VIDEO-ASSISTED ANAL FISTULA TREATMENT (VAAFT)

Pradeep CHOWBEY
Rajesh KHULLAR, Anil SHARMA
Vandana SONI, Manish BAIJAL
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Address for correspondence:
Dr. Anil Sharma MS (Bom), FICS, FRCS (Edin)
Max Institute of Minimal Access, Metabolic and Bariatric Surgery
Max Super Specialty Hospital – East Block 2,
Press Enclave Road, Saket, New Delhi – 110017 (India)
Phone (off): +91-999968200 / 99996628700, Fax: +91-11-66115585
E-mail: asharma736@yahoo.in / anil.sharma@maxhealthcare.com
Web: www.maxhealthcare.com
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Pradeep CHOWBEY,
Director

Rajesh KHULLAR
Consultant

Anil SHARMA
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Vandana SONI
Consultant

Manish BAIJAL
Consultant

Max Institute of Minimal Access, Metabolic and Bariatric Surgery
Max Super Specialty Hospital, New Delhi, India
Preface

It is a great pleasure for me to introduce this manual on the VAAFT technique, edited by Prof. Pradeep Chowbey, with whom I share a both cordial and professional relationship.

Fortunately, in the last few years, a variety of minimally-invasive techniques have been proposed in order to further improve the outcomes of surgery in the field of complex anal fistulas. Nowadays, less and less invasive techniques are employed to cure complex anal fistulas and recurrences, with increasingly widespread use of anal sphincter-saving techniques as method of first choice.

The main benefit that Video-Assisted Anal Fistula Treatment (VAAFT) possesses over the other techniques, is the direct vision. We all know that, even recently, many papers have been published about traditional techniques like lay open, seton placement, fistulctomy, etc., reporting on 30% of flatus incontinence, 4–5% soft stools and even solid stools, and that some patients are obliged to use a pad.

This is the right occasion to remember our patients suffering from anal fistulas. They are entrusted in our care and deserve to be treated as if they were our own children. Which technique would we want to be performed on them? Would we really want to run the risk of any kind of incontinence?

This fundamental idea was immediately understood by Professor Pradeep Chowbey and his staff. I met him for the first time in Santa Margherita Ligure, Italy, on the occasion of one of our international VAAFT courses, and straightaway, we both understood the importance of our mutual cooperation.

In 2011, I had the special honour to inaugurate Professor Chowbey’s prestigious Department of Proctology at the Max Institute, New Delhi. I have personally witnessed his high level of professionalism and advanced skills, not only in the field of bariatric surgery, but also in other surgical specialties.

In order to provide evidence, it is sufficient to read this manual and one will realize the true dimension of the outstanding work of Prof. Chowbey and his staff.

I also want to express my cordial gratitude to him and his staff for spreading the VAAFT technique all over India while taking care of their patients in the best possible way.

Sincere thanks also go to the members of Prof. Chowbey’s staff, Dr Sharma, Dr Soni, Dr Khullar and Dr Baijal. All our staff congratulates them for their valuable work and I personally wish them every future success.

Prof. Piercarlo Meinero
Acknowledgement

Grateful acknowledgement to Dr. Khoobsurat Najma, Medical Writer at Max Institute of Minimal Access, Metabolic and Bariatric Surgery, for conceptualizing, compiling and editing the scientific content of this manuscript.

The authors are thankful to Ms. Tripta Sharma, Mr. Anshul Chauhan, Mr Pankaj Gupta and Ms. Aenu Batra for technical assistance and secretarial support.

Please note:

Attached to the inside back cover is a DVD KS 774 titled “Video-Assisted Anal Fistula Treatment (VAAFT)”, produced by Prof. Pradeep Chowbey and collaborators.

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Introduction

An anal fistula is defined as a track lined with granulation tissue. The track connects a primary opening inside the anal canal to a secondary opening in the perianal skin. The overall prevalence of anal fistula is 8–10 cases per 100,000 individuals with a male:female ratio of 2:1. Anal fistula can have a primary etiology, resulting from an anorectal abscess or can develop secondary to trauma, tuberculosis, Crohn’s disease, anal fissures, certain infections (actinomycosis, chlamydia, HIV), carcinomas and exposure to radiation. Anorectal abscess can be complicated by anal fistula in about 25% of patients during the acute phase of sepsis or within 6 months thereafter.

