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Introduction and Historical Background

Laser, acronym for Light Amplification by Stimulated Emission of Radiation, represents a light with special properties, spatial and temporal coherence, brilliance and directionality. The laser beam can produce damage to tissues with only a few milliwatts of power, and can be delivered to the target area by thin optical fibers with minimal loss.19,21,28 During the last decades some laser technologies became established as standard modalities widely available to urologists.4,18,29 Laser beams can have three different effects on human tissue: photothermal, photomechanical and photochemical.9,10,23 Photothermal effects, such as incision and ablation, result from absorption of laser light by tissue components with a subsequent increase in temperature at that site. This phenomenon is facilitated when the wavelength of laser energy is absorbed by tissues (the absorption peaks of water are near 980, 1470, 1910 and 2870 nm, respectively). The photothermal effect is mainly produced by continuous wave (CW) laser radiation which is absorbed by tissues.9,10,17,23 The photomechanical effect is an inherent property of a pulsed laser causing instantaneous fluid evaporation and subsequent ionization with formation of a plasma bubble. This bubble expands and then collapses violently producing a strong shockwave at the tip of the fiber close to the target site. Laser energy is also capable of causing chemical reactions that change the properties of various materials. To date, laser-induced photochemical effects have not been extensively used in urology.9,10,23

The Holmium:YAG Laser

Nowadays, the Holmium Yttrium-Aluminium-Garnet (Ho:YAG) laser, commonly known as holmium laser, is the most widespread and versatile laser available in urology. Ho:YAG is a pulsed solid state laser, which operates in a free-running mode with a pulse duration ranging from 250 µsec to 600 µsec, at a wavelength of around 2,100 nm.9,22,23,29 This wavelength is very close to the absorption peak of water (1,910 nm). Owing to these characteristics, Ho:YAG energy is highly absorbed in water with plasma formation occurring at low levels of energy: this phenomenon makes the holmium laser particularly effective and it occurs only if the tip of the fiber is immersed into water.5,18,23 Several other properties make the Ho:YAG laser very useful in endourology. First, the output beam is well-collimated and may be coupled effectively into tiny optical fibers. Secondly, the plasma produced by the Ho:YAG laser can disintegrate almost any type of urinary stones reducing them to tiny fragments small enough to be passed spontaneously through the upper urinary tract (UUT).

Finally, Ho:YAG laser lithotripsy is related to a combined effect, photothermal and photomechanical, associated with a low risk of stone push-up and collateral tissue injury caused by mechanical force. Thus, Ho:YAG laser lithotripsy can also be used safely in patients with uncorrected bleeding diathesis.17,18,23

More recently, the low-power version of the Ho:YAG laser, that yields up to 10–20 W of power, has been successfully used to treat urinary stones, strictures of the ureteropelvic junction (UPJ), urethral and ureteral strictures, and transitional cell carcinomas.

The high-power version of the Ho:YAG laser (60–100 W) is still an indispensable delivery device for endoscopic-guided laser treatment of benign prostatic hyperplasia (BPH).9,23
Laser Fibers

Laser energy is delivered from the source to the target through optical fibers. Low-OH silica fibers (named water-free fibers), provide for an efficient transmission of the Ho:YAG laser beam. Because of the high quality of the laser beam, the holmium laser can use water-free (WF) fibers with a core diameter of 200 µm. The diameter of the fiber is the main determinant of laser performance: actually, the use of a small-caliber fiber results in an increase in effective power density. Therefore, it is possible to work with very thin fibers which provide some degree of flexibility and enable urologists to use both rigid and flexible ureteroscopes or nephrosopes.19,29

The Holmium:YAG Laser in the Treatment of Urinary Stones

Continuous improvement in the field of semirigid and flexible endoscopes, lithotripsy devices and ancillary instruments have contributed greatly to an increase in overall success rates of endourological treatments, accompanied by a reduction in morbidity rates. Ho:YAG lasers have increasingly come into use over the last decade and may therefore be considered the gold standard in laser lithotripsy. Fragmentation of urinary calculi with the holmium laser is supposed to occur as a result of photothermal effects induced by plasma bubbles5. Plasma bubbles forming at the laser fiber tip have an inside temperature as high as several thousand degrees centigrade: in such a way, they are capable of destroying any type of material. Therefore, the Ho:YAG laser is highly effective in stone fragmentation, whatever chemical composition and degree of radiation absorption are.5

Holmium laser lithotripsy causes stone fragmentation through two mechanisms: the first is the creation of a “plume” consisting of ion bubbles and small stone fragments, which causes stone migration away from the laser fiber; the second is the generation of shock waves inside the stone due to plasma bubble expansion.17,22,23

Due to the long pulse duration of 250–600 µsec, the photomechanical effect is less than that produced by the old dye laser (with a pulse of 1–3 µsec) and results in more controlled lithotripsy with reduced probability of stone displacement during pulsed laser deposition. Consequently, the risk of the so-called stone push-up is minimized. All these features are very important, especially when taking into account that fragmentation of stones located in the proximal ureter may finally result in a migration of a few stone fragments into the renal pelvis and calices, which will lengthen intraoperative time, and accordingly, elevate the frustration level of the urologist.

Currently, the Ho:YAG laser represents the most effective lithotripsy modality used in conjunction with modern ureterorenoscopes. The aim of laser lithotripsy in combination with ureterorenoscopy (URS) is to disintegrate the stone preferably into dust or minimal fragments to obtain very small pieces that can pass spontaneously through the UUT (Fig. 1).

Figs. 1a–d
Large stone located in the renal cavities, fragmented into small pieces with the aid of the Ho:YAG laser.
The Ho:YAG laser produces fragments smaller than those created by pneumatic or electrohydraulic lithotripsy, but the stone breakage is “less explosive and more regular”. With regard to ultrasound lithotripsy, it should be remembered, that the caliber of an ultrasound probe is far bigger than that of a laser fiber. Therefore, its use is advisable only with larger caliber ureteroscopes.

As mentioned before, the flexibility of the smallest WF laser fibers allows to use them during flexible URS. This is necessary for the treatment of renal calculi not accessible with rigid instruments.

Analysis of the current literature indicates an improvement in stone-free rates when URS and laser lithotripsy are applied: the overall stone-free rates range from 89 to 97%. As stratified by location, stone-free rates approach 98–100% when stones are located in the distal as well as in the mid ureter, and 89–100% when stones are located in the upper ureter. Success rates are lower (77–89%) if stones are in the kidney. Up to 95% of patients may be successfully treated during a single session.\(^\text{2,14,27,30,31}\)

No major complications have been related to the use of the Ho:YAG laser.\(^\text{27}\)

In contrast, the Ho:YAG laser seems to have limited applicability in cases of PCNL.

When lithotripsy is required during a percutaneous approach, the main goal is to create the fewest number of fragments with a diameter small enough to be extracted through the Amplatz sheath.

Therefore, in performing routine PCNL, where a 26–30 Fr. nephrostomy tract is created, laser lithotripsy does not represent the ideal modality for stone fragmentation, unless smaller instruments are used, as in the so-called “mini-perc technique”,\(^\text{26}\) or if the alternative option of using flexible instruments is found to be feasible.

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**The Holmium:YAG Laser in the Treatment of Lesions Other Than Urinary Stones**

The Holmium:YAG laser may be used for cutting soft-tissue lesions by setting the pulse rate up to over 12 Hz. The plasma bubbles formed at the tip of the fiber produce soft-tissue ablation. Moreover, the plasma releases its thermal energy in the surrounding water, creating a spray of vapor and warm water, that produces the coagulation effect around the irradiated zone.\(^\text{5,6,16}\)

Low-power Ho:YAG lasers have been used to treat different soft-tissue lesions, such as strictures of the ureteropelvic junction (UPJ), urethral and ureteral strictures, as well as superficial urothelial tumors.
Treatment of Urinary Tract Strictures

Although definitive data are not yet available, Ho:YAG laser urethrotomy may be considered a safe and effective minimally invasive treatment modality for urethral strictures (Fig. 2). The results are quite comparable to those obtained with conventional urethrotomy. Therefore, Ho:YAG laser urethrotomy can be considered a valid alternative to urethroplasty in patients with increased comorbidity, who are ineligible for open reconstruction.

