TEO® – TRANSANAL ENDOSCOPIC OPERATIONS
Minimally Invasive Transanal Full Thickness Resection of Early Rectal Tumors

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1.0 Epidemiology

1.1 Adenoma-Carcinoma Sequence

The pathogenesis of colorectal carcinoma has been relatively well investigated. The adenoma-carcinoma sequence, called also the Vogelstein hypothesis, forms the basis for our current understanding of colorectal carcinogenesis. Building upon previously known macroscopic and microscopic observations, Vogelstein and Fearon advanced a molecular concept in 1988 that explained the process of colon carcinogenesis at a molecular genetic level\(^1\). According to this concept, colon carcinoma is the result of a series of somatic mutations that block or activate certain intracellular signal pathways. By identifying the specific changes that take place at different stages in the evolution of colorectal carcinoma (normal mucosa – early adenoma – intermediate adenoma – large adenoma – carcinoma), it was possible to determine the temporal sequence of the mutations that culminate in invasive cancer.

Besides genetic changes in cells, recent studies have shown that the ability of tumor cells to adapt to the extracellular milieu is of key importance in the origination and growth of tumors. For example, it has been found that dedifferentiated cells possessing the malignant properties of invasion and migration are particularly abundant in the transition zone from normal epithelium to tumor tissue\(^2\).

1.2 Incidence and Prognosis

Approximately 60,000 new cases of colorectal cancer are diagnosed in Germany each year. The annual death toll is approximately 30,000, and the incidence is rising\(^3\). Based on representative surveys, rectal cancers account for approximately 35% of the total incidence of colorectal carcinoma – a percentage that has remained stable over the years. Approximately 25–29% of rectal carcinomas are at UICC* stage I when diagnosed. T1 carcinomas account for approximately one-third of UICC I cases, with low-risk T1 tumors comprising about 75% of T1 carcinomas in general\(^4\).

\(^{1}\) Union Internationale Contre le Cancer (UICC)
Rectal carcinoma has a relatively good long-term oncologic prognosis following primary treatment with curative intent. The disease-free 5-year survival rate is 73% in all patients with UICC stage I–III tumors. The disease-free 5-year survival rate is highly stage-dependent, however, with respective figures of 82%, 76% and 61% for stage I, II and III lesions.

Despite the relative good prognosis compared with other solid tumors, these survival rates can be substantially improved. In the United States, where epidemiologic conditions are comparable to those in Germany, it has been possible to lower the mortality rate to approximately 30% in recent years.

Besides improvements in surgical techniques, (neo)adjuvant therapies, and the more active treatment of recurrent and metastatic disease, the improved prognosis of colorectal tumors is most likely a result of earlier detection. It is hoped that colorectal tumors in the German population will be diagnosed and treated at an earlier stage than has traditionally been the case, but unfortunately the public campaign for screening colonoscopy has not significantly altered the stage distribution of treated rectal cancers (Table 1). This is due mainly to a lack of acceptance of colorectal cancer screening among the target population.

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(Institute for Quality Assurance in Operative Medicine GmbH, Otto von Guericke University, Magdeburg, Germany. H. Ptok, personal communication)
2.0 Indications

2.1 Differentiation between Adenoma and Carcinoma

The diagnosis and treatment of rectal tumors are more closely interrelated than in most other clinical scenarios. This is because the adenoma-carcinoma sequence represents a virtual continuum from adenomatous lesions to various degrees of dysplasia and finally to invasive cancer. As a result, preoperative diagnosis is particularly important in planning and carrying out the local excision of a rectal tumor. Gross evaluation of the lesion by an experienced endoscopist and clinical evaluation by digital rectal examination (Mason clinical staging) continue to be reliable and proven criteria.

By definition, invasive cancer is present only if the adenomatous lesion has infiltrated the muscularis propria layer of the mucosa. This question can be definitively answered only by a complete histopathologic workup of the entire tumor. Thus, the complete removal of a tumor by excisional biopsy is both a diagnostic and therapeutic necessity. Determining the depth of tumor penetration with endorectal ultrasound has assumed a particularly important role in the preoperative diagnosis of rectal tumors. While endorectal ultrasound cannot supply a direct histologic diagnosis, it can predict local tumor resectability with a very high degree of confidence.

2.2 Local Staging

Besides efforts to make a benign-malignant differentiation, patient selection and planning for the local excision of a rectal tumor require an accurate preoperative assessment of local tumor extent. This includes determining the distance of the upper and lower tumor margins from the anocutaneous line, the distance of the tumor from the pectinate line (measured by rigid rectoscopy), the degree of circumferential wall involvement, and the degree of stenosis.

Local staging by endorectal ultrasound should be an essential prelude to the local excision of rectal tumors. Endorectal probes are available from numerous ultrasound manufacturers. Highly experienced examiners can achieve well above 90% accuracy in the T-staging of rectal tumors, depending on the tumor stage. However, if we look at the published results of uni- and multicenter studies of endosonographic staging in large groups of patients, we find an overall agreement of 65–70% between sonography and histology in the T-staging of these tumors. T3 tumors show the highest agreement (73–86%), T4 tumors the lowest (31–44%). T1 tumors, which are of greatest interest here, are correctly staged in 50–59% of cases.

Lymph node evaluation with endorectal ultrasound continues to pose a methodologic problem. While it is possible to measure the size of activated lymph nodes, we are still unable to determine whether lymph node enlargement is due to nonspecific activation or tumor infiltration.

Magnetic resonance imaging (MRI) is assuming an increasing role in the pretherapeutic diagnosis of rectal carcinoma. This modality appears to be particularly useful in evaluating the potential circumferential resection...
margins for locally advanced tumors. Based on current data including meta-analyses, MRI is as accurate as endosonography in differentiating between T1 tumors (confined to the mucosa and submucosa) and T2 tumors (invasion of the muscularis propria)\textsuperscript{15,16}.