Among the treatment options available for anal fistulae, there are both traditional and novel techniques. The traditional methods include fistulotomy (laying open of the track) and fistulectomy (excision of the entire track) for low fistulae. For high and complex fistulae, seton placement is traditionally the preferred treatment modality used to minimize incontinence. More complex surgical procedures in the form of local advancement flaps have met with moderate success. The newer treatment options include use of fibrin glue, bio-prosthetic plugs and ligation of intersphincteric fistula tract (LIFT). Traditional techniques including fistulectomy and use of cutting seton have been associated with incontinence, especially in patients who have had previous surgery. Mucosal advancement flaps are technically challenging and are found to have high rates of recurrence and postoperative incontinence. The LIFT procedure has proved to be associated with good healing rates. In recent years, a minimally invasive video-assisted technique has emerged using a specially designed fistuloscope. The Video-Assisted Anal Fistula Treatment (VAAFT) was developed by Professor P. Meinero in 2006. The technique involves the identification and secure internal closure of the internal fistula opening and visualization with cautery of the fistulous track using a specially designed fistuloscope. We adopted the technique in April 2011 in an effort to reduce postoperative morbidity and to enable our patients to benefit from the advantages of minimally invasive surgery. Between April 2011 and December 2012, VAAFT was performed in 416 patients at our Division of Proctology at the Max Institute of Minimal Access, Metabolic and Bariatric Surgery, New Delhi, India. The brochure reflects our experience with the new technique over this period.

Classification of Anal Fistulae

Various classifications for anal fistulae have been proposed over several decades. Milligan and Morgan, in 1934, classified anal fistulae on the basis of the relation of the fistulous track to the anorectal ring. They were subdivided into anal and anorectal fistulae, depending on the location below or above the level of the anorectal ring. Stelzner, in 1959, classified anal fistulae into three main types: intermuscular, transphincteric and extrasphincteric, in relation to the external anal sphincter. Goligher modified the classification of Milligan and Morgan by subdividing high anorectal fistulae into ischiorectal or infrarectal and pelvic or suprarectal. Thompson classified anal fistulae on the basis of frequency and ease of operation into simple and complex anal fistulae. Lilus, in 1968, classified anal fistulae as seen during the operative procedure into: subcutaneous, low intermuscular, high intermuscular, low anal, high anal and pelvirectal.

The most widely used classification for anal fistulae was formulated by Parks in 1976. The Parks classification relates the type of fistula to the external anal sphincter / puborectalis complex. According to Parks’ classification, anal fistulae are classified into four main types (Fig. 1). These include:

- Intersphincteric fistula
- Transphincteric fistula
- Suprasphincteric fistula
- Extrasphincteric fistula

Intersphincteric fistula is the most common anal fistula which predominantly arises from an infection within an anal gland, that tracks down towards the anal margin. Here, the fistula track is mainly confined to the intersphincteric plane. A transphincteric fistula connects the intersphincteric plane with the ischiorectal fossa by perforating the external sphincter muscle. A suprasphincteric fistula passes above the external sphincter muscle and perforates the levator ani. An extrasphincteric fistula passes from the rectum to the perianal skin, completely external to the sphincter apparatus.
Anal fistulae can also be clinically classified as simple and complex anal fistula. A simple anal fistula consists of a single tract that involves < 30–50% of external anal sphincters. These fistulae can be probed and the overlying skin incised and laid open for the fistula tract to heal. Complex anal fistulae may consist of multiple tracts in > 30–50% of external anal sphincters, are found in an anterior location, and may be related to an etiology of radiation exposure and inflammatory bowel disease. Complex fistulae can be found in patients with already compromised sphincter function (prone to incontinence). These complex fistulae commonly require a staged procedure wherein the first step is to control sepsis by seton placement.

Preoperative magnetic resonance imaging (MRI), applied as an adjunct modality in diagnostic workup and treatment planning, has shown to be very useful in achieving an optimal outcome of this new surgical technique. MRI is commonly used during initial diagnostic assessment and treatment planning for:

- Identification of the primary fistulous tract as well as its secondary ramifications.
- Identification of associated abscesses.
- Identification of the type of fistula.
- Detection of inflammatory swellings or fibrosis.
- Demonstration of occult intersphincteric space sepsis.
- Assessment of long-term outcomes.

