IMAGE1 S™ Camera Platform

mORe than a camera

IMAGE**1** **S**

STORZ
KARL STORZ—ENDOSKOPE

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A Modular Camera Platform

mORe than a camera

In minimally invasive surgery (MIS), excellent endoscopic imaging is a fundamental requirement for good surgical results.

Before the endoscopic image is displayed on the monitor, the image is relayed through various links of the imaging chain starting with the light source and ending with the displayed image on the monitor.

All these links form the endoscopic imaging chain. For over 75 years, KARL STORZ has been a worldwide leader in the field of endoscopy. Based in Tuttlingen (Germany), the family-run company offers complete systems with excellent image quality and carefully matched components.

The rapid development of camera technology in recent years has resulted in a better view of the surgical field and a much wider treatment spectrum. This ultimately leads to better outcomes for patients. New standards in resolution as well as new technologies and innovative approaches form the basis for this trend.

mORe than a camera

To meet the increased demands on visualization and account for greater complexity in minimally invasive surgery, KARL STORZ offers IMAGE1 S™, a modular camera system that gives users great flexibility both today and in the future.

From FULL HD to 4K resolution, from 2D to 3D, white light or fluorescent imaging – the choice lies with the user.

Four link modules for interdisciplinary use

**4K
FULL HD
2D/3D**

Automatic light source control

Opal1®: NIR/ICG BLI

Natural color rendition

Wide range of compatible devices

5 visualization technologies (S-Technologies)

Endoscopy & exoscopy

Rigid and flexible endoscopy

Modularity

Thanks to its modular concept, the IMAGE1 S™ camera platform offers a single system for diverse applications. In addition to the high image quality, the modular design of IMAGE1 S™ benefits different user groups. Thanks to operational consistency that is independent of the module composition, usability for all user groups can be increased.

Furthermore, a needs-based procurement is made possible. Only the module that is actually required for a specific application has to be procured. Any functions required at a later date can be easily integrated.
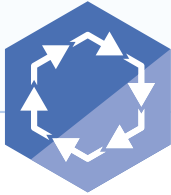
Sustainability

Sustainability plays a major role in many areas of life. This is also an important task for KARL STORZ and not only from an environmental standpoint. To enable our customers to profit from our systems in the future, forward and backward compatibility is an important component of our philosophy.

IMAGE1 S™ offers you a system that can be tailored to your needs and preferences.

Image quality

KARL STORZ is regarded as one of the pioneers in the field of endoscopic imaging. 4K offers four times more resolution than FULL HD.

In addition, IMAGE1 S™ features innovative visualization technologies that support tissue differentiation.

Studies have shown that 3D visualization helps to increase proficiency and to decrease the operating time.[1,2,3] This benefits both experienced and novice surgeons.[3]