The Ho:YAG laser can even be used to treat ureteral and ureteroenteric (UE) anastomotic strictures.

Length, severity, location, nature and time of occurrence of ureteral strictures seem to be the most important factors influencing the success of conservative treatment. Ureteral strictures with an ipsilateral renal function of less than 25% of total renal function are associated with a higher failure rate.

For all strictures, it is recommended that the incision be placed approximately 5 mm above and continuing until 5 mm below the stricture. Regarding UE strictures, those on the left side, when a conservative approach is used, were found to have less favourable results, probably due to the longer mobilization of the left ureter compared to the right one. Results of a few available studies of ureteral and/or UE anastomotic strictures, treated with the Ho:YAG laser, showed an overall success rate of 75%.

Although endopyelotomy may be considered a quite safe and effective minimally invasive treatment in the presence of UPJ obstruction, the traditional open technique as well as laparoscopic pyeloplasty seem to offer better long-term functional results. While its use as first-line treatment modality remains controversial, ureteroscopic laser endopyelotomy appears to play an important role in the treatment of UPJ obstruction in selected patients, particularly in those with a previous history of failed pyeloplasty.

Endopyelotomy may be performed using an antegrade or a retrograde approach. Despite other minimally invasive treatment options, laser treatment achieves some of the highest success rates and is associated with only few complications. The thin cut created by the Ho:YAG laser allows a gradual full thickness incision to be made, which is why the Ho:YAG laser is considered an ideal instrument to incise the UPJ.

An overall success rate of 78% was reported with the use of the Ho:YAG laser for endopyelotomy. Minor complications have been described in 7.5% of the cases, and major complications in 0.8%.

Figs. 2a–d
Laser incision of bulbous urethral stricture.
Treatment of Transitional Cell Tumors

Conservative endoscopic laser-assisted treatment can be considered a safe and effective management option in a selected group of patients with superficial transitional cell carcinoma (TCC), particularly for those who have congenitally, functionally or surgically solitary kidneys, renal failure, or severe medical comorbidities that may preclude nephroureterectomy (NUT).\textsuperscript{7,21,24}

UUT TCC can be treated using a retrograde transureteral or percutaneous approach. Each technique has its own advantages and limitations. Laser energy is applied for both tissue ablation and adequate hemostasis. Ho:YAG and Nd:YAG lasers are the most commonly used types of lasers in the treatment of UUT TCCs.\textsuperscript{3} The Nd:YAG laser is effective for coagulation. Its penetration depth of more than 10 mm\textsuperscript{15} often makes it difficult to judge the depth of ablation and may induce some iatrogenic lesions. On the other hand, the Ho:YAG laser must be used close to the target tissue (Fig. 3), with thermal damage limited to a 0.5–1 mm zone of contiguous tissue around the site of laser exposure.\textsuperscript{11} In such a way, its utility and safety in the UUT appear superior.

Analysis of recent literature shows several small studies on the results of TCC laser ablation in the UUT: a wide variability of outcomes is described with a recurrence rate ranging from 17 up to 70%. It increases from low to high grade/stage.\textsuperscript{1,15} Patients treated with laser ablation for high grade/stage of disease often require subsequent aggressive treatments, such as a NUT.

Endoscopic laser ablation of TCC is not without any risk: for patients with TCC of any stage and grade, the overall complication rate may reach 25%.\textsuperscript{21}

Figs. 3a–d
Transitional cell carcinoma of the ureter treated conservatively with retrograde ureteroscopy and laser ablation.
Special Features of the CALCULASE II SCB Low-Power Ho:YAG Laser System

The CALCULASE II SCB* low-power Ho:YAG laser system is operated at low pulse frequencies and energy levels, which are sufficient to achieve the fine-tuned performance needed in urinary lithotripsy or in the management of soft-tissue lesions with only minor increases in temperature at the urinary wall. As with other holmium lasers, the tip of the fiber must be operated while immersed in water and close to the target area, making sure that the distal tip is always under visual control, and the aiming beam properly positioned on the target tissue. The operating parameter settings used to perform laser lithotripsy, soft-tissue incision or coagulation are listed in Table 1. These parameter settings represent the starting points for proper use of the CALCULASE II SCB* low-power Ho:YAG laser.

A 365 µm WF laser fiber is the best choice when URS is performed using rigid or semirigid instruments. Rarely, 600 µm fibers are required. Otherwise, the two most common fibers used with flexible ureteroscopes are either 365 or 230 µm in diameter. The former is the first choice in case of ureteral stones, strictures or TCCs, because only minimal deflection is required. The latter minimally impairs maximal deflection of the tip, and is therefore recommended for the treatment of intrarenal calculi or neoplasms. When a flexible endoscope is used through a percutaneous approach, either 365 or 230 µm fibers can be used, based on the size of the instrument.

<table>
<thead>
<tr>
<th>Table 1: Initial Operating Parameter Settings for Laser Lithotripsy with the CALCULASE II SCB* Low-power Ho:YAG Laser System</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pulse Frequency</strong></td>
</tr>
<tr>
<td>Lithotripsy</td>
</tr>
<tr>
<td>Soft-tissue coagulation</td>
</tr>
<tr>
<td>Soft-tissue cutting</td>
</tr>
</tbody>
</table>

*with pulse frequency at 8 Hz, energy at 0.8 J/pulse, and average power at 6.4 W soft-tissue incisions are thinner with less tissue edema.

Personal Experiences with the CALCULASE II SCB* Low-power Ho:YAG Laser System

We started our experience with the CALCULASE II SCB* low-power Ho:YAG laser in January 2006. Over a 23-month period, 268 patients have been treated. The majority of them were treated for stones located in the UUT (88.4%); the others for lesions other than urinary stones (urethral and ureteral strictures and UUT TCCs) (11.6%).

Ureteral Stones

One hundred twenty four consecutive patients (81 males and 43 females), with a mean age of 49 years (range 16–77) and complaining of ureteral stones, underwent retrograde ureteroscopy (US) and laser lithotripsy. Overall 155 stones have been treated: 88 were located in the distal, 21 in the mid and 46 in the proximal ureter.

All URSs have been performed using the 8 or 9.5 Fr. semirigid ureteroscope* and/or the Flex X2™ flexible ureteroscope. For stone fragmentation, the CALCULASE II SCB* low-power Ho:YAG laser system has been used. Lithotripsy was performed using WF fibers, 230 or 365 µm in diameter, depending on specific situations. The settings in terms of pulse energy and frequency were 0.8 J/pulse and 6 or 8 Hz, respectively, corresponding to an average power of 4.8 or 6.4 watt.

In accordance with the literature, a stone-free condition was defined as complete stone clearance or the presence of residual fragments smaller than 2 mm in diameter.

* KARL STORZ Tuttlingen, Germany
Figs. 4a–d
Retrograde ureteroscopy (US) with laser fragmentation of a ureteral stone. Tiny pieces, created by laser exposure, were capable of passing through the ureter. A few small fragments had to be removed using a basket of adequate size.

An overall success rate of 100% was achieved during a single US session to treat stones located in the distal ureter. 95% were located in the middle and 93.5% in the proximal ureter, regardless of stone hardness (Table 2). Fragmentation resulted more often in tiny, sandy residuals less than 2 mm in diameter (Fig. 4). During laser lithotripsy a stone push-up occurred only in a few cases (Fig. 5). To avoid such a problem, it may be advisable to open a basket just proximal to the stone before starting to break it. This prevents any possible stone displacement towards the kidney.

Stone composition was calcium oxalate and/or phosphate in 74.2% of cases, uric acid in 9.1%, cystine in 1.5%, and mixed in the remaining 15.2%. Minor complications occurred in 7 cases. No patient required additional manoeuvres other than a symptomatic therapy. Neither ureteral wall injury nor perforation occurred as a result of laser lithotripsy.

When the stone is entrapped by the basket and subsequently fragmented, the wires are highly prone to being damaged because they are in the so-called “plasma expansion zone” (Fig. 6).