### 2.3 Indications for Local Procedures

There is no question that adenomatous tumors of the rectum should be completely removed, both to permit a definitive diagnosis and to prevent the development of rectal carcinoma. In the case of rectal carcinoma, all local therapeutic procedures should be measured against the oncologic standard of total mesorectal excision. According to histopathologic studies, only T1(m) rectal carcinomas of the low-risk histologic type (G1–G2, no lymphatic invasion) are suitable for curative local excision\textsuperscript{17–11}. Additional criteria that should be considered for a possible local excision are tumor size (3 cm) and gross tumor morphology (polypoid, nonulcerated)\textsuperscript{8, 9, 19, 23, 24}. Local excision is an adequate oncologic treatment for these lesions, as many authors have been able to confirm based on clinical experience\textsuperscript{25}. In recent years, several reviews have shown that the risk of lymph node metastasis from various gastrointestinal tumors including rectal carcinoma is markedly increased if depth of infiltration reaches only as far as the lamina submucosa. In view of this finding, even T1 carcinomas now mandate a differentiated evaluation. Oncological follow-up resection should be offered to patients with sm2 infiltration and recommended to those with sm3 infiltration because these cases were found to have an elevated risk of lymph node metastasis ranging above 20%, even in well-differentiated carcinoma. (Reference: Br J Surg. 2008 Apr; 95(4):409-23. Management of early rectal cancer. Tytherleigh MG, Warren BF, Mortensen NJ.).

If the definitive workup of the surgical specimen indicates a high-risk histologic type and/or stage T2 disease or higher, it is necessary to proceed with a radical procedure consisting of abdominoperineal excision of the rectum (APER) or a low anterior rectal resection. Aside from oncologic requirements, however, factors such as age, comorbidity, and tolerance for loss of anal continence should also be considered in formulating an individual treatment plan. The surgical mortality associated with abdominoperineal excision or low anterior resection is comparable to that of a T1 low-risk carcinoma that has already undergone nodal metastasis (approximately 3–7%). Thus, in cases where a local R0 resection is technically feasible for a T1 low-risk carcinoma, it is important that these risks be individually considered in every patient.

Another key consideration is the fact that a local recurrence develops in up to 20% of cases following the local R0 resection of a T1 low-risk carcinoma with curative intent\textsuperscript{6, 8, 23, 26, 27, 28}. This underscores the need for close-interval follow-ups in these patients. When local recurrences are detected in time, they can be adequately resected with a favorable overall prognosis\textsuperscript{22, 29, 30}. This also applies to reexcisions in cases where the postoperative histologic workup reveals a less favorable tumor stage than was indicated by preoperative diagnosis.
Numerous individual case reports have been published on T2 and T3 tumors in patients who, for various reasons, were not managed by radical surgery. There have been increasing reports in recent years on acceptable oncologic results of neoadjuvant and adjuvant radiochemotherapeutic regimens combined with local excision\textsuperscript{24, 31–39}. It is also interesting to consider studies on the risk of residual lymph node metastasis in patients with ypT0 and ypT1 tumors following neoadjuvant radiochemotherapy\textsuperscript{40–42}. An initial randomized prospective study in a very limited number of patients has documented identical long-term results in cases where neoadjuvant radiochemotherapy was followed by laparoscopic or transanal endoscopic resection.\textsuperscript{43} While these treatment concepts would expand the indications for transanal endoscopic operations (TEO\textsuperscript{®}), they have not yet been established as standard regimens and require further evaluation.

### 2.4 Comparison of Local Procedures

The local excision of rectal tumors has a long tradition. The low extrarectal approaches described by Mason (anterolateral) and Kraska (posterior) are of purely historical interest today. Various self-retaining retractors (Parks, etc.) are available for transanal procedures that afford a satisfactory view of the rectal wall, especially in the lower third of the rectum.

During the 1980s, Prof. Gerhard Buess developed a technique for full-thickness wall resection using an operating rectoscope and a specially modified instrument set\textsuperscript{44}.

The TEO\textsuperscript{®} set manufactured by KARL STORZ was designed with the goal of utilizing as many existing standard instruments for laparoscopic surgery as possible while also combining the advantages of well-established endoscopic techniques. A particular benefit is that surgeons already experienced in laparoscopic techniques can apply their experience to TEO\textsuperscript{®}. Another advantage of the TEO\textsuperscript{®} set is cost, as it eliminates some unnecessary additional acquisitions.

The advantage of endoscopic local excision over traditional procedures lies in the high precision of the resection, which is essential for a good long-term oncologic outcome.

### Summary:

The transanal endoscopic operation (TEO\textsuperscript{®}) is appropriate for rectal tumors that:

- are not accessible to endoscopic mucosal resection or submucosal dissection,
- have not infiltrated the muscularis propria or metastasized to lymph nodes,
- are rectoscopically accessible and are at least 2 cm from the pectinate line,
- are not classified as high-risk cancers by biopsy.
3.0 Instrumentation

Operating rectoscopes are available in lengths of 7.5 cm, 15 cm or 20 cm to provide access for different tumor locations (Fig. 1). They are 40 mm in diameter and can be secured to the operating table with an articulated support arm.

The rectoscope is used with a 5-mm HOPKINS® rod-lens telescope that offers a 30° viewing angle (Figs. 2a, b). The telescope fits into a special guide channel and is connected to a camera system and also to a cold light source by fiberoptic light cable.
The working attachment is equipped with a Luer lock connector for CO₂ insufflation of the surgical site. In addition, there is a separate connector that may be used for cleaning the scope (Fig. 3).

The operating rectoscope has a total of three working channels: two for instruments 5 mm in diameter, and one for instruments up to 12 mm in diameter (Fig. 4a).

Each of the working channels has an inner self-sealing silicone-leaflet valve that reduces intraoperative gas loss (e.g., during instrument changes) to a minimum (Figs. 4a, b).

The ergonomic handle features an integrated connector for smoke evacuation. Via the KS Lock quick-release coupling, the handle can be easily attached to the KARL STORZ holding system (Fig. 4c).

LUER lock connectors for telescope cleaning and CO₂ insufflation.

Working attachment with three working channels.