Innovation

Fluorescence applications such as NIR/ICG and BLI (Blue Light Imaging) will support you in your day-to-day work. NIR/ICG (near infrared/indocyanine green) is used to visualize anatomic structures such as the vascular, hepatobiliary and lymphatic systems. It helps you identify various structures earlier and in a more differentiated manner. In the field of urology, BLI improves the visualization of bladder carcinoma.
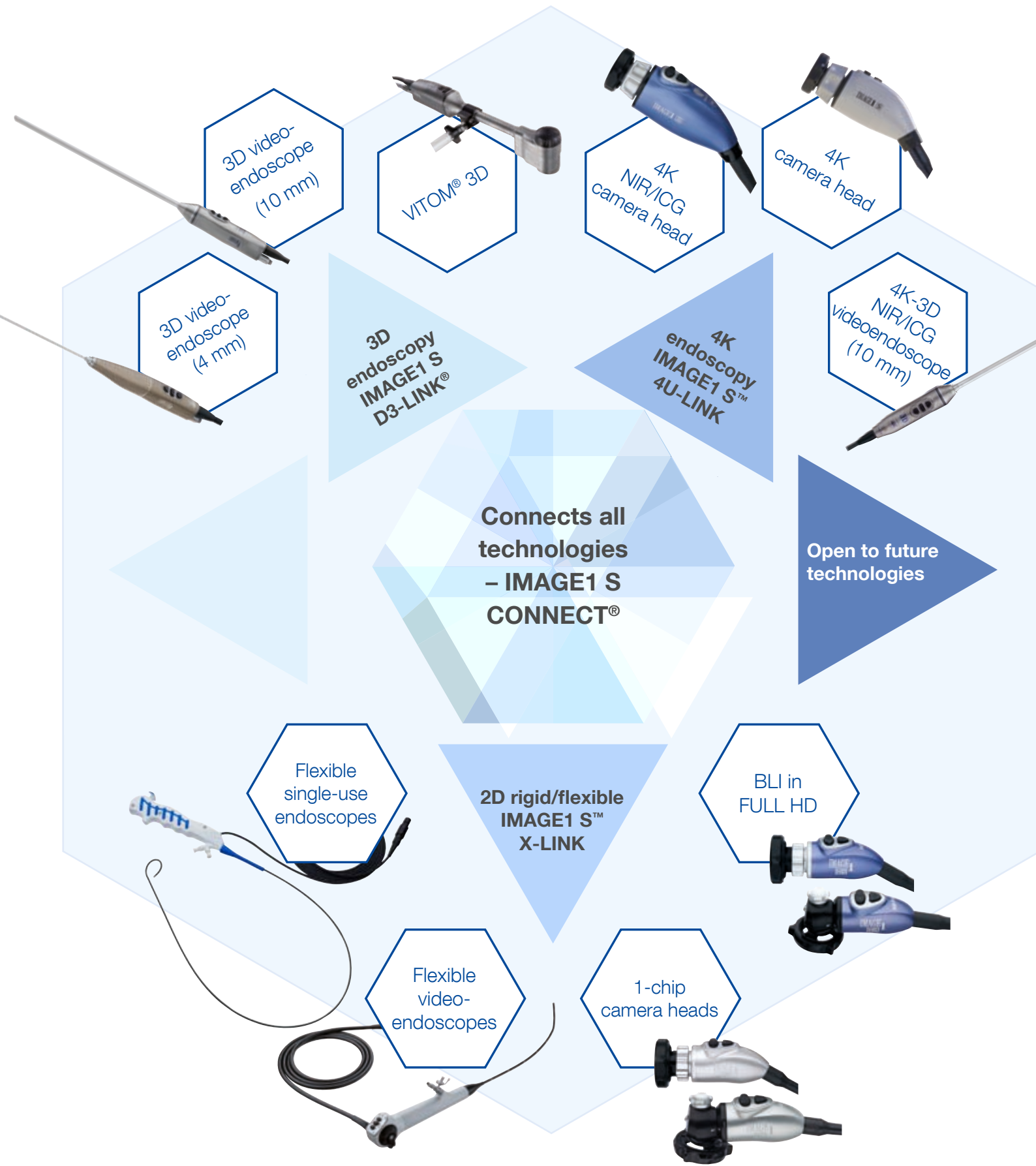
3D video-endoscope (10 mm)

VITOM® 3D

4K NIR/ICG camera head

4K camera head

3D video-endoscope (4 mm)

3D endoscopy IMAGE1 S D3-LINK®

4K endoscopy IMAGE1 S™ 4U-LINK

4K-3D NIR/ICG videoendoscope (10 mm)

Connects all technologies – IMAGE1 S CONNECT®

Open to future technologies

Flexible single-use endoscopes

2D rigid/flexible IMAGE1 S™ X-LINK

BLI in FULL HD

Flexible video-endoscopes

1-chip camera heads

Continuous development of Hardware...

November 2013
- IMAGE1 S™ launch
- 2D rigid; NIR/ICG; flexible videoendoscopes

May 2014
- Flex-X^C IMAGE1 S™ video uretero-renoscope

March 2015
- IMAGE1 S D3-LINK®/ implementation of 3D capability
- TIPCAM®1 S 3D LAP 0°/30°

September 2015
- IMAGE1 S™ HX/HX-P camera head

June 2016
- TIPCAM®1 S 3D 4 mm ORL

August 2016
- DCI® camera heads for mediastinoscopy

December 2016
- VITOM® 3D (exoscope with 4K sensors and 3D display)

June 2017
- IMAGE1 S™ HX/HX-P-FI camera head
- BLI in FULL HD

... and Software:

June 2016
- S-Technologies in 3D
- Zoom in 3D
- SCB® control for ENDOFLATOR® 40/50 and CO_2mbi® LED

November 2016
- Enhanced menu navigation

June 2017
- Patient data in the live menu
- Enhanced privacy settings

August 2018
- Integration of the new IMAGE1 S CONNECT® II
- Green color option for ICG fluorescence and integration into the Opal1® tile