<table>
<thead>
<tr>
<th>Ureteral localization</th>
<th>Stone-free rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distal ureter</td>
<td>88/88 (100)</td>
</tr>
<tr>
<td>Middle ureter</td>
<td>20/21 (95)</td>
</tr>
<tr>
<td>Proximal ureter</td>
<td>43/46 (93.5)</td>
</tr>
<tr>
<td>Total Number (stone-free rate%)</td>
<td>151/155 (97.4)</td>
</tr>
</tbody>
</table>
Figs. 5a–f
During laser fragmentation of an ureteral stone some stone fragments were pushed up into the dilated renal cavities. Fragments could be approached with a flexible ureteroscope and were treated with the laser in two different calices.

Fig. 6
A basket wire at the right side (arrow) had broken during laser fragmentation of the stone entrapped in a basket.
Renal Stones

Ninety seven consecutive patients (45 males and 52 females) with a mean age was 47 years (range 6–77), presenting with stones located in the renal cavities, underwent retrograde URS. Overall 107 URSs were performed with laser fragmentation of a single (63 cases) or multiple (44 cases) pyelo-calyceal calculi. A total of 185 stones were treated: 37 were located in the renal pelvis; 78 in the lower, 37 in the middle and 33 in the upper calices. All URSs were performed using an 8 or 9.5 F semirigid ureteroscope* and/or the Flex-X2™ flexible ureteroscope. For lithotripsy, the CALCULASE II SCB® low-power Ho:YAG laser system was used with WF fibers of 230 or 365 µm in diameter, depending on specific situations and instruments available (Figs. 7–9).

* KARL STORZ Tuttlingen, Germany
Energy and frequency settings were 0.8 J/Pulse and 6 or 8 Hz, respectively, corresponding to an average power of 4.8 or 6.4 watt. As with lithotripsy of ureteral stones, the stone-free condition was defined as complete stone clearance or the presence of residual fragments smaller than 2 mm in diameter.8

An overall success rate of 76.2% and 56.8% was achieved in one-session treatment of single and multiple pyelo-caliceal calculi, respectively. As stratified by stone location, success rates of 82.6%, 83.3%, 58.3% and 77.3% were achieved for stones localized in the renal pelvis, and in the upper, middle and lower calices, respectively.

Figs. 8a–f
Horseshoe kidney with a pyelic stone resistant to repeated ESWL treatments. Retrograde flexible ureterorenoscopy and laser lithotripsy were performed.
Figs. 9a–h
Renal stone located in a diverticulum of the left middle calyx. Following balloon dilatation of the narrow caliceal neck, laser lithotripsy was performed through a retrograde transureteral approach.
The presence of multiple or large stones in middle and lower calices adversely affected the outcome of treatment. Indeed, complete clearance was achieved in only 51.4% of the cases involving this group and further maneuvers were required to complete the clearance of the stones. In contrast, a complete stone clearance was achieved in 77.8% of cases of multiple pelvic and/or superior caliceal nephrolithiasis (Tab. 3).

Stone composition was calcium oxalate and/or phosphate in 72.7% of the cases, uric acid in 7.3%, cystine in 4.6%, struvite in 3.6%, and mixed in the remaining 11.8%.

No specific complications occurred as result of using the low-power Ho:YAG laser.

As mentioned above, when the stone is entrapped by a basket, the wires are highly prone to rupture during laser exposure.

| Table 3: Stone-free rates after URS and Ho:YAG laser fragmentation of single and multiple / large renal stones according to renal localization. |
|---------------------------------|---------------------------------|
| Single stone (63 cases) (%)     | Stone-free rate (%)             |
| Renal pelvis                    | 19/23 (82.6)                    |
| Upper calices                   | 5/6 (83.3)                      |
| Middle calices                  | 7/12 (58.3)                     |
| Lower calices                   | 17/22 (77.3)                    |
| Total                           | 48/63 (76.2)                    |
| Multiple stones (44 cases) (%)  |                                  |
| Renal pelvis and/or upper calices | 7/9 (77.8)                     |
| Renal pelvis, middle and/or lower calices | 18/35 (51.4)    |
| Total Number                    | 25/44 (56.8)                    |
| Overall stone-free rate         | 73/107 (68.2)                   |
In additional 16 patients, who underwent a percutaneous approach, laser lithotripsy was performed through a flexible endoscope to complete stone clearance. This involved large / complex/ staghorn / multiple stones where flexible nephroscopy allowed removal of caliceal stones otherwise not accessible with the rigid nephroscope (Fig. 10). WF 600 or 365 µm fibers have been used generally to fragment stones prior to basket removal. Occasionally, in certain situations, a flexible ureteroscope was used with 230 µm fibers (Fig. 11).

For patients who underwent percutaneous treatment, the use of flexible instruments in combination with laser lithotripsy allowed complete clearance in 14 out of 16 treated patients (87.5%), with no need for another percutaneous approach or adjunctive treatments.

Figs. 10a–d
A flexible nephroscope was used to complete the removal of a few caliceal stones not accessible with the rigid endoscope. The stones were disintegrated by fiber-guided laser application, and stone fragments were removed with a basket.
Figs. 11a–f

Horseshoe kidney with a pyelic stone: a flexible ureteroscope was inserted percutaneously through a relatively narrow upper caliceal neck. The stone was fragmented using laser lithotripsy.
Treatment of Urinary Tract Lesions Other Than Stones

Thirty one patients (23 males and 8 females), with a mean age of 61 years, (range 41–81), underwent single or multiple urethro-cystoscopies and/or URSs, based on the specific situation, with laser treatment of soft-tissue lesions localized in the urinary tract. By use of the CALCULASE II SCB low-power Ho:YAG laser system an average power of 9.6 W (8 Hz x 1.2 J/pulse) was delivered through 230, 365 or 600 µm WF fibers.

Overall, 42 procedures were performed. (Table 4)

A 22/24 Fr. urethro-cystoscope with 365–600 µm fibers was used to treat small urothelial bladder tumors, to cut urethral or bladder neck strictures, and to treat ureterocele (Fig. 12).

All URSs were performed using either an 8 or 9.5 Fr. semirigid ureteroscope and/or the Flex-X2 flexible ureteroscope.

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Table 4: List of Treatments using the CALCULASE II SCB Low-power Ho:YAG Laser System for Urinary Tract Soft Tissue Lesions

<table>
<thead>
<tr>
<th>Type of procedure</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incision of bulbous urethral stricture</td>
<td>3</td>
</tr>
<tr>
<td>Incision of bladder neck stricture</td>
<td>2</td>
</tr>
<tr>
<td>Incision of ureterocele</td>
<td>1</td>
</tr>
<tr>
<td>Incision of ureteral stricture</td>
<td>20</td>
</tr>
<tr>
<td>Endopyelotomy for UPJ obstruction</td>
<td>2</td>
</tr>
<tr>
<td>Photo-ablation of urothelial bladder tumor</td>
<td>3</td>
</tr>
<tr>
<td>Photo-ablation of upper urinary tract TCC</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total Number of procedures</strong></td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>

---

Figs. 12a–d
Left ureterocele containing a stone. A “smiling mouth” laser incision was performed, and the stone removed.
Semirigid instruments of adequate length and caliber were used whenever possible to treat soft-tissue lesions located in accessible zones. As alternative option, a flexible fiberscope was used to treat soft lesions not accessible with the semirigid endoscope. The flexible fiberscope offers a narrower operating channel (3.6 F) which allows the use of small-diameter laser fibers (230 µm) and permits active deflection of the distal tip.

The parameter settings of pulse rate and energy per pulse, used both for soft-tissue coagulation and ablation, were 8 Hz and 1.2 J/pulse, respectively. The product of these two parameters results in an average value of delivered power corresponding to 9.6 W.

The results of all treatments for soft-tissue lesions were extremely satisfactory; the cuts could be made in a quick and easy way without significant bleeding (Figs. 13, 14).

Figs. 13a–d
Incision of a bulbous urethral stricture using the CALCULASE II SCB low-power Ho:YAG laser.

Figs. 14a–d
Laser incision of a stricture located in the distal ureter.
Prior to definite surgical treatment of a transitional cell carcinoma, the tumor was initially biopsied using a forceps to obtain some material for histological examination. The residual cancer tissue, including the base of the tumor, was vaporized by Ho:YAG laser application close to the target area leading to blanching of the tissue (Fig. 15).