Telescope with integrated cleaning channel located above, and separate insufflation channel in lateral position. Minimal gas loss owing to self-sealing leaflet valves which close while instruments are changed.

Reinforced mounting element for attachment to a holding system and connector for smoke evacuation.

More detailed information on the operating instruments can be found at the addendum section of this booklet.
4.0 Preoperative Preparations

4.1 Patient Positioning

Positioning for TEO® requires considerable care and experience to obtain adequate exposure of the operative area and avoid positioning-related complications. Tumor location will determine the optimum patient position (see Local Staging), as the goal is to place the center of the tumor in a deposition position (Fig. 5).

Accordingly, four different positions are available:

**Traditional lithotomy position (Fig. 6).** This position, used for posterior lesions, is most advantageous from an anesthesiologic standpoint as it allows the patient to remain in the same position after endotracheal intubation and also allows for all other types of anesthetic procedure. The legs should be abducted and flexed past 90° at the hips, if possible, to provide optimum exposure of the perianal region and create sufficient space for instrument manipulations.
Modified prone position (Fig. 7) with the legs abducted and flexed at the hips. The anesthesiologist should be consulted to ensure that the thoracic cage and abdominal wall will have sufficient mechanical clearance for ventilation, possibly by positioning the patient on a box frame. The degree of upper-body downward tilt that can be achieved depends on the patient’s individual body habitus and circulatory status.

Right or left lateral decubitus position (Fig. 8), also with the legs abducted and flexed at the hips. The upper leg is secured to a contoured rest on the anterior side of the operating table while the lower leg is placed on the leg rest of the operating table, which is angled forward beneath the hip.

Sufficient padding should always be provided to maintain a stable position during the operation and prevent neurovascular injuries. It is extremely difficult to make position adjustments once the operation has begun.
4.2 Anesthesia

In principle, the procedure can be performed under general endotracheal anesthesia or epidural anesthesia. Details should be tailored to the individual patient and discussed with the anesthesiologist, taking into account the expected duration of the operation and the patient position.

4.3 Sphincter Dilation

The anal sphincter is carefully dilated to three fingerwidths (Fig. 9) at the start of the procedure. This will help prevent mucosal lesions from movement of the operating rectoscope.
5.0 Steps in the Operation

5.1 Insertion of the Operating Rectoscope

Perianal skin preparation and sterile draping follow the same protocol as in other types of proctologic surgery. The operating rectoscope with obturator in place is inserted into the rectum with copious lubricant and is fastened to the support arm attached to the operating table (Figs. 10a–e). First, the surgeon must choose either the short tube or one of the two longer tubes, depending on the height of the tumor above the anal canal. In general, the shorter tube is used preferably because it provides for a slightly greater freedom of maneuverability for the instruments, but one of the longer tubes is needed to treat findings located more than 7 cm or 15 cm above the anus, respectively.
The standard protocols used in laparoscopic surgery are followed in connecting the lines for \( \text{CO}_2 \) gas insufflation, irrigation, illumination, video monitoring, and instrument placement in the working channels of the rectoscope (Fig. 11). The video monitor is placed to the right or left of the patient in a favorable ergonomic position that is within easy view of the surgeon (Fig. 12). As in all endoscopic procedures, the video monitor and operative field should be approximately along the same line of sight from the surgeon’s perspective.

5.2 Visualization of the Operative Site

The rectoscope should be optimally positioned in relation to the operative site at the start of the procedure. The tube position will have to be intermittently readjusted during the course of the operation to achieve an optimum working position, because mechanical and anatomical constraints will limit instrument maneuvers to a range of action that is smaller than the total field of view. It is essential, however, to make certain at the start of the procedure that the entire tumor is accessible through the operating rectoscope. For lesions that cover an extensive area, the rectoscope may have to be moved frequently to maintain sufficient access.
5.3 Introduction of the Instruments

The operating rectoscope has multiple ports that will accommodate three instruments in addition to the telescope. It may be most convenient for the right-handed surgeon to use an atraumatic grasping forceps in the left port, and the current working instrument – initially a monopolar needle electrode – in the right port. The lower, central port is occupied by the coagulation-suction tube. As the operation proceeds, additional necessary operating instruments, such as needle holders, clip appliers, and scissors are introduced through the right entry port (Fig. 13).

The coagulation-suction tube has a downward curve at its proximal and distal ends. It should be withdrawn from the operating rectoscope when not in use – not just from the visual field but all the way to its distal curve to avoid interference with the other two instruments.

5.4 Equipment Settings

The equipment settings necessary for transanal endoscopic operations (TEO®) are basically the same as those used in laparoscopy. The insufflator unit may be set at maximum capacity for CO₂ gas flow. The connectors are a limiting factor in this regard, and a setting of 8 L/min should be adequate (Fig. 14).

As far as the gas pressure settings are concerned, we recommend an initial pressure setting of 14 mmHg on the insufflator. This initial setting may be increased to 18 mmHg, if necessary. This should be discussed beforehand with the anesthesiologist. Hyoscine butylbromide (Buscopan®) may be administered as needed to facilitate exposure of the operative site.

The light intensity is adjusted to provide the desired result. While the intensity should initially be set to approximately 50% of maximum to avoid glare, it may be necessary to readjust the intensity during the course of the procedure (Fig. 15).

The settings on the high-frequency generator should be guided according to the manufacturer’s recommendations for monopolar cutting.
5.5 Marking the Resection Plane

To satisfy oncologic requirements, the proposed plane of the resection should be marked in a way that encompasses the tumor with at least a 10-mm safety margin. We mark the resection plane by making a series of coagulation points with the monopolar needle electrode, spacing the points at intervals of approximately 8–15 mm around the tumor (Fig. 17). This step also confirms that there will be sufficient access to all portions of the bowel wall.

As is generally the case in transanal endoscopic procedures, it may be helpful at this stage to grasp the rectal wall with the forceps (left hand) and position it so that it can be reached comfortably with the operating instrument in the right hand (in this case the needle electrode), reapplying the forceps as the coagulation proceeds. Of course, the no-touch rule should be rigorously observed with respect to the tumor itself.