October 2017

◆ IMAGE1 S™ 4U-LINK/IMAGE1 S™ 4U
camera head

◆ 4K resolution for endoscopy

August 2018

◆ IMAGE1 S CONNECT® II

June 2019

◆ Adaptive zoom

April 2020

◆ Integration of IMAGE1 S™ Rubina®

◆ Wider range of choices with regard to 2D/3D
outputs

◆ Implementation of the new
KS HIVE® communication standard

April 2020

◆ POWER LED Rubina®

◆ IMAGE1 S™ 4U Rubina®

◆ TIPCAM®1 Rubina®

June 2021

◆ NIR/ICG functionality TIPCAM®1 Rubina®

Q2 2022

◆ Integration of IMAGE1 S™ Saphira™

◆ Compatibility of single-use videoendoscopes

IMAGE1 S™ S-Technologies

Visualization technologies

S-Technologies provide various visualization options for the differentiation of tissue structures. A total of five different display options are available. Dark areas are brightened through homogeneous illumination while the display of structures is intensified with the help of contrast enhancement and certain areas of the color spectrum are emphasized more strongly by means of a color shift.

IMAGE1 S™ offers the possibility of a Picture-in-Picture display of the standard image and a selected S-mode.
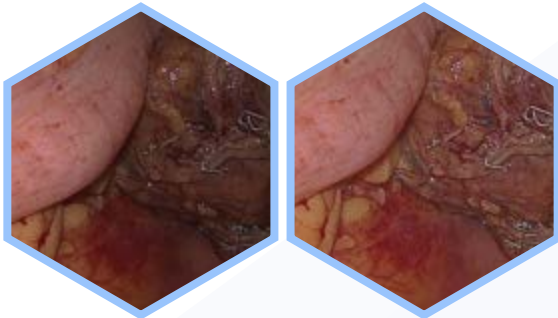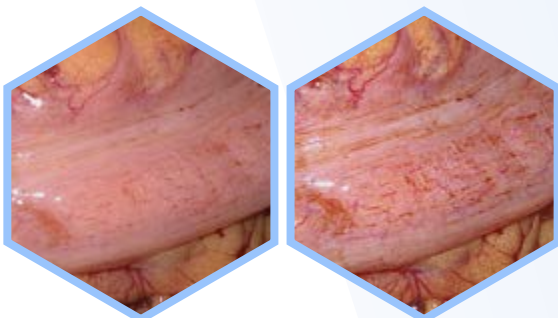
CLARA: Homogeneous image illumination

CLARA ensures homogeneous illumination in all areas so that details can also be perceived in dark areas. Overexposure and reflections are avoided while dark areas are simultaneously brightened.
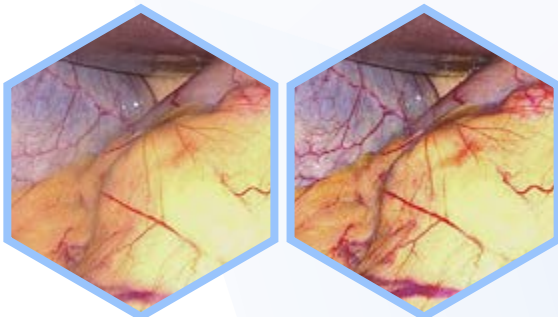
CHROMA: Contrast enhancement

The color contrast is intensified without altering the natural color experience. Color changes and structures are thus enhanced. The transition between different tissue types can become clearer.

CLARA + CHROMA: Homogeneous image illumination and contrast enhancement

With a combination of CLARA and CHROMA, the image is homogeneously illuminated and tissue structures are clearly enhanced.
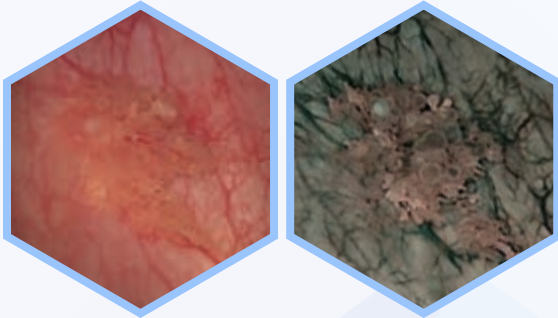
SPECTRA* A: Spectral color shift and switch