Figs. 15a–f
Transitional cell carcinoma located in the renal pelvis. A transureteral approach was chosen. Following forceps biopsy sampling at the tumor site, laser ablation was performed.
In a few cases, where both ureteral stricture (or UPJ obstruction) and ureteral (or renal) stones were found to be present, incision of the stricture, subsequent stone fragmentation and removal of fragments with a basket could be performed in a single session (Fig. 16).

Figs. 16a–f
Recurrent left UPJ obstruction with a renal stone located in the lower calyx. Endopyelotomy was performed using a semirigid ureteroscope and Ho:YAG laser. Next, the stone was approached with a flexible ureteroscope and disintegrated using the same laser. Stone fragments were removed with a basket.
3.0 Conclusions

In the course of the past decade, endourology has gained wider and wider acceptance over open surgery, which can be attributed to the miniaturization and technological improvement of endoscopes as well as the refinement of ancillary instruments necessary to work in safety and to achieve the most favourable results. Together with the improved experience of urologists, there is no doubt that laser systems play a key role in enabling this success.

Regarding the Ho:YAG laser, it has shown to be safe and effective tool for performing lithotripsy: definitively, the Ho:YAG laser has to be considered as the first-choice fragmentation modality when calculi in the UUT are treated via a retrograde transureteral approach. Likewise, it is indispensable that flexible instruments, ureteroscopes or nephroscopies be used for retrograde as well as percutaneous manoeuvres.

Unlike other laser sources, the CALCULASE II SCB low-power Ho:YAG laser can be operated at low pulse frequencies and energy levels: in our experience, as well as in that of others, these parameters have shown to be adequate for fine-tuned performance in lithotripsy. Furthermore, this type of laser also proved to be effective in the management of soft-tissue lesions of the urinary tract including strictures or superficial urothelial tumors, with only a minor increase in temperature within the urinary tract wall. This application is particularly useful when such lesions involve the UUT. Subject to these criteria, patient selection must be conducted carefully to obtain the best results. In some cases, conservative treatment may be attempted prior to the definitive approach or traditional open surgery.
4.0 References


CALCULATE II SCB
LASER System for Endoscopic Stone Therapy and Soft Tissue Treatment

20 Watt LASER Power
The brand CALCULATE II SCB stands for a cost-effective and efficient Holmium:YAG LASER system for endoscopic LASER lithotripsy.

Soft Tissue Treatment
The system can be used for, among others, soft tissue treatment such as ureteropelvic junction stenosis and ablation of urethral carcinoma.

Diverse LASER Fibers and Instruments
KARL STORZ offers LASER fibers in various sizes (230, 365 and 600 µm) for both single and multiple use. Together with its wide range of rigid and flexible ureterorenoscopes equipped with fiber optic and sensor technology, KARL STORZ offers the ideal complete solution for stone therapy and soft tissue treatment.

Automatic Fiber Detection
This feature enables automatic adjustment of energy settings to the fiber sizes and, consequently, prevents damage to the fibers or the unit itself.

Mobility
Its compact design makes CALCULATE II SCB a very versatile and mobile system. With its innovative handles, the LASER system can easily be placed on the urological equipment cart and moved from one OR to the next. Alternatively, the LASER system can be placed on an equipment cart specially designed for this purpose and transported as required.
CALCULASE II SCB
LASER System for Endoscopic Stone Therapy and Soft Tissue Treatment

LASER System for the Treatment of Bladder, Ureter and Kidney Stones
and for opening stenoses/strictures as well as tumor ablations

Special Features:
- 20 Watt for effective and precise treatment: precise cutting effect in the case of stenoses
- Extremely fast lithotripsy
- Automatic fiber detection:
  - High user-friendliness
  - Increased safety
- Green pilot laser: Good visibility even in challenging situations
- Special design with:
  - Mobile desktop housing
  - Automatically controlled energy output
  - Integrated low-noise cooling system
- Least possible tissue damage
- High success rate independent of stone composition
- Lithotripsy under endoscopic control
- Intensity preselection adjustable in 5 steps
- Pulse frequency adjustable in 5 steps
- For use with rigid, semiflexible and flexible endoscopes
- For use on endoscopic equipment carts
- Easy to maintain
- With connections to the KARL STORZ Communication Bus (KARL STORZ SCB)

It is recommended to check the suitability of the product for the intended procedure prior to use.
CALCULASE II SCB
Holmium LASER System for Endoscopic Stone Therapy
and Soft Tissue Treatment, Recommended System Configuration

27 7502 01-1  CALCULASE II SCB, Holmium LASER system, power supply 230 VAC, 50/60 Hz
including:
Mains Cord
One-Pedal Footswitch
Key Set, package of 2, for key-operated switch
Remote Interlock Connector
SCB Connecting Cable, length 100 cm
Safety Goggles Ho:YAG LASER 2080 µm

27 7502 01U1  Same, power supply 115 VAC, 50/60 Hz

Please note:
Each lithotripsy system requires a separate basic fiber set: 27 7502 87 or 27 7502 86.

Parameters for 230 µm Fibers

<table>
<thead>
<tr>
<th>Energy</th>
<th>4 Hz</th>
<th>6 Hz</th>
<th>8 Hz</th>
<th>10 Hz</th>
<th>15 Hz</th>
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<tbody>
<tr>
<td>0.5 J</td>
<td>2 W</td>
<td>3 W</td>
<td>4 W</td>
<td>5 W</td>
<td>–</td>
</tr>
<tr>
<td>0.8 J</td>
<td>3.2 W</td>
<td>4.8 W</td>
<td>6.4 W</td>
<td>8 W</td>
<td>–</td>
</tr>
<tr>
<td>1.2 J</td>
<td>4.8 W</td>
<td>7.2 W</td>
<td>9.6 W</td>
<td>12 W</td>
<td>–</td>
</tr>
<tr>
<td>1.7 J</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>2 J</td>
<td>–</td>
<td>–</td>
<td>–</td>
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</table>

Parameters for 365 µm and 600 µm Fibers

<table>
<thead>
<tr>
<th>Energy</th>
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<th>6 Hz</th>
<th>8 Hz</th>
<th>10 Hz</th>
<th>15 Hz</th>
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</thead>
<tbody>
<tr>
<td>0.5 J</td>
<td>2 W</td>
<td>3 W</td>
<td>4 W</td>
<td>5 W</td>
<td>7.5 W</td>
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<tr>
<td>0.8 J</td>
<td>3.2 W</td>
<td>4.8 W</td>
<td>6.4 W</td>
<td>8 W</td>
<td>12 W</td>
</tr>
<tr>
<td>1.2 J</td>
<td>4.8 W</td>
<td>7.2 W</td>
<td>9.6 W</td>
<td>12 W</td>
<td>18 W</td>
</tr>
<tr>
<td>1.7 J</td>
<td>6.8 W</td>
<td>10.2 W</td>
<td>13.6 W</td>
<td>17 W</td>
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<tr>
<td>2 J</td>
<td>8 W</td>
<td>12 W</td>
<td>16 W</td>
<td>20 W</td>
<td>–</td>
</tr>
</tbody>
</table>

Parameter settings are selected via the LASER fiber code.
CALCULASE II SCB
System Components
CALCULASE II SCB

**Accessories**

**Fiber Sets, reusable**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 7502 71-P6</td>
<td>CALCULASE II Fiber 230 µm</td>
<td>reusable, sterile, length 300 cm, package of 6</td>
</tr>
<tr>
<td>27 7502 72-P6</td>
<td>CALCULASE II Fiber 365 µm</td>
<td>reusable, sterile, length 300 cm, package of 6</td>
</tr>
<tr>
<td>27 7502 73-P6</td>
<td>CALCULASE II Fiber 600 µm</td>
<td>reusable, sterile, length 300 cm, package of 6</td>
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</tbody>
</table>

**Fiber Sets, for single use**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 7502 77-P6</td>
<td>CALCULASE II Fiber 230 µm</td>
<td>for single use, sterile, length 300 cm, package of 6</td>
</tr>
<tr>
<td>27 7502 78-P6</td>
<td>CALCULASE II Fiber 365 µm</td>
<td>for single use, sterile, length 300 cm, package of 6</td>
</tr>
<tr>
<td>27 7502 79-P6</td>
<td>CALCULASE II Fiber 600 µm</td>
<td>for single use, sterile, length 300 cm, package of 6</td>
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</tbody>
</table>