Videoendoscopic view of the tumor.

The plane of the resection is marked with coagulation points.
5.6 Full-Thickness Wall Resection

Starting in the right anterior quadrant (from the surgeon’s perspective), the rectal wall is incised to the perirectal fat with the monopolar needle electrode. An ultrasonic dissector may also be used, especially one with a curved scissor design. A key advantage of the TEO® method is that it provides excellent visibility enabling the surgeon to proceed in layers. After completing the initial cut through the rectal wall, the surgeon can grasp the cut edge of the wall with the forceps and then proceed with accurate, stepwise division of the rectal wall along the preplaced coagulation marks. The plane between the muscularis propria and perirectal fat can also be developed bluntly with an offset suction tip or gauze pledget, for example (Figs. 18, 19).

When resecting an anterior tumor located approximately 9 cm from the anal verge, the surgeon may inadvertently open the peritoneum allowing CO₂ to enter the peritoneal cavity (capnoperitoneum). While this is not considered a complication, it does require attention by the anesthesiologist and may require separate suture closure of the peritoneum in addition to the rectal wall.
5.7 Hemostasis

Various hemostasis techniques are available in transanal endoscopic operations. When vessels are encountered during the layer-by-layer dissection, they can be grasped with the forceps and prophylactically cauterized by applying a coagulation current through the forceps. For this purpose the high frequency cord is removed from the HF needle electrode and connected to the grasping forceps. Profuse bleeding can be controlled with the forceps or, more easily, with the coagulation-suction tube. This is done by pressing the suction tube gently against the bleeding lesion for some preliminary hemostasis and then delivering current to the insulated metal tip of the suction tube (after moving the high frequency cord to the suction). The current should be applied for an adequate length of time and should be left on until the suction tip has separated from the tissue.

5.8 Removing the Surgical Specimen

Once the specimen has been completely resected from the rectal wall and separated from the underlying tissue, the working attachment of the resectoscope must be withdrawn to allow specimen retrieval. To facilitate histologic assessment, the specimen is spread open and mounted on a cork or plastic board with pins so that it can be photographed, fixed, and sent for histopathologic examination (Fig. 21).
5.9 Suture Techniques

The surgical defect in the rectal wall is closed with continuous all-layer inverting sutures using a 3-0 absorbable monofilament material. The sutures should encompass a generous amount of tissue. With defects that exceed 40% of the bowel circumference, the closure should be supported with an initial craniocaudal Z-plasty that transforms the typically round defect into a smaller transverse gap. This opening is then closed with a continuous suture line starting on the right side. While knots can be used in principle, the progress of the operation is greatly facilitated by placing clips on the suture ends. The goal is to fully reapproximate the ends of the bowel wall without narrowing the lumen. It is not absolutely necessary to obtain a watertight closure of the defect. Postoperative packing is unnecessary.
6.0 Postoperative Care

6.1 Early Postoperative Care
As in classic rectal resections, the resumption of an oral diet is initiated on the third postoperative day. Before the patient is discharged on about the fourth or fifth postoperative day, the wound should be scrutinized with a flexible endoscope, giving particular attention to any impending signs of postoperative bleeding. Suture dehiscence is not uncommon after TEO®, especially in cases where the suture extends close to the pectinate line. Most dehiscences will resolve without significant clinical sequelae.

6.2 Oncologic Follow-Up
Oncologic follow-up is based on the recommendations of the corresponding professional societies. The standard recommendation for patients with benign lesions and clear margins is endoscopic follow-up at 6 months followed by colonoscopy every 3 years. Patients with low-risk carcinomas initially require endoscopic examinations every 3 months, preferably including endosonography, as part of their standard follow-up protocol. It is also advisable to extend the follow-up period past the usual 5 years.

If postoperative histology indicates a T2 carcinoma, high-risk carcinoma, or R1 margins, the patient should be referred for a conventional reexcision.
References


Instrument Set for TEO®
Transanal Endoscopic Operations

TEO® – Video Operating Rectoscope
Operating Instruments and Rectoscope Holder

IMAGE1 S Camera System and IMAGE1 S Camera Heads, Monitors

KARL STORZ Cold Light Fountains,
ENDOFLATOR® 40 SCB, HAMOU® ENDOMAT®
KARL STORZ AIDA® – Digital Archiving of Still Images, Video Sequences and Audio Files
Recommended Configuration
for TEO® – Transanal Endoscopic Operations

Telescope for Operating Rectoscope, working length 7.5 cm and 15 cm
24941 BA HOPKINS® Forward-Oblique Telescope 30°, angled eyepiece, diameter 5 mm, length 21 cm, autoclavable, fiber optic light transmission incorporated, color code: red

Operating Rectoscope, working length 7.5 cm
24942 TK TEO® Operating Rectoscope Tube, outer diameter 40 mm, working length 7.5 cm, with handle for holding system, LUER-Lock connector for vapor evacuation
24942 OK TEO® Obturator, for use with Operating Rectoscope Tube 24942 TK
24942 AK TEO® Working Attachment, with attachment for Telescope 24941 BA, 2 channels for instrument size 5 mm and 1 channel for instruments up to size 12 mm, automatic sealing with silicone leaflet valve, LUER-Lock connector for insufflation, for use with 24942 TK

Operating Rectoscope, working length 15 cm
24942 T TEO® Operating Rectoscope Tube, outer diameter 40 mm, working length 15 cm, with handle for holding system, LUER-Lock connector for vapor evacuation
24942 O TEO® Obturator, for use with Operating Rectoscope Tube 24942 T
24942 A TEO® Working Attachment, with attachment for Telescope 24941 BA, 2 channels for instrument size 5 mm and 1 channel for instruments up to size 12 mm, automatic sealing with silicone leaflet valve, LUER-Lock connector for insufflation, for use with 24942 T