With SPECTRA A, the spectral color shift aids tissue differentiation. Red hues are removed by spectral filtration so that the most delicate red structures, such as blood vessels and the mucosa, are displayed in greenish-blue.
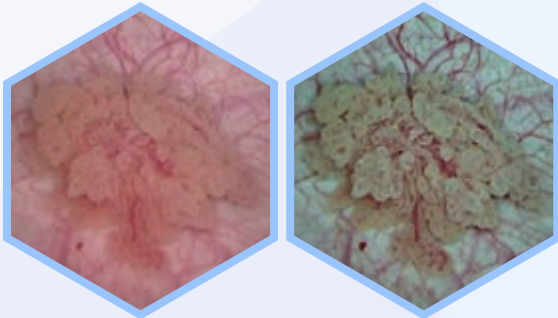
SPECTRA* B: Spectral color shift

With the spectral color shift, the reds are reduced and the greenish-blue spectral components are intensified. The image background becomes greenish, highlighting blood vessels and capillaries. The original color impression is largely maintained.

SPECTRA* B

CLARA

SPECTRA* A

S-TECHNOLOGIES

CHROMA

CLARA + CHROMA
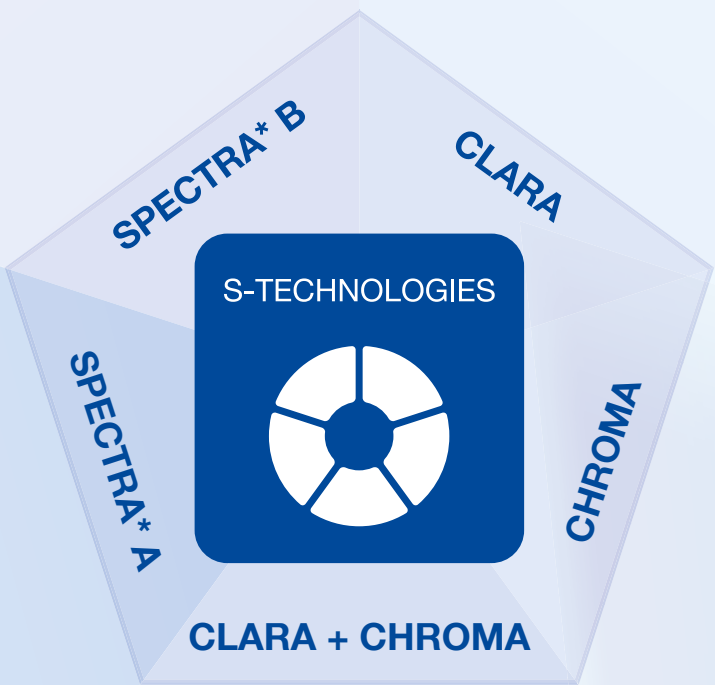
* Not for sale in the U.S.

IMAGE1 S™ 4U – mORe than a camera

IMAGE1 S™ 4U Camera Head

- 4K image resolution
- Brighter images and more detailed images compared to the predecessor model
- S-Technologies available
- Ergonomic design
- Compatible with IMAGE1 S™ 4U-LINK

IMAGE1 S CONNECT® II

- High-resolution camera system for multidisciplinary use
- Connection possibility for up to 3 Link modules

IMAGE1 S™ 4U-LINK

- Link module for 4K and 4K/3D
- 4K resolution and modern image processing technology

POWER LED 300

- Light intensity on the level of a 300 Watt Xenon light source
- Service life of at least 30,000 hours
- Constant light intensity throughout the entire service life
- Low temperature development
- Very low volume
- Energy savings thanks to greater efficiency

Monitor portfolio

- Various resolutions (4K/FULL HD), sizes and technologies (2D/3D) available
- 4K technology offers an extended color space combined with enhanced color saturation due to the implementation of the BT.2020 standard in the monitors
- Special tempered safety glass
- With a screen diagonal of 32", the monitors feature an enclosed glass surface that allows quick and easy wipe disinfection

Customer feedback:

"CLARA+CHROMA, fantastic. Clear image. It's an eye opener.
When you switch from the white light to CLARA+CHROMA it is like you
switch from a blurred image, I don't say it's bad. But from a blurred image to something
which is sparkling. And that makes me think about the diamond standard. Diamonds are sparkling.
That image is really sparkling. I'm loving it."

Prof. Jean de la Rosette
Professor of Urology at Amsterdam UMC, University Hospital in
Amsterdam, Netherlands
Professor of Urology at Istanbul Medipol University, Turkey

"Honestly, the quality of the vision was always superior compared to all products on the market.
What makes it different, is the quality not only of the definition of the camera but also the quality of the
software that allows you to play a little bit with the features of the camera and to improve your quality
of vision – the information you use to do a surgery."