**Fiber Sets, reusable**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 7502 87</td>
<td>CALCULASE II Fiber Kit</td>
<td>including:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3x CALCULASE II Fiber 230 µm, reusable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3x CALCULASE II Fiber 365 µm, reusable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3x CALCULASE II Fiber 600 µm, reusable</td>
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</table>

**Additional accessories**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>27 7500 82</td>
<td>Fiber Cutter</td>
</tr>
<tr>
<td>27 7500 81</td>
<td>Fiber Stripper</td>
</tr>
<tr>
<td>27 7502 80</td>
<td>Fiber Stripper Set, sterilizable</td>
</tr>
<tr>
<td></td>
<td>for use with CALCULASE II SCB fibers</td>
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<tr>
<td></td>
<td>including:</td>
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<tr>
<td></td>
<td>Silicone Pad</td>
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<td></td>
<td>Ceramic Knife</td>
</tr>
<tr>
<td></td>
<td>Fiber Stripppers 230, 365 and 600 µm</td>
</tr>
<tr>
<td>27 7500 95</td>
<td>Safety Goggles Ho:YAG Laser, 2080 µm</td>
</tr>
</tbody>
</table>

The CALCULASE II fibers above are compatible with the previous model CALCULASE (27 7501 20-1).
CALCULASE II SCB
Equipment Cart

Special Features:
- Flexible use of CALCULASE II SCB in various ORs
- Spacious storage room for accessories and expendable materials in two lockable drawers (LASER safety goggles or LASER fibers)
- Integrated cable winding and footswitch holder maintain an uncluttered OR
- Easy to transport due to large, smooth-running and antistatic dual wheels
- Powder-coated panels and shelves meet the most stringent quality and hygiene standards

UG 210

Equipment cart, wide, low, rides on 4 antistatic dual wheels equipped with locking brakes, mains switch on cover, double rear panel with integrated electrical subdistributors with 6 sockets, potential earth connectors, Dimensions in mm (w x h x d):
- Equipment cart: 830 x 1265 x 730,
- shelf: 630 x 25 x 510,
- caster diameter: 150 mm,
including:
- Base module, equipment cart, wide
- Cover, equipment cart, wide
- Beam package, equipment cart, low
- Shelf, wide
- 2x Drawer unit with lock, wide
- 2x Equipment rail, long
Special Features:
- The LASERITE ceramic tip at the distal end of the working channel prevents thermal damage to the flexible uretero-renoscope during LASER treatment
- Additional passive deflection components
- Integrated shock absorber system
- Deflection 270° upwards/downwards allows the intuitive orientation and visualization of the entire renal tract
- The new angulation mechanism makes it possible to use LASER fibers with little or with no loss of the angulation properties
- Enhanced material resistance and stiffness allow easier access to the kidney

- Waterproof and fully immersible in solution
- Sterilizable with EtO and FO gas, Steris® and Sterrad®
- Minimal discomfort for the patient
- Smaller outer diameter
- Compatible with all KARL STORZ systems without the need for adaptors
- Diagnostic and therapeutic applications for the ureteral and renal tract
- Lithotripsy and stone extraction in the ureteral and renal tracts
Uretero-Reno-Fiberscopes
for Access to the Entire Intrarenal Collection System

7.5 Fr.

<table>
<thead>
<tr>
<th>Order no.</th>
<th>Uretero-Reno-Fiberscopes</th>
<th>Deflection of distal tip</th>
<th>Direction of view</th>
<th>Angle of view</th>
<th>Working length</th>
<th>Working channel inner diameter</th>
<th>Sheath size</th>
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<tr>
<td>11278 A</td>
<td>with positive deflection</td>
<td>0°</td>
<td>88°</td>
<td>67 cm</td>
<td>3.6 Fr.</td>
<td>7.5 Fr.</td>
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<tr>
<td>11278 AU</td>
<td>with contrapositive deflection</td>
<td>0°</td>
<td>88°</td>
<td>67 cm</td>
<td>3.6 Fr.</td>
<td>7.5 Fr.</td>
<td></td>
</tr>
</tbody>
</table>

Following accessories are included:

- 27677 X Case
- 13242 XL Leakage Tester, with bulb and manometer
- 27651 AL Cleaning Brush, round, flexible, outer diameter 2 mm, for working channel diameter 1.2 – 1.8 mm, length 150 cm
- 27014 Y LUER-Adaptor, with seal

Optional accessories:

- 11275 FE Grasping Forceps, double action jaws, flexible, 3 Fr., length 100 cm
- 11275 ZE Biopsy Forceps, double action jaws, flexible, 3 Fr., length 100 cm
- 27023 VB Stone Basket, sterile, for single use, 2.5 Fr., length 120 cm
- 11770 T Coagulation Electrode, unipolar, 3 Fr., length 110 cm
- 27025 P Guide Wire, with ball end, 3 Fr., package of 10
- 27550 N Seal, for working channel, package of 10, single use recommended
- 27001 RA Cleaning Adaptor

Plastic Container for sterilizing with gas and hydrogen peroxid (Sterrad) and for storage, perforated, with lid, for use with flexibel fiberscopes, with max. working length of 950 mm, external dimensions (wxdxh): 550 x 260 x 92 mm
The New Generation
KARL STORZ Uretero-Renoscopes

The reduced outer diameter ensures minimal patient discomfort. The unique design combined with the proven KARL STORZ quality guarantee a stable and robust sheath. The new, slender design makes work more ergonomic and comfortable for the operating surgeon.

Right-angled irrigation/suction channels prevent positioning instruments too close to the housing, enabling optimal handling and convenient introduction. The flow control stopcock allows the surgeon to dispense the inflow/outflow very precisely in critical situations, preventing a stone from being washed into the renal pelvis due to irrigation which is too strong or which changes in an uncontrolled manner.

The removable instrument ports are attached to the uretero-renoscope with a quick coupling mechanism and are available either as single or dual working channels. The dual-closing sealing system from KARL STORZ has the only sealing valve that opens and closes by itself during both distal and proximal introduction of instruments without removing the seal.

Wire Tray 39501 XK ideally protects the uretero-renoscope during transportation, cleaning and storage and, consequently, ensures a long service life.

From diagnosis to therapy through to transportation, cleaning, storage, accessories and service, KARL STORZ provides solutions to cover all hospital workflow processes.
The New Generation
KARL STORZ Uretero-Renoscopes

Atraumatic tip:
allows easy introduction to the ureteral orifice

Optional flow control stopcock
for precise dispersion of
in- and outflow

Conical sheath:
robust and durable

Variable instrument ports
with quick release coupling

Self-closing
sealing system

Unobtrusive step
Uretero-Renoscopes, Ureteroscopes

7 Fr., lengths 43 and 34 cm

Special Features:
- Distal end of sheathatraumatically shaped, with rounded tip
- Minimal sheath diameter
- Maximum irrigation through the large straight working channel with 2 lateral, right-angled irrigation ports
- The large working channel allows the use of rigid instruments and probes up to 4 Fr.
- The rigid angled eyepiece makes work more comfortable and ensures easy handling of instruments as well as a safe distance to the surgeon while using lithotripsy probes.