Telescope for Operating Rectoscope, working length 20 cm
24941 BAL HOPKINS® Forward-Oblique Telescope 30°, angled eyepiece, diameter 5 mm, length 28 cm, autoclavable, fiber optic light transmission incorporated, color code: red

Operating Rectoscope, working length 20 cm
24942 TL TEO® Operating Rectoscope Tube, outer diameter 40 mm, working length 20 cm, with handle for holding system, LUER-Lock connector for vapor evacuation
24942 OL TEO® Obturator, for use with Operating Rectoscope Tube 24942 TL
24942 AL TEO® Working Attachment, with attachment for HOPKINS® Telescope 24941 BAL, 2 channels for instrument size 5 mm and 1 channel for instruments up to size 12 mm, automatic sealing with silicone leaflet valve, LUER-Lock adaptor for insufflation, for use with Operating Rectoscope Tube 24942 TL

28272 RLD Holding System, for use with Operating Rectoscope Tubes

Operating Instruments
25352 ME CLICKLINE Dissecting and Grasping Forceps, rotating, dismantling, with connector pin for unipolar coagulation, with LUER-Lock irrigation connector for cleaning, single action jaws, width of jaws 4.8 mm, jaws offset downwards, multiple teeth, atraumatic, size 5 mm, length 36 cm
25352 MG CLICKLINE Dissecting and Grasping Forceps, rotating, dismantling, with connector pin for unipolar coagulation, with LUER-Lock irrigation connector for cleaning, single action jaws, jaws offset downwards, 2 x 4 teeth, size 5 mm, length 36 cm
25351 PMR CLICKLINE Universal Grasping Forceps "PARROT-JAW™", rotating, dismantling, with connector pin for unipolar coagulation, single action jaws, jaws offset downward, curved to the right, size 5 mm, length 36 cm
25361 ML CLICKLINE KELLY Universal Grasping Forceps, rotating, dismantling, without connector pin for unipolar coagulation, single action jaws, jaws offset downward, long, size 5 mm, length 36 cm
25351 MAR CLICKLINE Scissors, rotating, dismantling, with connector pin for unipolar coagulation, single action jaws, jaws offset downward, curved to the right, size 5 mm, length 36 cm
25370 SC Coagulating Suction Tube, insulated sheath, proximally and distally bent downwards, punctual, size 5 mm, length 33 cm
25370 DM Coagulating Suction Tube, insulated sheath, proximally and distally bent downwards, needle-shaped, size 5 mm, length 33 cm
2x 30804 Handle with Trumpet Valve, for suction or irrigation, autoclavable, for use with 5 mm coagulating suction tubes and 5 mm suction and irrigation tubes
37370 SC Coagulating and Dissecting Electrode, with suction channel, insulated sheath, with connector pin for unipolar coagulation, size 5 mm, length 36 cm, for use with trocars size 6 mm
30805 Handle with Two-Way Stopcock, for suction and irrigation, autoclavable, for use with suction and irrigation tubes size 5 mm
Operating Rectoscopes
for TEO® – Transanal Endoscopic Operations

TEO® (Transanal Endoscopic Operations) combines the minimal invasiveness of an intervention via a natural orifice (NOTES) with the precision of resection under visual control. A wide lumen rectoscope enables precise guidance of surgical instruments under visual control.

Special Features:
- Available in lengths of 7.5, 15 and 20 cm
- Compatible with various working attachments
- Integrated telescope irrigation
- Connectors optimized for insufflation and vapor evacuation
- Can be used with instruments 3 – 14 mm

It is recommended to check the suitability of the product for the intended procedure prior to use.
**Operating Rectoscope**

for TEO® – Transanal Endoscopic Operations – Working length 7.5 cm

**TEO® Operating Rectoscope**

24941 BA  **HOPKINS® Forward-Oblique Telescope 30°**, angled eyepiece, diameter 5 mm, length 21 cm, **autoclavable**, fiber optic light transmission incorporated, color code: red

**Working length 7.5 cm:**

24942 TK  **TEO® Operating Rectoscope Tube**, outer diameter 40 mm, working length 7.5 cm, with handle for holding system, LUER-Lock connector for vapor evacuation

24942 OK  **TEO® Obturator**, for use with Operating Rectoscope Tube 24942 TK

24942 AK  **TEO® Working Attachment**, with attachment for Telescope 24941 BA, 2 channels for instrument size 5 mm and 1 channel for instruments up to size 12 mm, automatic sealing with silicone leaflet valve, LUER-Lock connector for insufflation, for use with 24942 TK
Operating Rectoscope

for TEO® – Transanal Endoscopic Operations – Working length 15 cm

**TEO® Operating Rectoscope**

- **24941 BA**  HOPKINS® Forward-Oblique Telescope 30°, angled eyepiece, diameter 5 mm, length 21 cm, autoclavable, fiber optic light transmission incorporated, color code: red

**Working length 15 cm:**

- **24942 T**  TEO® Operating Rectoscope Tube, outer diameter 40 mm, working length 15 cm, with handle for holding system, Luer-Lock connector for vapor evacuation
- **24942 O**  TEO® Obturator, for use with Operating Rectoscope Tube 24942 T
- **24942 A**  TEO® Working Attachment, with attachment for Telescope 24941 BA, 2 channels for instrument size 5 mm and 1 channel for instruments up to size 12 mm, automatic sealing with silicone leaflet valve, Luer-Lock connector for insufflation, for use with 24942 T
Operating Rectoscope

for TEO® – Transanal Endoscopic Operations – Working length 20 cm

**TEO® Operating Rectoscope**

24941 BAL  **HOPKINS® Forward-Oblique Telescope 30°**, angled eyepiece, diameter 5 mm, length 28 cm, **autoclavable**, fiber optic light transmission incorporated, color code: red

**Working length 20 cm:**

24942 TL  **TEO® Operating Rectoscope Tube**, outer diameter 40 mm, working length 20 cm, with handle for holding system, Luer-Lock connector for vapor evacuation