Prof. Arnaud Wattiez
Head of Gynecology Department at Latifa Hospital, Dubai,
United Arab Emirates

"The overall image quality is fantastic."

Prof. Luigi Boni
Chief of Surgery, Gastrointestinal Surgeon, University of Milan, Italy

IMAGE1 S™ Rubina® – mORe to discover

Get to know the Rubina® family

IMAGE1 S™ 4U Rubina® – The new 4K-NIR/ICG camera head

- ◆ Native 4K image resolution with good image brightness as well as rich color and detail
- ◆ Opal1® NIR/ICG technology with new functionalities
- ◆ S-Technologies in white light and with overlay modes

TIPCAM®1 Rubina® – The new 4K-3D NIR/ICG videoendoscope

- ◆ Automatic horizon control for better orientation and handling
- ◆ 4K-3D NIR/ICG videoendoscopes with a diameter of 10 mm and 0° and 30° directions of view
- ◆ Easy toggle from 3D to 2D
- ◆ New Opal1® NIR/ICG visualization modes available

POWER LED Rubina® – The new LED light source for white light and NIR/ICG applications

- ◆ Laser-free LED light source for white light and NIR/ICG excitation
- ◆ Opal1® NIR/ICG technology with new functionalities
- ◆ Touch screen control
- ◆ Constant light intensity throughout the entire service life
- ◆ Very low volume*
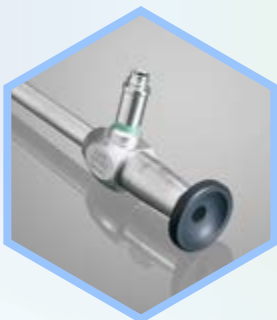
HOPKINS® Rubina® – Enhanced* NIR/ICG telescopes and new variants

- ◆ Specially designed for use in combination with the IMAGE1 S™ 4U Rubina® camera head and the POWER LED Rubina® light source
- ◆ Optimal illumination of the surgical site
- ◆ No refocusing required when switching between white light and NIR modes

In comparison with previous models

IMAGE1 S CONNECT® II

◆ High-resolution camera system for multidisciplinary use

◆ Connection possibility for use with up to 3 link modules

IMAGE1 S™ 4U-LINK

◆ Link module for 4K and 4K/3D

◆ 4K resolution and modern image processing technology

◆ Fluorescence imaging NIR/ICG in combination with the IMAGE1 S™ Rubina® product family

4K/3D monitors

◆ Coordinated parameters for an optimal imaging chain in conjunction with the IMAGE1 S™ camera system

◆ A 3D monitor and 3D glasses are required to display 3D images

◆ 4K technology offers an extended color space combined with enhanced color saturation due to the implementation of the BT.2020 standard in the monitors

IMAGE1 S™ Rubina® – mORe to discover

New NIR/ICG visualization modes

IMAGE1 S™ Rubina® combines the latest 4K, 3D and fluorescence imaging (NIR/ICG) technologies in one product family. The products feature 4K image quality in 2D and 3D as well as new NIR/ICG fluorescence modes. The new POWER LED Rubina® makes this possible.
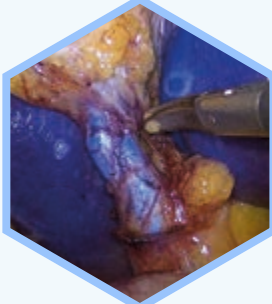
IMAGE1 S™ Rubina® provides Opal1® NIR/ICG technology with new functionalities for KARL STORZ fluorescence imaging with very good image brightness as well as rich color and detail.

Overlay

In the Overlay mode, the regular white light image is combined with the NIR/ICG data to generate an overlay image.
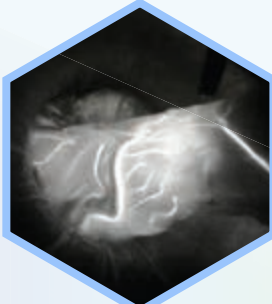
Source: Prof. Luigi Boni, Milan, Italy

Green or blue – you decide

Depending on your preferences and the application, the NIR/ICG data can be displayed as a green or blue overlay.

Source: Prof. Massimo Carlini, Rome, Italy
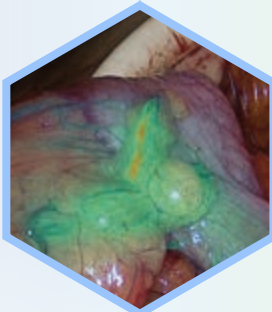

Monochromatic

In the monochromatic mode, the NIR/ICG signal alone is displayed in white on a black background to achieve the greatest possible differentiation.