Specifications:

- Distal tip: 6.5 Fr.
- Instrument sheath: 7 Fr., 1 step, 9.9 Fr.
- Working channel: 4.8 Fr., for use with instruments up to 4 Fr.
- Telescope: KARL STORZ fiber optic system, direction of view 6°
- Length: 43 and 34 cm
- Eyepiece: angled, rigid

Telescope

Working/irrigation channel

27000 L/K

27000 L

Uretero-Renoscope, autoclavable, length 43 cm

27000 K

Ureteroscope, autoclavable, length 34 cm
Ureter-Renoscopes, Ureteroscopes

8 Fr., lengths 43 and 34 cm

Special Features:

- Distal end of sheathatraumatically shaped, with rounded tip
- Minimal sheath diameter
- Maximum inflow due to large straight working channel with 2 lateral, right angled irrigation ports
- The large working channel allows the use of rigid instruments and probes up to 4 Fr.
- The rigid angled eyepiece makes working more comfortable and ensures easy handling of instruments as well as a safe distance to the surgeon while using lithotripsy probes

Specifications:

- Distal tip: 7 Fr.
- Instrument sheath: 8 Fr, 1 step, 12 Fr.
- Working channel: 5 Fr., for use with instruments up to 4 Fr.
- Telescope: KARL STORZ fiber optic system, direction of view 6°
- Length: 43 and 34 cm
- Eyepiece: angled, rigid

27001 L/K

27001 L Uretero-Renoscope, autoclavable, length 43 cm

27001 K Ureteroscope, autoclavable, length 34 cm
Uretero-Renoscopes, Ureteroscopes

9.5 Fr., lengths 43 and 34 cm

Special Features:
- Distal end of sheath atraumatically shaped, with rounded tip
- Minimal sheath diameter
- Maximum inflow due to large straight working channel with 2 lateral, right angled irrigation ports
- The large working channel allows the use of rigid instruments and probes up to 5 Fr.
- The rigid angled eyepiece makes working more comfortable and ensures easy handling of instruments as well as a safe distance to the surgeon while using lithotripsy probes

Specifications:
- Distal tip: 8 Fr.
- Instrument sheath: 9.5 Fr, 1 step 12 Fr.
- Working channel: 6 Fr. for use with instruments up to 5 Fr.
- Telescope: KARL STORZ fiber optic system, direction of view 6°
- Length: 43 and 34 cm
- Eyepiece: angled, rigid

27002 L/K

27002 L  Uretero-Renoscope, autoclavable, length 43 cm
27002 K  Ureteroscope, autoclavable, length 34 cm
MICHEL Uretero-Renoscope

9.5 Fr., length 43 cm

Special Features:
- Distal end of sheath atraumatically shaped, with rounded tip
- Minimal sheath diameter
- Maximum irrigation due to large central working channel with 1 right-angled irrigation port, left side
- The large working channel allows the simultaneous use of rigid instruments and probes from 2 to 3 Fr.
- Maximum irrigation due to an additional separate irrigation channel (2.3 Fr.) with an irrigation port on the underside
- The rigid angled eyepiece makes work more comfortable and ensures easy handling of instruments as well as a safe distance to the surgeon while using lithotripsy probes.

Specifications:
- Distal tip: 9 Fr.
- Instrument sheath: 9.5 Fr., 1 step, 12 Fr.
- Working channel: for simultaneous use of 2 and 3 Fr. instruments and probes
- Separate irrigation channel: 2.3 Fr.
- Telescope: KARL STORZ fiber optic system, direction of view 6°
- Length: 43 cm
- Eyepiece: angled, rigid
Uretero-Renoscopes, Ureteroscopes

7 Fr., lengths 43 and 34 cm

Special Features:
- Minimal sheath diameter
- Maximum inflow due to an additional irrigation channel (2.4 Fr.), left side
- The large working channel allows the use of instruments and probes up to 3 Fr.
- Especially suitable for use with the CALCULASE laser system for stone fragmentation

Specifications:
- Distal tip: 7 Fr.
- Instrument sheath: 7 Fr., 1 step, 8.4 - 9.9 Fr.
- Working channel: 3.4 Fr., for use with instruments up to 3 Fr.
- Irrigation channel: 2.4 Fr.
- Telescope: KARL STORZ fiber optic system, direction of view 6º
- Length: 43 and 34 cm
- Eyepiece: straight, rigid

27010 L/K Uretero-Renoscope, autoclavable, length 43 cm

27010 K Ureteroscope, autoclavable, length 34 cm
GAUTIER Uretero-Renoscope with HOPKINS® Rod Lens System

8 Fr., length 43 cm

Special Features:
- Excellent optical quality due to HOPKINS® rod lens system
- Distal end of sheath atraumatically shaped, with rounded tip
- Minimal sheath diameter
- Maximum inflow due to large straight working channel with 2 lateral, right angled irrigation ports
- The large working channel allows the use of rigid instruments and probes up to 4 Fr.

Specifications:
Distal tip: 7 Fr.
Instrument sheath: 8 Fr., conical, 1 step 8 – 13.5 Fr.
Working channel: 5 Fr., for use with instruments up to 4 Fr.
Telescope: KARL STORZ HOPKINS® rod lens system, direction of view 6°
Length: 43 cm
Eyepiece: straight, rigid

Telescope
Working/irrigation channel

27013 L  Uretero-Renoscope, autoclavable, length 43 cm
Accessories
Uretero-Renoscopes and Ureteroscopes

For use with 27000 L/K, 27001 L/K, 27002 L/K, 27003 L and 27013 L

Following accessories are included:

- **27001 G** Instrument Port with Sealing System and Quick Release Lock, 1 channel
- **27550 N** Seal, for working channel, package of 10, single use recommended
- **27500** Luer-Lock Tube Connector, male, tube diameter 9 mm
- **27502** Luer-Lock Tube Connector, with stopcock, dismantling
- **27504** Flow Control Stopcock
- **27001 E** Insertion Aid, for guide wires in uretero-renoscopy
- **39501 X** Wire Tray, 644 x 150 x 80 mm including:
  - Cleaning Adaptor, for Instrument Ports 27001 G/GF/GH

Optional Accessories:

- **27001 GF** Instrument Port with Sealing System and Quick Release Lock, 2 channels
- **27001 GH** Instrument Port with Sealing System and Quick Release Lock, 2 channels, 1 straight channel, 1 lateral channel
- **27550 N** Seal, for working channel, package of 10, single use recommended

For use with 27010 L/K

Following accessories are included:

- **27014 Y** Luer-Adaptor, with seal
- **27550 N** Seal, for working channel, package of 10, single use recommended
- **27500** Luer-Lock Tube Connector, male, tube diameter 9 mm
- **27502** Luer-Lock Tube Connector, with stopcock, dismantling
- **27001 E** Insertion Aid, for guide wires in uretero-renoscopy
- **39501 X** Wire Tray, 644 x 150 x 80 mm including:
  - Cleaning Adaptor, for Instrument Ports 27001 G/GF/GH

Optional accessories:

- **27550 N** Seal, for working channel, package of 10, single use recommended
Instruments for Uretero-Renoscopes and Ureteroscopes

For use with 27000 L/K, 27001 L/K and 27013 L

- **27424 F** Forceps, rigid, for grasping stone fragments, double action jaws, 4 Fr., length 60 cm, color code: blue
- **27424 P** Forceps, rigid, for grasping larger stones and fragments, double action jaws, 4 Fr., length 60 cm, color code: blue
- **27424 Z** Biopsy Forceps, rigid, double action jaws, 4 Fr., length 60 cm, color code: blue
- **27424 R** PÉREZ-CASTRO Forceps, rigid, with long jaws, for Steinstrasse, double action jaws, 4 Fr., length 60 cm, color code: blue
- **27424 U** Splitting Forceps, rigid, cutting upwards, single action jaws, 4 Fr., length 60 cm, color code: blue
- **27023 VB** Stone Basket, sterile, disposable, 2.5 Fr., length 120 cm
- **27023 Y** Brush for Cytology, 3 Fr., unsterile, for single use, package of 5

For use with 27010 L/K and 27003 L

- **27023 FM** Forceps, rigid, for grasping stone fragments, double action jaws, 3 Fr., length 60 cm, for use through both irrigation channels, color code: green
- **27023 VB** Stone Basket, sterile, disposable, 2.5 Fr., length 120 cm
- **27023 Y** Brush for Cytology, 3 Fr., unsterile, for single use, package of 5
## Instruments for Uretero-Renoscopes and Ureteroscopes