### Patient Selection

#### Indications

All discharging fistulae, which include:

- Mature fistula.
- Medium to high fistula with well-formed single or multiple tracks.
- Complex fistula (recurrent fistula, horse shoe fistula).

#### Contraindications

- Submucous fistula.
- Low perianal fistula.
- Fistula with acute/recent inflammation (immature track).
- Pelvic fistula (diagnosed by MRI).
- No active discharge for at least 2 months.
- Fistula secondary to systemic pathologies (Crohn’s disease, tuberculosis, actinomycosis, post irradiation, malignancy).

### Equipment

Use of dedicated equipment is highly recommended (KARL STORZ Tuttlingen, Germany). The instrument set essentially comprises the following components (Fig. 2):

- Fistuloscope (1)
- 3-mm Forceps (2)
- Endobrush (3)
- Unipolar Electrode (4)

In addition, the surgeon will require

- Anoscope (5)
- Linear Endostapler (6)
- Glycine-mannitol 1% solution
- Volkmann Spoon (7)
**Fistuloscope**

The fistuloscope offers an 8° direction of view and has a straight working channel also used as irrigation channel. The operative length is 18 cm and the outer diameter is 3.3 x 4.7 mm (Fig. 3).

**Video Equipment**

We use a standard high definition (HD) technology for our video equipment (Fig. 4). (IMAGE1™ HD, KARL STORZ Tuttlingen, Germany). These endoscopic camera systems are equipped with three CCD chips that support the 16:9 input format and capture images with a resolution of 1920 x 1080 pixels (Fig. 5).

---

**Operating Technique**

**Operating Room Setup and Patient Positioning**

The patient is placed in a lithotomy position with 15°–20° Trendelenburg tilt, as shown in Fig. 6. The procedure is performed under spinal/general anesthesia.

**Preparation and Assembly of Instruments**

Once the presence of a subcutaneous fistula has been excluded, a decision to proceed with VAAFT is taken. The fistuloscope is connected to the cold light source and loaded with the obturator. The irrigation tubing which is connected to a bag containing Glycine-Mannitol 1% solution, is attached to the LUER inlet of the fistuloscope (Fig. 7).
Initial Diagnostic Assessment

The initial diagnostic assessment involves examination of perianal area and the perineum for external fistula openings (Fig. 8). Digital per rectal examination and proctoscopy is performed to assess anorectal pathology and to localize the site of the internal opening of the fistula.

Surgical Procedure

The external opening of the fistula is dilated with the tip of a fistula probe, if required (Fig. 9). Fibrous scar tissue is excised to enlarge the opening in order to allow entry of the fistuloscope (Fig. 10). Prior to inserting the fistuloscope, the tip is placed just within the external opening and the LUER stopcock is opened allowing the glycine-mannitol 1% solution to distend and delineate the fistula track (Fig. 11).
Localization of the Internal Opening

The fistuloscope is gently advanced through the fistula tract which is distended by the irrigation solution (Fig. 12). The fistuloscope is slowly advanced with side-to-side, rotatory or vertical movements as may be required. The operative maneuvers are guided on the basis of the real-time image on the video monitor located at the head end of the patient. A typical fistula tract appears as a tunnel with granulation tissue and fibrous tissue in the form of whitish flakes appearing within the fistula tract (Figs. 13a–c). At this stage, an attempt is made to locate the position of the internal fistula opening. An anal retractor is inserted to localize the position of the internal opening. In many instances, a jet of irrigating solution is seen spurting from the internal opening from within the anal canal (Fig. 14). In some patients with a well-defined fistula tract and large internal opening, the fistuloscope itself may exit through the internal opening into the anal canal. In other patients, the internal opening may be obliterated or concealed within a fold of mucosa. In these patients, the transillumination effect of the
light of the fistuloscope shining through the bowel wall (with the lights of the OR switched off) may provide a clue to the location of the internal opening (Fig. 15). Provided, the internal opening cannot be identified, no attempt should be made to create an artificial internal opening.

Once the internal opening of the fistula has been localized on the bowel wall, it is isolated and marked with 3 stay sutures. The sutures are placed through the full thickness of the rectal mucosa (Figs. 16–19). The first suture is placed distal to the opening, the second at the opening and the third proximal to the internal opening. The tails of the sutures are kept long and are held by means of an artery forceps outside the anal canal.
Examination and Fulguration of the Fistula Track

Once the internal opening has been localized and isolated with stay sutures, the entire fistula tract is examined for secondary fistulous tracks and abscess cavities. The fistulous tract is re-examined with the fistuloscope starting at the external opening. The fistuloscope is advanced to search for any secondary tracks and abscess cavities (Figs. 20a–b). Any abscess cavities that are identified should be drained, followed by fulguration of their walls. Secondary tracks, if present, are entered with the fistuloscope and granulation tissue on the walls is fulgurated. The entire lining of the fistula tract is fulgurated. Fulguration is carried out by means of flexible monopolar electrode that is passed through the working channel of the fistuloscope (Figs. 20c–g).

Multiple fistula tracks (a). Fistula tracks showing abscess cavities (b). Fulguration of fistula track (c–g).

Figs. 20a–b. Figs. 20c–g.

Figs. 20a–b. Figs. 20c–g.
Debridement is completed with the help of an endobrush (passed through the fistuloscope, Figs. 21–23) and with a Volkmann spoon (after removal of the fistuloscope, Fig. 24). Excised tissue is sent for histopathological examination.
Closure of the Internal Opening

The anal retractor is re-inserted, thus affording a good view of the internal opening with stay sutures. Traction is applied on stay sutures perpendicular to the bowel wall and a linear endostapler (white cartridge) is applied at the base (Fig. 25a). This ensures a secure stapled closure of internal opening (Figs. 25b, c). The staple line is inspected for haemostasis (Fig. 25d). A temporary dressing is applied to the external opening.
Postoperative Care

All patients are administered oral Diclofenac sodium 75mg BD for 2 days and Tab Tramadol 50 mg SOS for breakthrough pain. Patients are also administered broad spectrum antibiotics for three days and are usually discharged on the same day after recovery from anesthesia. The dressing on external opening is changed as required. Patients are followed up at 1 week, 1 month, 3 months, 6 months, 1 year and whenever recurrence of symptoms necessitates care.

Discussion

Traditional surgical procedures for anal fistulae include fistulotomy for superficial fistulae, fistulectomy for complex and deep fistulae and staged fistulectomy with seton placement for high fistulae. The aforementioned procedures inherently lead to perianal wounds that require regular change of dressings and long-term follow up. Pain, discomfort and prolonged time off work are natural sequelae of these surgical procedures. Fecal incontinence is a significant complication in these patients, especially in complex and recurrent fistulae. This results from division and injury to the musculature that constitutes the sphincter mechanism of the anal canal.

The minimally invasive anal fistula treatment was initially described by Meinero. He states that “The rationale of the video-assisted anal fistula treatment technique is based on the same principles as other procedures for closing the internal opening and obliterating the tract, where the real innovation is constituted by a precise identification of the fistula anatomy and of the internal opening by fistuloscopy and fulguration of the tract walls under direct vision”.

VAAFT qualifies as a true minimally invasive surgical procedure. There are no iatrogenic incisions incurred to gain access to the site of operative treatment. Surgical access is obtained via the pre-existing pathological opening of the fistula.

The essential features of the VAAFT technique include:

- Fistuloscopic exploration of the fistula track.
- Identification of the internal fistula opening.
- Identification of secondary fistula tracks and abscess cavities.
- Fulguration and destruction of the fistula track under direct vision and
- Securely stapled closure of the internal fistula opening.

Fistuloscopy with irrigation facilitates accurate identification and localization of the internal fistula opening in the anal canal. In difficult circumstances, digital probing of the anal canal to locate the tip of the fistuloscope is helpful. Also, the transillumination effect of the fistuloscopic light shining through the bowel wall may aid in localizing the internal fistula opening. Based on our experience, we could not identify the internal fistula opening in 24% of patients. This is assumed to arise from a spontaneous closure of the internal opening. In patients, where the light of the fistuloscope can be seen transilluminating through a very thin layer of mucosa, it may be advisable to secure the mucosal site by reinforcement with an endostapler. If there is no transillumination visible on the bowel wall from the light of the fistuloscope, one should refrain from creating an artificial internal opening of the fistula. In these patients, only fulguration and debridement of the fistula tract may be performed. Patients in whom the internal fistula opening is not identified, are found to have a higher risk of recurrence. The 8°-viewing angle of the fistuloscope is very useful in the detection of secondary tracks and abscess cavities, thereby reducing the risk of recurrence. The fistulous tract is distracted by fulguration under direct vision. Debridement of the fulgurated tract is performed using flexible fistula brush for a curved tract and Volkmann’s spoon for a straight track. A securely stapled closure ensures hermetic occlusion of the internal fistula opening.

VAAFT in the management of anal fistulae is a new and evolving technique. As with many other new surgical techniques, users need to go through a learning curve. In our experience, which is based on a group of 416 patients, in 5 patients the internal opening of the anal fistula was very high (beyond the reach of anoscope). This condition precludes the option of a securely stapled closure of the internal opening. At present, the definitive endoscopic surgical management of such patients remains unresolved. Furthermore, in early stages of the surgeon’s learning curve with VAAFT, there is an elevated risk that the internal fistula opening may not be identified. Also, secondary fistula tracks may be missed. These factors contribute to a higher recurrence rate in patients undergoing treatment during the initial learning phase of the surgeon. However, the resultant morbidity is limited as there are no perianal wounds and the musculature of the anal sphincter remains intact. This is of significance as the incidence of faecal incontinence is high with other surgical treatment options available.

VAAFT involves an initial expenditure for purchasing the required equipment. However, the fistuloscope and ancillary equipment are reusable and the initial costs are likely to be recovered soon. The technique provides significant advantages to patients in terms of reduced pain, minimal morbidity and earlier resumption of normal activities. The global socioeconomic costs of this procedure are therefore likely to be low.

VAAFT is safe and feasible and can be mostly performed as a day care procedure. There are distinct advantages to patients in terms of reduced pain, absence of perianal wounds, faster recovery and earlier return to work. However, applicability of VAAFT in very high extraspincteric fistulae remains unclear at present. Long-term results from more centers are awaited.
References


VAAFT Instrument Set for Video-Assisted Anal Fistula Treatment
IMAGE1 S Camera System and Accessories
Instrument Set for Video-Assisted Anal Fistula Treatment (VAAFT)

24511 Fistulectomy Set, including:
Fistuloscope 8°, angled eyepiece, outer diameter 3.3 × 4.7 mm, working length 18 cm, autoclavable, with straight instrument channel for instruments up to diameter 2.5 mm, fiber optic light transmission incorporated, color code: green,

Wire Tray for Cleaning, Sterilization and Storage

Obturator

24511AA Fistuloscope 8°, angled eyepiece, outer diameter 3.3 × 4.7 mm, working length 18 cm, autoclavable, with straight working channel for instruments up to diameter 2.5 mm, fiber optic light transmission incorporated, color code: green

100020-10 Endoscopic Seal, for single use, for working channels for 4 – 10 Fr. instruments, sterile, package of 10

24512 Handle

24513 Obturator, for endoscope

24515 Coagulation Electrode, 7 Fr., for fistulectomy

It is recommended to check the suitability of the product for the intended procedure prior to use.
Instrument Set for Video-Assisted Anal Fistula Treatment (VAAFT)

**24514**  
**Fistula Brush**, with handle  
including:  
3-Ring Handle  
Outer Sheath  
3x Fistula Brush Inserts,  
with 4 mm, 4.5 mm and 5 mm outer diameter

**30251KJ**  
**CLICKLINE REDDICK-OLSEN Grasping Forceps**,  
rotating, size 2 mm, length 30 cm,  
with connector pin for  
unipolar coagulation,  
double action jaws,  
with irrigation connector for cleaning  
including:  
**Plastic Handle**, without ratchet  
**Outer Sheath with Working Insert**, insulated

**24981**  
**AUCKLAND EASI Anal Distending Speculum**,  
for anal examinations, with 3 blades, outer diameter 27 mm,  
working length 6 cm, with Obturator 24981O, with ratchet

**39501XP**  
**Wire Tray for Cleaning, Sterilization and Storage**,  
with integrated cleaning adaptor for washer-disinfector, with lid,  
Spare Parts Basket 39501XS and silicone telescope holders,  
external dimensions (w x d x h): 460 x 150 x 80 mm,  
for instruments with up to 27 cm working length
**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**

**FuLL HD Imaging**
- Very high quality of endoscopic images in FULL HD
- Natural color rendition

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

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**FULL HD image**

**CLARA**

**FULL HD image**

**CHROMA**

**FULL HD image**

**SPECTRA A***

**FULL HD image**

**SPECTRA B**

* SPECTRA A: Not for sale in the U.S.
** SPECTRA B: Not for sale in the U.S.
**IMAGE1 S Camera System**

TC200EN*

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

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

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

**Specifications:**

| HD video outputs | - 2x DVI-D |
| Format signal outputs | 1920 x 1080p, 50/60 Hz |
| LINK video inputs | 3x |
| USB interface | 4x USB, (2x front, 2x rear) |
| SCB interface | 2x 6-pin mini-DIN |
| Power supply | 100–120 VAC/200–240 VAC |
| Power frequency | 50/60 Hz |
| Protection class | I, CF-Defib |
| Dimensions (w x h x d) | 305 x 54 x 320 mm |
| Weight | 2.1 kg |

**For use with IMAGE1 S**

**IMAGE1 S CONNECT** Module TC200EN

TC300

**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** TC200EN including:

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

**Specifications:**

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* 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** TC200EN, **IMAGE1 S H3-LINK Module** TC300

and with all IMAGE1 HUB™ HD Camera Control Units

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**TH100**

**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:**

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<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>

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**TH104**

**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>
</tr>
</thead>
<tbody>
<tr>
<td>Product no.</td>
<td>TH104</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>
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<tr>
<td>Cable</td>
<td>non-detachable</td>
</tr>
<tr>
<td>Cable length</td>
<td>300 cm</td>
</tr>
</tbody>
</table>
Monitors

9619NB  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

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

### KARL STORZ HD and FULL HD Monitors

<table>
<thead>
<tr>
<th>Wall-mounted with VESA 100 adaption</th>
<th>19&quot;</th>
<th>26&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product no.</td>
<td>9619NB</td>
<td>9826NB</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:

- 9826SF Pedestal, for monitor 9826NB
- 9626SF Pedestal, for monitor 9619NB

### Specifications:

#### KARL STORZ HD and FULL HD Monitors

<table>
<thead>
<tr>
<th></th>
<th>19&quot;</th>
<th>26&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop with pedestal</td>
<td>optional</td>
<td>optional</td>
</tr>
<tr>
<td>Product no.</td>
<td>9619NB</td>
<td>9826NB</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>
Cold Light Fountain Power LED 175 SCB

20161401-1 Cold Light Fountain Power LED 175 SCB, with integrated SCB, high-performance LED and one KARL STORZ light outlet, power supply 110-240 VAC, 50/60 Hz including:
Cold Light Fountain Power LED
Mains Cord
SCB Connecting Cable, length 100 cm

20132026 Xenon-Spare-Lamp, 175 Watt, 15 Volt

495NL Fiber Optic Light Cable, diameter 3.5 mm, length 180 cm
495NA Fiber Optic Light Cable, diameter 3.5 mm, length 230 cm

AUTOCON® II 400 SCB

20535201-125 AUTOCON® II 400 High End, Set SCB
power supply 220 - 240 VAC, 50/60 Hz, HF connecting sockets:
Bipolar combination, Multifunction,
Unipolar 3-pin + Erbe Neutral electrode combination 6.3 mm, jack and 2-pin,
System requirements: SCB R-UI Software Release 20090001-43 or higher including:
AUTOCON® II 400, with KARL STORZ SCB
Mains Cord
SCB Connecting Cable, length 100 cm

Necessary Accessories:
20017831 Three-Pedal Footswitch, for use with HF generators
AUTOCON® II 400 and AUTOCON® II 200
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

**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 UGxxx

**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 UG310

**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 UGxxx
Notes:
Notes:
Notes:
Notes:
with the compliments of
KARL STORZ — ENDOSKOPE