Source: Prof. Luigi Boni, Milan, Italy

Intensity Map

The intensity map displays the intensity of the NIR/ICG signal using a color scale in an overlay image.

Source: Dr. Michael Zuend, Baar, Switzerland

Customer feedback:

"The new IMAGE1 S™ Rubina® and the new TIPCAM®1 Rubina® imaging components combine the best image quality with the possibility of intraoperative NIR/ICG imaging technology. Another improvement is the new automatic horizon control feature, which allows the surgeon to rotate the videoendoscope without losing the horizon."

Prof. Thomas Carus, Chief of Surgery, Klinik für Allgemein-, Viszeral- und Gefäßchirurgie, Niels-Stensen-Kliniken, Elisabeth-Krankenhaus Thuine, Germany

IMAGE1 S™ Saphira™ –
Enhance Your Options. Enhance Your View.

Flexibility in visualization

POWER LED Saphira™ – Boosting Your Level of Blue Light

The POWER LED Saphira™ can be used for both white light applications or fluorescence applications using blue light to display tumor cells. It offers a series of advantages and new possibilities.

- ◆ LED-based light source with two LEDs
  1x white light LED: Enhanced white light intensity*
  1x blue light LED: Higher light intensity*

- ◆ Both applications possible with autoclavable light cables

- ◆ Service life of at least 30,000 hours

The best possible fluorescence effect can be achieved through the use of the following components in combination with the POWER LED Saphira™:

IMAGE1 S™ HX-FI Camera Head

- ◆ Fluorescence imaging BLI (Blue Light Imaging)

- ◆ The following S-Technologies are available:
  Chroma, SPECTRA** A and SPECTRA** B

- ◆ Two models available
  (standard and pendulum)

- ◆ Lightweight, ergonomic design
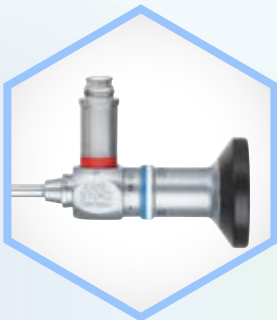
HOPKINS® BLI Telescopes

- ◆ Telescopes adapted to BLI applications

- ◆ With integrated fiberoptic light transmission

- ◆ Available with various viewing angles: 0°, 12°, 30°, 70°

IMAGE1 S CONNECT® II

- ◆ High-resolution camera system for multidisciplinary use

- ◆ Connection possibility for up to 3 Link modules

MAGE1 S™ X-LINK

- ◆ Compatible with IMAGE1 S™ HX camera heads

- ◆ FULL HD imaging

In comparison with previous models
*** Not for sale in the U.S.*

Customer feedback:

"Additional technologies such as 3D, 4K, ICG or BLI ensures a wide spectrum of imaging options."

Prof. Dr. med. Andreas Leunig, Specialist in Otorhinolaryngology,
Munich, Germany

"This system gives me the opportunity and benefit of using (just) one system with many different kinds of operations. It really is a nice combination with many technologies."

Dr. Ramiz Al Mukhtar, General and Bariatric Surgery,
Ramiz Al Mukhtar Clinic in St. Raphael Hospital,
Baghdad, Iraq

IMAGE1 S™ 3D – A Dimension Ahead

IMAGE1 S™ 3D provides surgeons with excellent depth perception. The 3D stereoscopic imaging system is particularly valuable for activities that demand a high degree of spatial perception. Thanks to the modular IMAGE1 S™ design, existing IMAGE1 S™ 2D systems can be upgraded to 3D. Studies have shown that 3D visualization can increase proficiency and decrease the operating time.[1,2,3] The innovative visualization technologies for tissue differentiation are now also available in 3D.

3D videoendoscopes with diameters of 10 mm and 4 mm can easily be integrated into the IMAGE1 S™ platform via the D3-LINK. The TIPCAM®1 S (FULL HD) and VITOM® 3D can be connected via the D3-LINK, which allows easy toggling between 2D and 3D imaging. The TIPCAM®1 Rubina® also offers the possibility to experience 3D visualization in 4K and is connected via the 4U-LINK. A 3D monitor and 3D glasses are required to display 3D images (additional information on the TIPCAM®1 Rubina® can be found on page 14).

VITOM® 3D

3D visualization for microsurgery and open surgery.
The VITOM® 3D system provides many surgical disciplines with a solution for the 3D visualization of microsurgical and open surgical interventions. Application possibilities are similar to that of the operating microscope. The most important functions are controlled via the IMAGE1 PILOT, which is mounted on the OR table in the direct vicinity of the surgeon.

Benefits of the VITOM® 3D system:

◆ Smaller, lighter, and more compact than an operating microscope

◆ Lower acquisition costs

◆ Synergistic effects with endoscopy thanks to integration in the endoscopy tower

◆ Ergonomic work – the user is not confined to the eyepiece

◆ Improved workflow – the OR team can view the procedure in the same image quality as the surgeon

◆ Great depth of field

IMAGE1 S™ System Overview

TC200, TC201

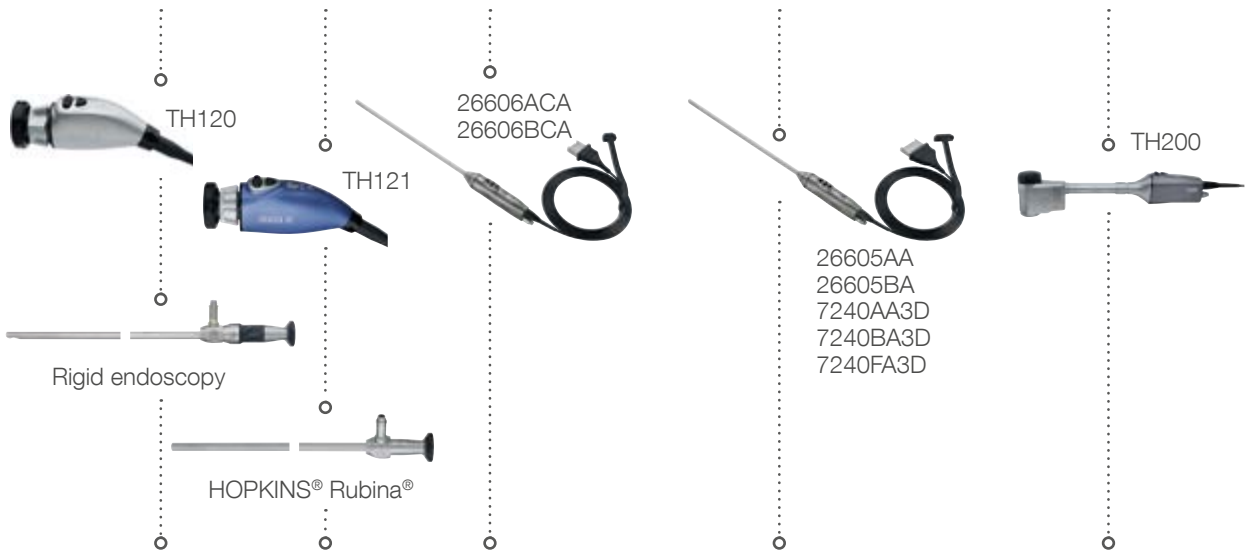**IMAGE1 S™ 4U-LINK**
Module for rigid endoscopy, 4K technology

TC304

IMAGE1 S D3-LINK®
Module for 3D endoscopy and VITOM® 3D

TC302

TH120

TH121

26606ACA
26606BCA

Rigid endoscopy

HOPKINS® Rubina®

26605AA
26605BA
7240AA3D
7240BA3D
7240FA3D

TH200

POWER LED Rubina®

TL400

POWER LED 300

TL300

4K Monitors

TM343|32", TM440|58",
TM441|43"

4K/3D Monitors

TM350|32", TM450|55"

TM003

3D Monitors

TM330|32", TM263|26"

IMAGE1 S CONNECT®
IMAGE1 S CONNECT® II

IMAGE1 S™ X-LINK
Module for flexible and rigid endoscopy

IMAGE1 S™ H3-LINK
Module for rigid endoscopy, FULL HD

TC301

TC300

Flexible videoendoscopes

TH112
TH113

TH110
TH111

TH100
TH102
TH103
TH104
TH106

BLI endoscope

Rigid endoscopes

Rigid endoscopes

20916025AIA

POWER LED Saphira™

POWER LED 300

POWER LED 175

20161401-1

TL410

TL300

FULL HD Monitor

FULL HD Monitor

TM220|27"

TM220|27"

Peripherals

A famous proverb says that a chain is only as strong as its weakest link. In imaging, many components are responsible for a good image. In addition to the more obvious components that influence the imaging chain (the telescope, camera head, image processor, and monitor), peripheral units also make a significant contribution to the viewing and user experience. In order to achieve the goal of the best possible visualization, technologies and solutions must also be considered here.

Peripherals from KARL STORZ can communicate with the IMAGE1 S™ camera platform, which also enables automated control of these units.

ENDOFLATOR® 50 –
The high-performance insufflator with integrated heating element

To be able to perform minimally invasive surgery, a stable cavity is essential. In many cases, this can only be achieved with the introduction of CO_2. Any changes in the cavity can affect the image impression as a result of altered light requirements or a change in the position of the telescope in relation to the boundaries of the cavity.

Powerful insufflators with a high flow rate and rapid control – among other factors – are required to counteract this effect.

With a high flow rate, high gas loss can be quickly counteracted, e.g., through smoke evacuation. Measurement/control at regular intervals ensures that the ENDOFLATOR® 40 or the ENDOFLATOR® 50 reacts to any changes in pressure conditions and restores pressure.

s-pilot® – Smoke evacuation control

The s-pilot® regulates the evacuation and filtering of surgical smoke during endoscopic procedures. The use of HF units in particular often generates a lot of smoke in the body and thus greatly obscures the image impression. To counteract this, the s-pilot® from KARL STORZ offers a solution for your smoke evacuation management. The s-pilot® helps to remove toxic smoke and thus ensures clear vision. In addition to improving image quality, this system also reduces unpleasant odors in the OR.

Product information

	TC201EN*	**IMAGE1 S CONNECT® II,** connect module, for use with up to 3 link modules, resolution 3840 x 2160 and 1920 x 1080 pixels, with integrated KARL STORZ-SCB or KS HIVE® and digital Image Processing Module, power supply 100–240 VAC, 50/60 Hz
	TC304	**IMAGE1 S™ 4U-LINK,** link module, for use with IMAGE1 S™ 4U camera heads, power supply 100-240 VAC, 50/60 Hz, for use with IMAGE1 S CONNECT® TC200 or IMAGE1 S CONNECT® II TC201
	TH121	**IMAGE1 S™ 4U Rubina®,** Opal1® NIR/ICG, two-chip 4K UHD camera head, S-Technologies available, for NIR/ICG fluorescence imaging in combination with POWER LED Rubina®, Opal1® NIR/ICG, progressive scan, low-temperature sterilization, focal length f=19 mm, 2 freely programmable camera head buttons, for use with IMAGE1 S CONNECT® II and IMAGE1 S™ 4U-LINK
	26606ACA / 26606BCA	**TIPCAM®1 Rubina®,** Opal1® NIR/ICG, 4K/3D, high-resolution videoendoscope with two distally integrated video chips, for NIR/ICG fluorescence imaging in combination with POWER LED Rubina®, direction of view 0° (26606ACA) and 30° (26606BCA), diameter 10 mm, length 32 cm, autoclavable, S-technologies available, freely programmable camera head buttons, for use with IMAGE1 S CONNECT® II and IMAGE1 S™ 4U-LINK
	TL400	**Cold Light Fountain POWER LED Rubina®,** for NIR/ICG fluorescence imaging and standard endoscopic diagnosis, with two LEDs and one KARL STORZ light cable connection, with integrated unit communication via KS HIVE®, power supply 100-125/220-240 VAC, 50/60 Hz

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

[1] Tanagho, Y.S. et al., Journal of Laparoendoscopic & Advanced Surgical Techniques, November 2012, 22(9): 865-870, doi: 10.1089/lap.2012.0220. "2D Versus 3D Visualization: Impact on Laparoscopic Proficiency Using the Fundamentals of Laparoscopic Surgery Skill Set"

[2] Alaraimi, B., et al. World J Surg (2014) 38: 2746, doi: 10.1007/s00268-014-2674-0 "A Randomized Prospective Study Comparing Acquisition of Laparoscopic Skills in Three-Dimensional (3D) vs. Two-Dimensional (2D) Laparoscopy"

[3] Feng, X. et al., Surgical Endoscopy, May 2015, Volume 29, Issue 5, pp 1231-1239 "3-Dimensional (3D) laparoscopy improves operating time in small spaces without impact on hemodynamics and psychomental stress parameters of the surgeon"

More than 75 Years

*Shaping the Future
of Endoscopy with you*

FOLLOW KARL STORZ

STORZ
KARL STORZ—ENDOSKOPE

96281053 TP 2 1.0 04/2023/MB-E