For use with 27002 L/K

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Details</th>
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<tbody>
<tr>
<td>27425 F</td>
<td><strong>Forceps</strong>, rigid, for grasping stone fragments, double action jaws, 5 Fr., length 60 cm, color code: red</td>
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</tr>
<tr>
<td>27425 P</td>
<td><strong>Forceps</strong>, rigid, for grasping larger stones and fragments, double action jaws, 5 Fr., length 60 cm, color code: red</td>
<td></td>
</tr>
<tr>
<td>27425 Z</td>
<td><strong>Biopsy Forceps</strong>, rigid, double action jaws, 5 Fr., length 60 cm, color code: red</td>
<td></td>
</tr>
<tr>
<td>27425 R</td>
<td><strong>PÉREZ-CASTRO Forceps</strong>, rigid, with long jaws, for Steinstrasse, double action jaws, 5 Fr., length 60 cm, color code: red</td>
<td></td>
</tr>
<tr>
<td>27425 U</td>
<td><strong>Splitting Forceps</strong>, rigid, single action jaws, cutting upwards, 5 Fr., length 60 cm, color code: red</td>
<td></td>
</tr>
<tr>
<td>27023 WU</td>
<td><strong>Balloon Catheter</strong>, sterile, for single use, 3 Fr., package of 2</td>
<td></td>
</tr>
<tr>
<td>27023 VK</td>
<td><strong>Stone Basket</strong>, 5 Fr., length 60 cm, for use through the lateral irrigation channel including: <strong>3-Ring Handle</strong> 3x <strong>Basket</strong> 3x <strong>Coil</strong></td>
<td></td>
</tr>
<tr>
<td>27023 VU</td>
<td><strong>Stone Basket</strong>, sterile, for single use, 3 Fr., length 115 cm</td>
<td></td>
</tr>
<tr>
<td>27023 Y</td>
<td><strong>Brush for Cytology</strong>, 3 Fr., unsterile, for single use, package of 5</td>
<td></td>
</tr>
</tbody>
</table>
A New Generation of Pressure-Controlled PCNL Systems
MIP – Minimally Invasive Percutaneous Nephrolitholapaxy

The New Family of MIP Systems and Innovative Features

Versatility
The right instrument is available for every stone indication. The systems stand out due to their exceptional quality and durability as well as safe and careful handling.

One-step-bougie
Following a skin incision, a single dilator can widen the port to allow the sheath to be advanced into the kidney. Telescope bougies or bougies in several sizes are no longer required for individual sheath sizes.

Innovative pressure management
All systems from the MIP series are designed as open systems, i.e. the sheath and telescope are not locked together and there is no second system connection to the system where irrigation liquid can flow off. With the MIP series, the irrigation liquid flows out via the space between the telescope and the operating sheath. Discontinuation of the outflow, which would lead to pressure build-up in the kidney, is not possible.

Efficient stone retrieval without instruments
The hydrodynamic effect achieved by the innovative inflow and outflow constellation makes it possible to retrieve stones without forceps, graspers or stone baskets. The funnel-shaped proximal sheath head enables stones to be removed from the sheath without any problems. A continuous irrigation flow ensures the residue-free elimination of small stone fragments and calculus dust.

Direct closure of the access tract
Access tracts to the kidney can be directly closed after stone retrieval using a gelatin-thrombin-matrix. This eliminates the need for nephrostomy (kidney fistula) in standard PCNL access tracts.
MIP M – Percutaneous Nephroscope

Special Features:

- Well-proven miniature nephroscope with optimized design
- One-step dilator with a second eccentric channel for guide wire deflection enables precise steering of the wire
- Large working channel allows the use of rigid standard instruments and large lithotripsy probes up to 5 Fr.
- For the treatment of medium stone burdens

Specifications:

- Instrument sheath: 12 Fr.
- Working channel: 6.7 Fr. for use with instruments up to 5 Fr.
- Telescope: Fiber optic system, direction of view 12°
- Length: 22 cm
- Eyepiece: angled

Following accessories are included in delivery:

- 27001 GP Instrument Port with Sealing System and Quick Release Lock, 1 channel
- 27550 N Seal, for Instrument Ports 27001 G/GF/GH/GP, package of 10, single use recommended
- 27500 LUE-R-Lock Tube Connector, male, tube diameter 9 mm
- 27502 LUE-R-Lock Tube Connector, with stopcock, dismantling
- 27001 E Insertion Aid, for guide wires
- 39501 XK Wire Tray including:
  - Cleaning Adaptor, for Instrument Ports 27001 G/GF/GH/GG/GP

27830 KA

Nephroscope for MIP M, autoclavable
Dilators, Sheaths and Applicators

27830 AB

27830 AA **One Step Dilator**, with central channel for guide wires, for use with 15/16 Fr. Operating Sheaths 27830 BA/BAS

27830 AB **One Step Dilator**, with central channel and a second eccentric channel for guide wires, for use with 16.5/17.5 Fr. Operating Sheaths 27830 BB/BBS

27830 AC **Same**, for use with 21/22 Fr. Operating Sheaths 27830 BC/BCS

27830 BB

27830 BA **Operating Sheath**, 15/16 Fr., working length 15 cm, for continuous irrigation and suction

27830 BB **Same**, 16.5/17.5 Fr.

27830 BC **Same**, 21/22 Fr.

27830 BAS **Operating Sheath**, for the supine position, 15/16 Fr., working length 18 cm, for continuous irrigation and suction

27830 BBS **Same**, 16.5/17.5 Fr.

27830 BCS **Same**, 21/22 Fr.

27830 CF

27830 CF **Applicator for Sealant**, including sheath and rod, for use with Operating Sheaths 27830 BA/BB/BC

27830 CFS **Applicator for Sealant**, for the supine position, including sheath and rod, for use with Operating Sheaths 27830 BAS/BBS/BCS

27001 GG

27001 GG **Instrument Port with Sealing System and Quick Release Lock**, large, 1 channel, for use with accessories up to 6 Fr. (diameter 2 mm) in combination with Miniature Nephroscope for MIP M 27830 KA
Optional Accessories for MIP M

27830 FK  **Forceps for Foreign Body Removal**, double action jaws, flexible, 5 Fr., length 40 cm

27830 FL  **Biopsy Forceps**, double action jaws, flexible, 5 Fr., length 40 cm

27830 S  **Scissors**, single action jaws, semiflexible, 5 Fr., working length 40 cm

27830 H  **Forceps**, rigid, for grasping large stones and stone fragments, with triple serrated jaw parts and U-spring handle, 5 Fr., length 36 cm
MIP XS/S – Percutaneous Nephroscope

Special Features:
- Smaller system for minimal access tract
- Working channel with 2 Fr. for guided laser fibers allows safe use
- Separate irrigation channel for optimal irrigation and good visualization
- For low stone burdens
- Provides an alternative where flexible uretero-renaloscopy is not possible

Specifications:
- Instrument sheath: 7.5 Fr.
- Working channel: 2 Fr.
- Separate irrigation channel: 3 Fr.
- Telescope: Fiber optic system, direction of view 6º
- Length: 24 cm
- Eyepiece: angled

Following accessories are included in delivery:

- 27001 G Instrument Port with Sealing System and Quick Release Lock, 1 channel
- 27550 N Seal, for Instrument Ports 27001 G/GF/GH/GP, package of 10, single use recommended
- 27500 Luer-Lock Tube Connector, male, tube diameter 9 mm
- 27502 Luer-Lock Tube Connector, with stopcock, dismantling
- 27001 E Insertion Aid, for guide wires
- 39501 XK Wire Tray including:
  - Cleaning Adaptor, for Instrument Ports 27001 G/GF/GH/GG/GP
- 39501 XRV Multiport Bridge
- 39107 ALK Cleaning Adaptor, for use with small Luer stopcocks
### Dilators, Sheaths and Applicators

#### for MIP XS/S

<table>
<thead>
<tr>
<th>Dilator and Operating Sheaths for MIP XS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>27820 AA</strong></td>
</tr>
<tr>
<td><strong>One Step Dilator</strong>, with central channel for guide wires, for use with 8.5/9.5 Fr. Operating Sheaths 27820 BA/BAS</td>
</tr>
<tr>
<td><strong>27820 BA</strong></td>
</tr>
<tr>
<td><strong>Operating Sheath</strong>, 8.5/9.5 Fr., working length 15 cm</td>
</tr>
<tr>
<td><strong>27820 BAS</strong></td>
</tr>
<tr>
<td><strong>Operating Sheath</strong>, for the supine position, 8.5/9.5 Fr., working length 18 cm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dilator and operating sheaths for MIP S</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>27820 AB</strong></td>
</tr>
<tr>
<td><strong>One Step Dilator</strong>, with central channel for guide wires, for use with 11/12 Fr. Operating Sheath 27820 BB</td>
</tr>
<tr>
<td><strong>27820 BB</strong></td>
</tr>
<tr>
<td><strong>Operating Sheath</strong>, 11/12 Fr., working length 15 cm, for continuous irrigation and suction</td>
</tr>
<tr>
<td><strong>27820 BBS</strong></td>
</tr>
<tr>
<td><strong>Operating Sheath</strong>, for the supine position, 11/12 Fr., working length 18 cm, for continuous irrigation and suction</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Applicators for MIP XS/S</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>27820 CF</strong></td>
</tr>
<tr>
<td><strong>Applicator for Sealant</strong>, including sheath and rod, for use with Operating Sheaths 27820 BA/BB</td>
</tr>
<tr>
<td><strong>27820 CFS</strong></td>
</tr>
<tr>
<td><strong>Applicator for Sealant</strong>, for the supine position, including sheath and rod, for use with Operating Sheaths 27820 BAS/BBS</td>
</tr>
</tbody>
</table>
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

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

Automatic light source control

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

Dashboard

Live menu

Intelligent icons

Side-by-side view: Parallel display of standard image and Visualization mode
IMAGE1 S Camera System

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

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

FULL HD image

CLARA

FULL HD image

CHROMA

FULL HD image

SPECTRA A*

FULL HD image

SPECTRA B**

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

TC 200EN

**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

<table>
<thead>
<tr>
<th>Specifications</th>
<th>TC 200EN (H3-Link)</th>
</tr>
</thead>
</table>
| **HD video outputs** | - 2x DVI-D
  - 1x 3G-SDI |
| **Format signal outputs** | 1920 x 1080p, 50/60 Hz |
| **LINK video inputs** | 3x |
| **USB interface** | 4x USB, (2x front, 2x rear)
  2x 6-pin mini-DIN |
| **SCB interface** | |
| **Power supply** | 100–120 VAC/200–240 VAC |
| **Power frequency** | 50/60 Hz |
| **Protection class** | I, CF-Defib |
| **Dimensions w x h x d** | 305 x 54 x 320 mm |
| **Weight** | 2.1 kg |

**For use with IMAGE1 S**

**IMAGE1 S CONNECT Module TC 200EN**

TC 300

**TC 300**

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

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

<table>
<thead>
<tr>
<th>Specifications</th>
<th>TC 300 (H3-Link)</th>
</tr>
</thead>
</table>
| **Camera System** | TH 100, TH 101, TH 102, TH 103, TH 104, TH 106 (fully compatible with IMAGE1 S)
  - 22220055-3, 22220056-3, 22220053-3, 22220060-3, 22220061-3, 22220054-3, 22220065-3
  (compatible without IMAGE1 S technologies CLARA, CHROMA, SPECTRA*) |
| **LINK video outputs** | 1x |
| **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** | 1.86 kg |

*SPECRA A*: Not for sale in the U.S.

**SPECRA 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

<table>
<thead>
<tr>
<th>IMAGE1 FULL HD Camera Heads</th>
<th>IMAGE1 S H3-Z</th>
<th>IMAGE1 S H3-P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product no.</td>
<td>TH 100</td>
<td>TH 103</td>
</tr>
<tr>
<td>Image sensor</td>
<td>3x 1/3” CCD chip</td>
<td>3x 1/3” CCD chip</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>39 x 49 x 114 mm</td>
<td>35 x 47 x 88 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>270 g</td>
<td>226 g</td>
</tr>
<tr>
<td>Optical interface</td>
<td>integrated Parfocal Zoom Lens, f = 15–31 mm (2x)</td>
<td>pendulum system, fixed focus f = 16 mm</td>
</tr>
<tr>
<td>Min. sensitivity</td>
<td>F 1.4/1.17 Lux</td>
<td>F 1.4/1.17 Lux</td>
</tr>
<tr>
<td>Grip mechanism</td>
<td>standard eyepiece adaptor</td>
<td>standard eyepiece adaptor</td>
</tr>
<tr>
<td>Cable</td>
<td>non-detachable</td>
<td>non-detachable</td>
</tr>
<tr>
<td>Cable length</td>
<td>300 cm</td>
<td>300 cm</td>
</tr>
</tbody>
</table>

Specifications:

- **TH 100**
  - IMAGE1 S H3-Z Three-Chip FULL HD Camera Head, 50/60 Hz, IMAGE1 S compatible, progressive scan, soakable, gas- and plasma-sterilizable, with integrated Parfocal Zoom Lens, focal length f = 15–31 mm (2x), 2 freely programmable camera head buttons, for use with IMAGE1 S and IMAGE1 HUB™ HD/HD

- **TH 103**
  - IMAGE1 S H3-P Three-Chip FULL HD Pendulum Camera Head, 50/60 Hz, IMAGE1 S compatible, with pendulum system and fixed focus, progressive scan, soakable, gas- and plasma-sterilizable, focal length f = 16 mm, 2 freely programmable camera head buttons, for use with IMAGE1 S and IMAGE1 HUB™ HD/HD
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><strong>Wall-mounted with VESA 100 adaption</strong></td>
<td>9619 NB</td>
<td>9826 NB</td>
</tr>
<tr>
<td>Inputs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DVI-D</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Fibre Optic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3G-SDI</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>RGB (VGA)</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>S-Video</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Composite/FBAS</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Outputs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DVI-D</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>S-Video</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Composite/FBAS</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>RGB (VGA)</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>3G-SDI</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Signal Format Display:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:3</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>5:4</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>16:9</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Picture-in-Picture</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>PAL/NTSC compatible</td>
<td></td>
<td>●</td>
</tr>
</tbody>
</table>

**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><strong>Desktop with pedestal</strong></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>
Camera System IMAGE1

Camera Heads

For use with IMAGE1 Camera Control Unit 22200011U1xx and 22201011-1xx

IMAGE1 P3 Three-Chip Pendulum Camera Head

<table>
<thead>
<tr>
<th>PAL/NTSC</th>
<th>IMAGE1 P3 Three-Chip Pendulum Camera Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 2200 32-3</td>
<td>color systems PAL/NTSC, f = 16.8 mm,</td>
</tr>
<tr>
<td>22 2201 32-3</td>
<td>2 freely programmable camera head buttons</td>
</tr>
</tbody>
</table>

Fiber Optic Light Cables

for Cold Light Fountains

495 NAC

Fiber Optic Light Cable,
with safety locking device,
extremely heat-resistant,
diameter 3.5 mm, length 230 cm

495 NL

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

Cold Light Fountain XENON 300 SCB

<table>
<thead>
<tr>
<th>20133101-1</th>
<th>Cold Light Fountain XENON 300 SCB</th>
</tr>
</thead>
<tbody>
<tr>
<td>with built-in antifog air-pump, and integrated KARL STORZ Communication Bus System SCB</td>
<td></td>
</tr>
<tr>
<td>power supply:</td>
<td></td>
</tr>
<tr>
<td>100 – 125 VAC/220 – 240 VAC, 50/60 Hz</td>
<td></td>
</tr>
<tr>
<td>including:</td>
<td></td>
</tr>
<tr>
<td>Mains Cord</td>
<td></td>
</tr>
<tr>
<td>SCB Connecting Cord, length 100 cm</td>
<td></td>
</tr>
</tbody>
</table>

20133027

Spare Lamp Module XENON

with heat sink, 300 watt, 15 volt

20133028

XENON Spare Lamp, only,
300 watt, 15 volt

Cold Light Fountain Power LED 175

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

20132026

Xenon-Spare-Lamp, 175 Watt, 15 Volt
Data Management and Documentation
KARL STORZ AIDA® – Exceptional documentation

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

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

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

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

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

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

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

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

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

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

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

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

Equipment Cart
wide, high, rides on 4 antistatic dual wheels
equipped with locking brakes
3 shelves,
mains switch on top cover,
central beam with integrated electrical subdistributors
with 12 sockets, holder for power supplies,
potential earth connectors and cable winding
on the outside,

Dimensions:
Equipment cart: 830 x 1474 x 730 mm (w x h x d),
shelf: 630 x 510 mm (w x d),
caster diameter: 150 mm

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

Monitor Swifel 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 UG xxx

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

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