24942 OL  **TEO® Obturator**, for use with Operating Rectoscope Tube 24942 TL

24942 AL  **TEO® Working Attachment**, with attachment for HOPKINS® Telescope 24941 BAL, 2 channels for instrument size 5 mm and 1 channel for instruments up to size 12 mm, automatic sealing with silicone leaflet valve, Luer-Lock adaptor for insufflation, for use with Operating Rectoscope Tube 24942 TL
Accessories and Replacement Parts for Operating Rectoscopes

for TEO® – Transanal Endoscopic Operations

**Accessories:**

- **24941 F**  
  Sealing Cap, fenestrated, with holder for Fiber Optic Light Carrier 24960 B

- **24960 B**  
  Fiber Optic Light Carrier, with connector pin for fiber optic light cable, with sealing ring

- **24941 I**  
  Insertion Aid, for placement of inner silicone leaflet valves

- **24941 AKF**  
  TEO® Working Attachment, for use with 10 mm HOPKINS® telescopes, 2 channels for instruments up to size 14 mm and 1 channel for instruments up to size 10 mm, automatic sealing with silicone leaflet valve, for use with TEO® Operating Rectoscope Tube 24941 T/TK and 24942 T/TK

**Replacement parts:**

- **24941 SP**  
  Sealing Set, for TEO® Working Attachments 24941 A/AK and 24942 A/AK/AL

- **24941 SPF**  
  Sealing Set, for TEO® Working Attachment 24941 AKF
Operating Instruments
for TEO® – Transanal Endoscopic Operations

CLICKLINE Dissecting and Grasping Forceps, rotational, can be dismantled, with and without connector pin for unipolar coagulation

Size 5 mm

<table>
<thead>
<tr>
<th>Length</th>
<th>Handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 cm</td>
<td>33151</td>
</tr>
<tr>
<td>43 cm</td>
<td>33151</td>
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</table>

CLICKLINE Dissecting and Grasping Forceps, rotational, can be dismantled, with and without connector pin for unipolar coagulation

Single-action jaws

<table>
<thead>
<tr>
<th>Working Insert</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>25310 ME</td>
<td>25351 ME 25352 ME 25353 ME 25361 ME 25362 ME 25363 ME</td>
</tr>
<tr>
<td>25410 ME</td>
<td>25451 ME 25452 ME 25453 ME 25461 ME 25462 ME 25463 ME</td>
</tr>
</tbody>
</table>

CLICKLINE Dissecting and Grasping Forceps, jaws offset downwards, multiple teeth, atraumatic, width of jaws 4.8 mm

<table>
<thead>
<tr>
<th>Working Insert</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>25310 DF</td>
<td>25351 DF 25352 DF 25353 DF 25361 DF 25362 DF 25363 DF</td>
</tr>
<tr>
<td>25410 DF</td>
<td>25451 DF 25452 DF 25453 DF 25461 DF 25462 DF 25463 DF</td>
</tr>
</tbody>
</table>

CLICKLINE Universal Grasping Forceps, atraumatic, jaws offset downwards

<table>
<thead>
<tr>
<th>Working Insert</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>25310 MG</td>
<td>25351 MG 25352 MG 25353 MG 25361 MG 25362 MG 25363 MG</td>
</tr>
<tr>
<td>25410 MG</td>
<td>25451 MG 25452 MG 25453 MG 25461 MG 25462 MG 25463 MG</td>
</tr>
</tbody>
</table>

CLICKLINE Dissecting and Grasping Forceps, jaws offset downwards, 2x 4 teeth

<table>
<thead>
<tr>
<th>Working Insert</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>25310 PMR</td>
<td>25351 PMR 25352 PMR 25353 PMR 25361 PMR 25362 PMR 25363 PMR</td>
</tr>
<tr>
<td>25410 PMR</td>
<td>25451 PMR 25452 PMR 25453 PMR 25461 PMR 25462 PMR 25463 PMR</td>
</tr>
</tbody>
</table>

CLICKLINE Universal Grasping Forceps PARROT JAW®, jaws offset downwards, curved right

<table>
<thead>
<tr>
<th>Working Insert</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>25310 PML</td>
<td>25351 PML 25352 PML 25353 PML 25361 PML 25362 PML 25363 PML</td>
</tr>
<tr>
<td>25410 PML</td>
<td>25451 PML 25452 PML 25453 PML 25461 PML 25462 PML 25463 PML</td>
</tr>
</tbody>
</table>

CLICKLINE Universal Grasping Forceps PARROT JAW®, jaws offset downwards, curved left

<table>
<thead>
<tr>
<th>Working Insert</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>25310 ML</td>
<td>25351 ML 25352 ML 25353 ML 25361 ML 25362 ML 25363 ML</td>
</tr>
<tr>
<td>25410 ML</td>
<td>25451 ML 25452 ML 25453 ML 25461 ML 25462 ML 25463 ML</td>
</tr>
</tbody>
</table>

CLICKLINE KELLY Universal Grasping Forceps, long, jaws offset downwards
## Operating Instruments

for TEO® – Transanal Endoscopic Operations

CLICKLINE Scissors, rotational, can be dismantled, with and without connector pin for unipolar coagulation

### Size 5 mm

<table>
<thead>
<tr>
<th>Length</th>
<th>Handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 cm</td>
<td>33151</td>
</tr>
<tr>
<td>43 cm</td>
<td></td>
</tr>
</tbody>
</table>

![Clickline Scissors](image)

### Single-action jaws

offset downwards

<table>
<thead>
<tr>
<th>Working Insert</th>
<th>Complete Instrument</th>
</tr>
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<tbody>
<tr>
<td>25310 MT</td>
<td>25351 MT</td>
</tr>
<tr>
<td>25410 MT</td>
<td>25451 MT</td>
</tr>
</tbody>
</table>

CLICKLINE Scissors, jaws offset downwards, serrated

<table>
<thead>
<tr>
<th>Working Insert</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>25310 MAR</td>
<td>25351 MAR</td>
</tr>
<tr>
<td>25410 MAR</td>
<td>25451 MAR</td>
</tr>
</tbody>
</table>

CLICKLINE Scissors, jaws offset downwards, curved right

<table>
<thead>
<tr>
<th>Working Insert</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>25310 MAL</td>
<td>25351 MAL</td>
</tr>
<tr>
<td>25410 MAL</td>
<td>25451 MAL</td>
</tr>
</tbody>
</table>

CLICKLINE Scissors, jaws offset downwards, curved left

![Clickline Scissors](image)
Operating Instruments
for TEO® – Transanal Endoscopic Operations
Coagulation Suction Tubes, Dissection Hook Electrodes

<table>
<thead>
<tr>
<th>Length</th>
<th>Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 cm</td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Distal End</th>
<th>Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 25370 DM   | Coagulation Suction Tube, proximally and distally bent downwards, needle-shaped |
| 25370 SC   | Coagulation Suction Tube, proximally and distally bent downwards |
| 30804      | Handle with Trumpet Valve, for suction or irrigation, autoclavable, for use with 5 mm coagulating suction tubes and 5 mm suction and irrigation tubes |
| 30805      | Handle with Two-Way Stopcock, for suction and irrigation, autoclavable, for use with suction and irrigation tubes size 5 mm |

<table>
<thead>
<tr>
<th>Length</th>
<th>Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 cm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distal End</th>
<th>Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 25370 KG   | Dissection Hook Electrode, proximally and distally bent downwards, needle-shaped |
| 25370 KGG  | Dissection Hook Electrode, distally bent downward, needle-shaped |
The ergonomic handle and the optimal distal curve of the needle holder ensures easier handling for suturing and grasping the needle, particularly in the narrow space between the tube and the suture line at the rectosigmoid transition to the rectal side walls.

The jaw profile offers a secure hold that makes it easier to grasp the needle.

**PD D. SCHUBERT, M.D.**
Head of Department, Klinikum Saarbrücken, Germany

### Operating Instruments

**KOH Macro Needle Holder, size 5 mm, dismantling, distally curved**, consisting of:
- **Handle**
- **Outer Sheath**

The reusable dismantling design offers the user the following benefits:
- Can be disassembled into two separate components
- Fully autoclavable
- Cleaning connector
- Choice of six different handles
- Jaws with tungsten carbide inserts
- User-friendly and ergonomic handling
Metal Handles

for KOH Macro Needle Holder, dismantling, distally curved

Handles, axial and pistol, with disengageable ratchet

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>30173 AR</td>
<td>Handle, axial, with disengageable ratchet, ratchet position right</td>
</tr>
<tr>
<td>30173 AL</td>
<td>Handle, axial, with disengageable ratchet, ratchet position left</td>
</tr>
<tr>
<td>30173 AO</td>
<td>Handle, axial, with disengageable ratchet, ratchet position on top</td>
</tr>
<tr>
<td>30173 PR</td>
<td>Handle, pistol-shaped, with disengageable ratchet, ratchet position right</td>
</tr>
<tr>
<td>30173 PL</td>
<td>Handle, pistol-shaped, with disengageable ratchet, ratchet position left</td>
</tr>
<tr>
<td>30173 PO</td>
<td>Handle, pistol-shaped, with disengageable ratchet, ratchet position on top</td>
</tr>
</tbody>
</table>
**Operating Instruments**

for **TEO® – Transanal Endoscopic Operations**

**KOH Macro Needle Holder, dismantling, distally curved**

---

**Size 5 mm**

Operating Instruments, **length 33 cm**, with axial handle for use with trocars size 6 mm

<table>
<thead>
<tr>
<th>Length</th>
<th>Handle</th>
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</thead>
<tbody>
<tr>
<td>33 cm</td>
<td>30173 AR</td>
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**Single action jaws**

<table>
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<tr>
<th>Working Insert</th>
<th>Complete Instrument</th>
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</thead>
<tbody>
<tr>
<td>25140</td>
<td>25140 AR</td>
</tr>
</tbody>
</table>

**Needle Holder**, distally curved, diameter 5 mm

---

**Operating Instruments**, **length 33 cm**, with pistol-shaped handle for use with trocars size 6 mm

<table>
<thead>
<tr>
<th>Length</th>
<th>Handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 cm</td>
<td>30173 PR</td>
</tr>
</tbody>
</table>

---

**Single action jaws**

<table>
<thead>
<tr>
<th>Working Insert</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>25140</td>
<td>25140 PR</td>
</tr>
</tbody>
</table>

**Needle Holder**, distally curved, diameter 5 mm
**Holding Systems, U-shaped**

for **TEO® – Transanal Endoscopic Operations**

**Special Features:**
- Simple, fast and accurate positioning
- All five joint functions can be fixed by means of a mechanical central clamp
- Variable height adjustment by using the socket
- Additional angle adjustment by using socket 28172 HR

- Sockets for use with European and United States standard rails of OR table
- Maintenance-free and autoclavable
- With quick release coupling KSLOCK

---

**28272 KLD**

**Holding System, U-shaped, autoclavable,**

with quick release coupling KSLOCK

including:

**Socket**, to clamp to the OR table, for European and US standard rails, also suitable for rails 25 x 10 up to 35 x 8 mm, with lateral clamp for height adjustment of the articulated stand

**Articulated Stand**, reinforced version, U-shaped, with one mechanical central clamp for all five joint functions, with quick release coupling KSLOCK (female)

**28272 RLD**

**Same,**

including:

**Rotation Socket**, to clamp to the OR table, for European and US standard rails, with lateral clamp for height and angle adjustment of the articulated stand
Holding Systems, U-shaped
for TEO® – Transanal Endoscopic Operations

28172 HK

28172 HK **Socket**, to clamp to the OR table, for European and US standard rails, also suitable for rails 25 x 10 up to 35 x 8 mm, lateral clamp for height adjustment of the articulated stand

28172 HR

28172 HR **Rotation Socket**, to clamp to the operating table, with one mounted Butterfly Nut 28172 HRS, for European and US standard rails, with lateral clamp for height and angle adjustment of the articulated stand

optional:

28272 UL

28272 UL **Clamping Jaw**, universal, clamping range 0 to 18 mm, with quick release coupling KSLOCK (male)
Mobile Equipment Cart

Monitor:
9627 NB  27" FULL HD Monitor

Camera System:
TC 200 DE  IMAGE1 S CONNECT, connect module
TC 300  IMAGE1 S H3-LINK, link module
TH 100  IMAGE1 S H3-Z
Three-Chip FULL HD Camera Head

Light Source:
20133101-1  XENON 300 SCB Cold Light Fountain
495 NCSC  Fiber Optic Light Cable

HF-Device:
20535201-125  AUTOCON® II 400
20017830  Two-Pedal Footswitch

Insufflation:
UI 400 S1  ENDOFLATOR® 40
UP 501 S3  S-PILOT™

Pump System:
26331101-1  HAMOU® ENDOMAT®

Equipment Cart:
UG 120  COR™ Equipment Cart, narrow, high
UG 500  Monitor Holder
UG 609  Bottle Holder, for CO₂-Bottles
29005 DFH  Foot-Pedal Holder, for Two- and Three-Pedal Footswitches
UG 310  Isolation Transformer, 200V–240V
UG 410  Earth Leakage Monitor, 200V–240V

Additional for documentation purposes:
WD 250  AIDA® with SmartScreen®
TC 009  USB Adaptor, for ACC 1 and ACC 2
**IMAGE1 S Camera System**

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

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

- Sustainable investment
- Compatible with all light sources

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

**Dashboard**

**Live menu**

**Intelligent icons**

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

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>Feature</th>
<th>TC 200EN*</th>
</tr>
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<tbody>
<tr>
<td>HD video outputs</td>
<td>2x DVI-D</td>
</tr>
<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>SCB interface</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>
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</table>

For use with IMAGE1 S

IMAGE1 S CONNECT Module TC 200EN

TC 300

TC 300* IMAGE1 S H3-LINK, link module, for use with IMAGE1 FULL HD three-chip camera heads, power supply 100–120 VAC/200–240 VAC, 50/60 Hz, for use with IMAGE1 S CONNECT TC 200EN including:
- Mains Cord, length 300 cm
- Link Cable, length 20 cm

Specifications:

<table>
<thead>
<tr>
<th>Feature</th>
<th>TC 300 (H3-Link)</th>
</tr>
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<tbody>
<tr>
<td>Camera System</td>
<td>TH 100, TH 101, TH 102, TH 103, TH 104, TH 106 (fully compatible with IMAGE1 S)</td>
</tr>
<tr>
<td>Supported camera heads/video endoscopes</td>
<td>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

**Specifications:**

<table>
<thead>
<tr>
<th>IMAGE1 FULL HD Camera Heads</th>
<th>IMAGE1 S H3-Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product no.</td>
<td>TH 100</td>
</tr>
<tr>
<td>Image sensor</td>
<td>3x 1/3&quot; CCD chip</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>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>
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<tr>
<td>Cable length</td>
<td>300 cm</td>
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</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

**Specifications:**

<table>
<thead>
<tr>
<th>IMAGE1 FULL HD Camera Heads</th>
<th>IMAGE1 S H3-ZA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product no.</td>
<td>TH 104</td>
</tr>
<tr>
<td>Image sensor</td>
<td>3x 1/3&quot; CCD chip</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>39 x 49 x 100 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>299 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>
Monitors

9619 NB

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

9826 NB

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

<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>
</tr>
<tr>
<td>Reaction time</td>
<td>5 ms</td>
<td>8 ms</td>
</tr>
<tr>
<td>Contrast ratio</td>
<td>700:1</td>
<td>1400:1</td>
</tr>
<tr>
<td>Mount</td>
<td>100 mm VESA</td>
<td>100 mm VESA</td>
</tr>
<tr>
<td>Weight</td>
<td>7.6 kg</td>
<td>7.7 kg</td>
</tr>
<tr>
<td>Rated power</td>
<td>28 W</td>
<td>72 W</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>0–40°C</td>
<td>5–35°C</td>
</tr>
<tr>
<td>Storage</td>
<td>-20–60°C</td>
<td>-20–60°C</td>
</tr>
<tr>
<td>Rel. humidity</td>
<td>max. 85%</td>
<td>max. 85%</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>469.5 x 416 x 75.5 mm</td>
<td>643 x 396 x 87 mm</td>
</tr>
<tr>
<td>Power supply</td>
<td>100–240 VAC</td>
<td>100–240 VAC</td>
</tr>
<tr>
<td>Certified to</td>
<td>EN 60601-1, protection class IPX0</td>
<td>EN 60601-1, UL 60601-1, MDD93/42/EEC, protection class IPX2</td>
</tr>
</tbody>
</table>

### Optional accessories:
- 9826 SF  Pedestal, for monitor 9826 NB
- 9626 SF  Pedestal, for monitor 9619 NB
Accessories for Video Documentation

495 NL  Fiber Optic Light Cable, with straight connector, diameter 3.5 mm, length 180 cm
495 NA  Same, length 230 cm
495 NAC Fiber Optic Light Cable, with straight connector, extremely heat-resistant, with safety lock, increased light transmission, diameter 3.5 mm, length 230 cm, can be used for ICG applications

Cold Light Fountain XENON 300 SCB

20133101-1 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
SCB Connecting Cord, 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 VCA/220–240 VAC, 50/60 Hz including:
Mains Cord
20133028 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.
**ENDOFLATOR® 40 with KARL STORZ SCB**

with High Flow Insufflation (40 l/min.)

*This product is marketed by mtp.*
For additional information, please apply to:

mtp medical technical promotion gmbh,
Take-Off Gewerbepark 46,
D-78579 Neuhausen ob Eck, Germany

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**HAMOU® ENDOMAT® with KARL STORZ SCB**

Suction and Irrigation System

*This product is marketed by mtp.*
For additional information, please apply to:

mtp medical technical promotion gmbh,
Take-Off Gewerbepark 46,
D-78579 Neuhausen ob Eck, Germany
Notes:
Notes: