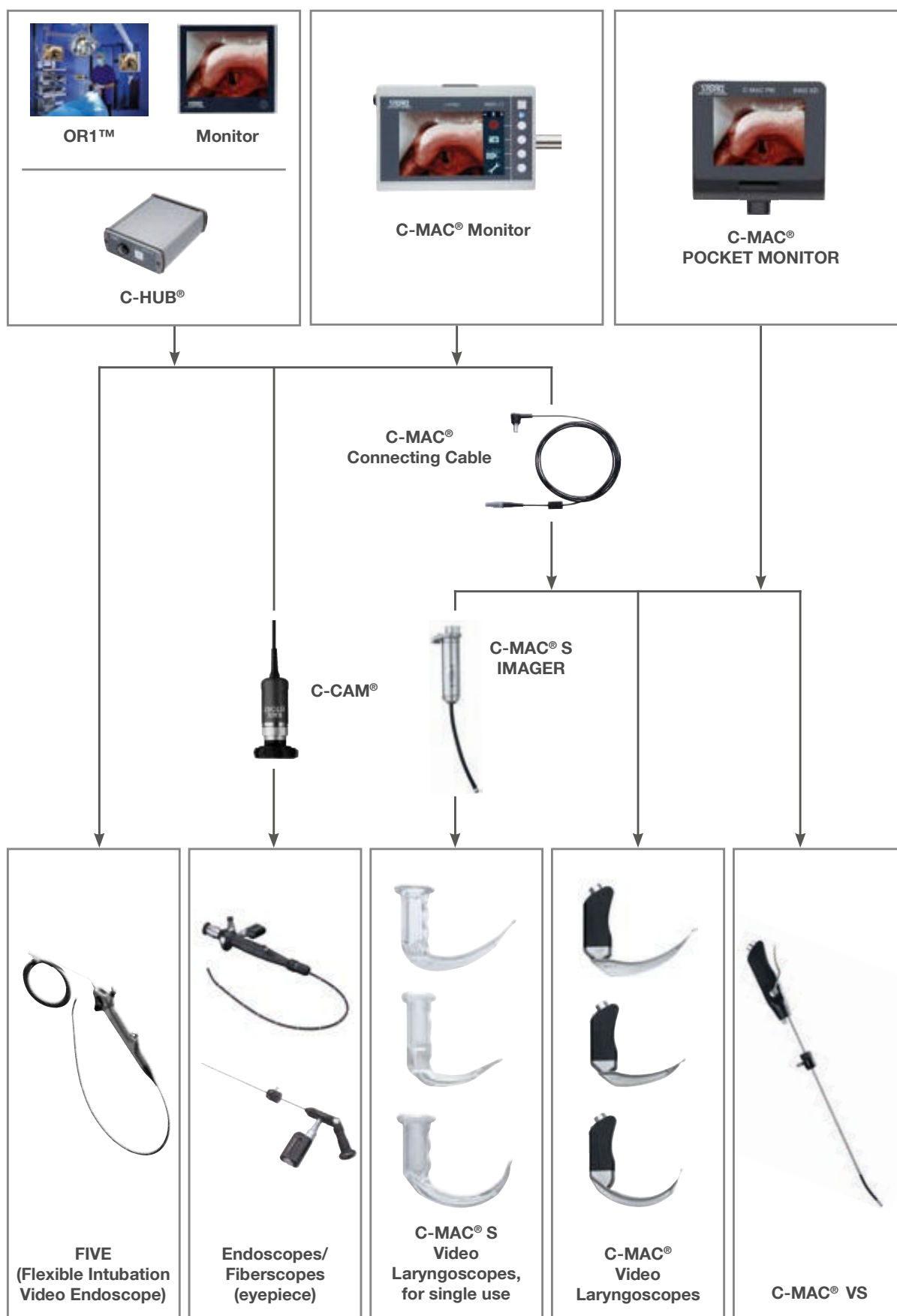


## Modern Airway Management with the C-MAC® system in bariatric surgery





## Do adipose patients present a weighty problem?

Obesity, defined as an independent disease in 2000 by the WHO, has almost doubled worldwide since 1980. According to WHO reports, more than 1.9 billion adults over 18 years of age were considered to be overweight in 2014 and it is likely that the number of obese patients will continue to rise.<sup>1</sup>

A high grade of adiposity is considered to be a good predictor for difficult intubation as airway management for patients with higher BMI categories presents increasing challenges for the intubator. In addition to specific anatomical conditions, the special positioning required for obese patients makes the anesthesiologist's work more difficult.

With the C-MAC® system, KARL STORZ offers a fully flexible airway management platform that allows the simultaneous connection of several endoscopes to a monitor for the first time.

The integration of the universal C-MAC® system interface offers the possibility to plan and execute intubation with one central system – the C-MAC® monitor.



<sup>1</sup> cf. WHO website, in: <http://www.who.int/mediacentre/factsheets/fs311/en/> (August 2017)

## No airway in sight?

Bariatric surgery is adapted to the particular features of adipose patients – only intubation is performed in a conventional manner. This dispenses with a decisive opportunity to minimize risks. Who would buy a car without an airbag?

Due to their weight, adipose patients feature anatomical characteristics that can lead to complications in intubation:

- Reduced neck mobility
- Short neck, allowing little or no reclinacion
- Small mouth opening
- Large chest circumference (especially in women)
- Large tongue
- Additional tissue folds reduce the oropharyngeal space
- Reduced lung volume
- High proportion of adipose tissue often prevents manipulation of the glottis.

Visualization of the larynx is often inadequate or even impossible as the anatomical conditions make laryngoscopy difficult.

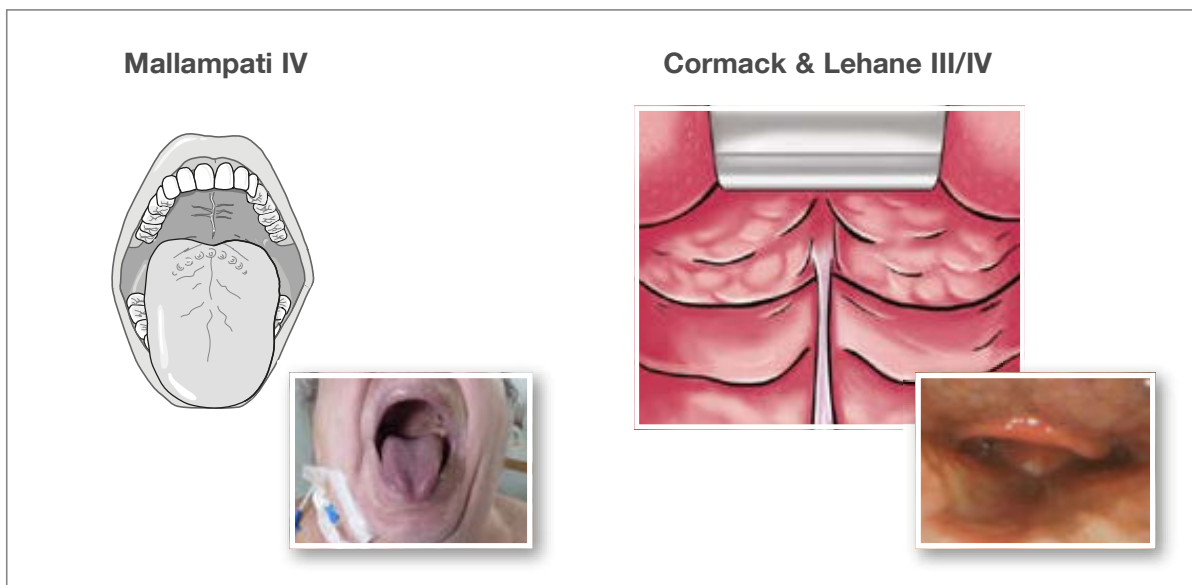


Fig.1: Mallampati and C&L classification of an adipose patient (Source: Archive PD Dr. Noppens, PD Dr. Piepho)

Awake fiberoptic intubation remains the gold standard in the expected difficult airway. The use of video laryngoscopes such as the C-MAC® or the C-MAC® POCKET MONITOR has led to a significant decrease in such awake intubations and has greatly enhanced patient safety. A study by KAPLAN MB et al showed that, in 84% of cases where the glottis was not visible, video laryngoscopy greatly improved the view of the glottis when compared to direct laryngoscopy<sup>2</sup>. In a further study, BYHAHN C et al came to the conclusion that the use of KARL STORZ video laryngoscopes enhanced visualization in expected difficult intubation.<sup>3</sup>

<sup>2</sup> KAPLAN MB et al. Comparison of direct and video-assisted views of the larynx during routine intubation. Journal of clinical anaesthesia. 2006 Aug; 18(5): 357-62

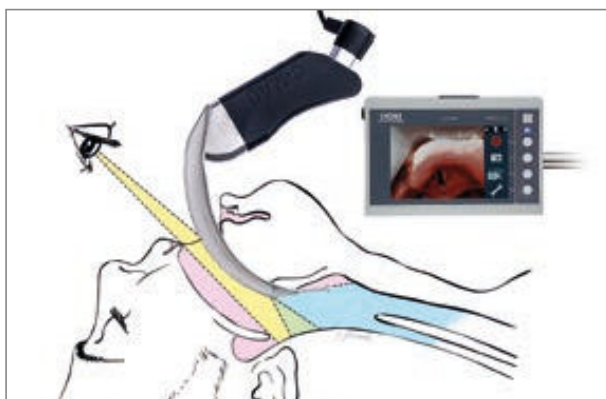
<sup>3</sup> BYHAHN C et al. Tracheal intubation using the mobile C-MAC video laryngoscope or direct laryngoscopy for patients with a simulated difficult airway. Minerva anaesthesiologica. 2010 Aug; 76(8):577-83

## Easy intubation even in the case of particular positioning



Fig. 2: Lateral positioning of an adipose patient (Source: Archive Prof. Dr. Byhahn)

## Look around the corner



With the C-MAC® video laryngoscope, intubation of patients in a lateral position is much easier than with a conventional laryngoscope. As the camera (CMOS chip) is located at the distal tip of the blade, a direct line of sight between the eyes and the glottis is not required.

Fig. 3: Video laryngoscopy allows, in contrast to conventional laryngoscopy, a "look around the corner" (light blue area with D-BLADE)

## 3Ts\* – Essential for Secure Video Laryngoscopy

- TIP:**  
Visualized blade tip  
for improved orientation
- TARGET:**  
Improved viewing of the  
target structure (glottis)
- TUBE:**  
Insertion of the tube  
possible without guiding  
stylet (MACINTOSH blade)



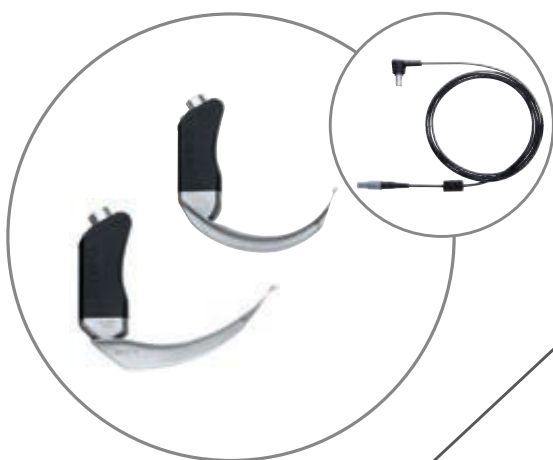
\* Preconditions for secure video laryngoscopy are that the Tip, Target, and Tube can be identified on the monitor.

# The C-MAC® Monitor: The

- System open to all C-MAC® components (forward and backward compatibility)
- 7" TFT wide viewing angle (160°) with enhanced image quality
- Rapid toggling between video images possible – “plan B” is already connected
- HDMI output for connecting an external monitor
- Documentation and display of images and videos in real time
- Easy data backup to USB flash drive for quality control
- System can be used while charging



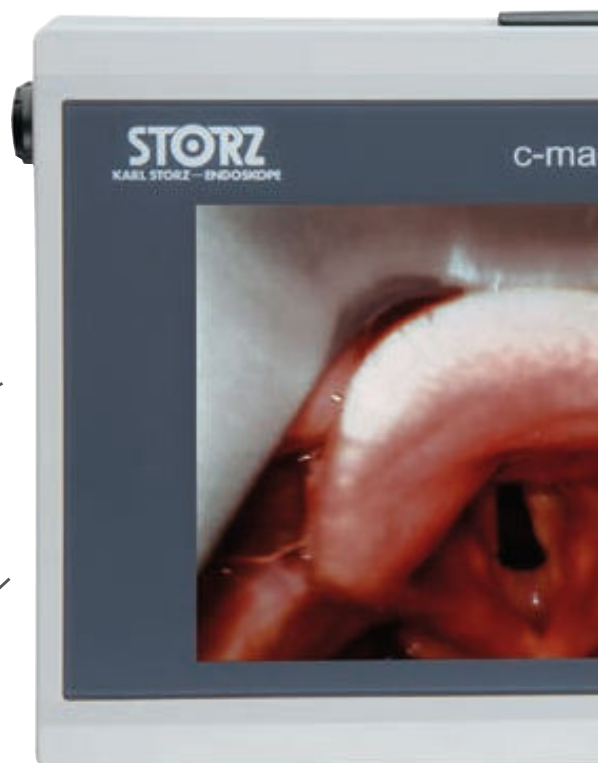
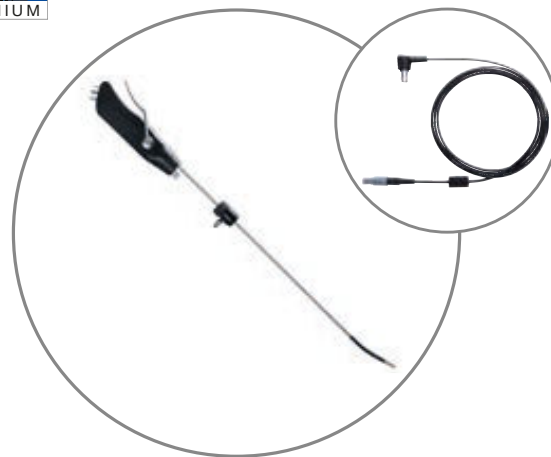
**C-MAC® Video Laryngoscopes**



**C-MAC® S Video Laryngoscopes**



**C-MAC® Video Stylet**





# Heart of the C-MAC® System

**Flexible Intubation  
Video Endoscopes**



**Intubation Fiberscopes**



**Retromolar  
Intubation Endoscopes**



# The C-MAC® Pocket Monitor: The Emerge

- 3.5" OTI® (Open To Intubate) display with wide view angle (160°)
- High-contrast image even in bright daylight
- Universal C-MAC® system interface, tailored to your airway management
- Real-time documentation for quality assurance
- Exchangeable, rechargeable battery – always ready for use
- Completely watertight (IPX8)
- C-MAC® PM connecting cable allows optimal visualization coupled with a well-balanced C-MAC® video laryngoscope



## C-MAC® Video Laryngoscopes

- Standard MACINTOSH video laryngoscopes for safe intubation
- D-BLADE Ped. with strong curvature for the particularly difficult airway



## C-MAC® S Video Laryngoscopes

- Single-use video laryngoscopes for optimal protection against cross-contamination



## C-MAC® Video Stylet

- Deflectable distal tip combines the advantages of both rigid and flexible intubation endoscopes

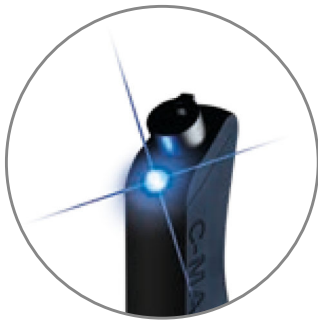


# ncy Tool for Time-critical Situations



## OTI® (Open To Intubate) Display

- The video laryngoscopes are ready for immediate use after starting the monitor



## Real-time Documentation for Quality Assurance

- BlueButton enables images and videos to be recorded to internal memory and retrieved via the USB data cable



## Intelligent Battery Management

- Uninterrupted readiness at no extra cost thanks to exchangeable and rechargeable battery



## C-MAC® PM Connecting Cable

- The C-MAC® PM connecting cable enables flexible positioning of the monitor for difficult-to-access patients

## The C-MAC® Video Laryngoscope for Bariatric Surgery

### The premium class for your airway management

- Robust and light: High stability and shock resistance; light alloy design
- Particularly flat model, especially suited for bariatric surgery
- Straightforward Plug & Play thanks to universal C-MAC® system interface
- BlueButton: Documentation via innovative multifunctional button
- Reprocessing up to 93 °C
- Ergonomic handle design
- For routine clinical use and training



### C-MAC® MACINTOSH #4 and #3



### C-MAC® D-BLADE



### C-MAC® GUIDE



The C-MAC® GUIDE is adapted to the special blade shape of the D-BLADE and is thus an ideal tool for the placement of endotracheal tubes. The distal angle of the guide makes it suitable for use with all C-MAC® MACINTOSH video laryngoscopes.

**NEW**

## The C-MAC® S IMAGER

**The ideal solution with single-use video laryngoscope blades**



The single-use video laryngoscope blades form a perfect symbiosis with the reusable C-MAC® S IMAGER while meeting the highest hygiene standards.

- Blade and handle form one continuous piece: Risk of cross-contamination is drastically reduced
- Exchange of C-MAC® S video laryngoscopes within seconds
- BlueButton: Documentation via innovative multifunctional button
- Straightforward Plug & Play thanks to universal C-MAC® system interface

### C-MAC® S IMAGER



Top view:  
C-MAC® system interface

### C-MAC® S MACINTOSH #4 and #3



### C-MAC® S D-BLADE



## The New Gold Standard: FIVE for the Expected Difficult Airway

### Fine, fast, focused – the new visualization in flexible intubation

With the new Flexible Intubation Video Endoscopes (FIVE) 5.5 x 65, 4.0 x 65 and 3.0 x 51.5, KARL STORZ once again sets a new direction in airway management. Similar to the C-MAC® video laryngoscopes, the FIVEs deliver clear, pixel-free images without a Moiré effect. The flexible intubation video endoscopes are directly connected to the C-MAC® monitor. This allows you to switch to the video laryngoscope very rapidly whenever necessary.

- Compatible with the C-MAC® monitor and the C-HUB® camera control unit
- Compact design and ergonomic handle shape
- Checks positioning of double lumen tubes (DLT)
- For inspection of the airways
- Practical tube fixation with patented adaptor
- High image resolution and video imaging in 4:3 format
- Integrated LED light source



**NEW**

## The C-MAC® VS (Video Stylet)

**Redefine your limits!**



The C-MAC® VS can be considered a successor to the familiar retromolar intubation endoscope. Thanks to its sheath and deflectable tip, the C-MAC® VS combines the advantages of both rigid and flexible intubation endoscopes and is therefore of particular benefit in bariatric surgery or for patients with a restricted mouth opening or cervical spine problems. Thanks to the patented product design featuring a sheath with distal bend, the sheath can easily be adapted to specific anatomic conditions. The high-resolution CMOS chip ensures clear, pixel-free images in a 4:3 format without a Moiré effect.

- Straightforward Plug & Play thanks to universal C-MAC® system interface
- BlueButton: Documentation via innovative multifunctional button
- Reprocessing up to 65° possible
- Completely watertight (IPX8)
- Angulation up to 60° with attached ETT
- Continuous O<sub>2</sub> flow available via the tube adaptor extends the time window for intubation



## Accessories: Little things that make work easier

We do not stop working when our products are finished – because we want to make life easier for you...

How are flexible fiberscopes and rigid eyepiece endoscopes connected to the monitor?

**With C-CAM®.**



And how are instruments stored?

**In addition to the unobtrusive C-MAC® protective cover and the well-organized C-MAC® PM bag...**



**...we can also offer mobile airway management solutions.**





## Instruments



8403ZXK

**C-MAC® Monitor for CMOS Endoscopes**, screen size 7" with 1280 x 800 pixel resolution, two camera inputs, a USB and a HDMI port, optimized user interface, video and image capture in real time on SD card, playback of recorded video clips and still images, data transfer from SD card to USB flash drive possible, splash-proof according to IP54, suitable for wipe disinfection, shock-resistant ABS plastic housing, intelligent power management with rechargeable Li-Ion batteries, VESA 75 mounting option, power adaptor for EU, UK, USA and Australia, power supply 110-240 VAC, 50/60 Hz, for use with CMOS video endoscopes

including:

**Protection Cap**

**VESA 75 Quick Clip**

**Mains Adaptor Set**



8403X

**C-MAC® Connecting Cable**, with C-MAC® system interface, for C-MAC® Monitor 8403ZXK or C-HUB® II 20290301, length 200 cm, for use with C-MAC® Video Laryngoscopes 8403xxx



8403XDK

**C-MAC® POCKET MONITOR Set**, unit with LCD monitor and power supply for all C-MAC® video laryngoscopes, with C-MAC® system interface, screen size 3.5", documentation of images and video sequences saved on internal memory, monitor movable via two rotation axes, rechargeable Li-Ion battery, 1 h operation time, exchangeable battery pack, 2 h charging time, power management with capacity indicator, protection class IPX8, for use with C-MAC® Video Laryngoscopes 8403xxx

including:

**Battery**, rechargeable

**USB Data Cable**



8403XDP

**C-MAC® PM Connecting Cable**, for the transmission of digital signals from C-MAC® PM 8403XD to C-MAC® Video Laryngoscopes 8403xxx (C-MAC® system interface), length 50 cm



**8403XDL** **Charging Unit**, for one rechargeable battery 8403XDA for C-MAC® POCKET MONITOR 8403XD, with power supply and mains adaptor for EU, UK, USA and AUS, power supply 100-240 VAC, 50/60 Hz, suitable for wipe disinfection, for use with battery for C-MAC® PM



**8403XDA** **Battery**, rechargeable Li-Ion battery for power supply of C-MAC® PM 8403XD, charging via Charging Unit 8403XDL, optimal operation time of 60 min, suitable for wipe disinfection



**8403XDD** **USB Data Cable**, USB 2.0 port, for data transfer from C-MAC® PM 8403XD to a computer, length 200 cm



**20290132** **C-CAM® Camera Head**, 8-pin, one-chip CMOS camera head, resolution 640 x 480, focal length  $f = 20$  mm, for use with C-HUB® 20290101 and C-HUB® II 20290301 as well as C-MAC® Monitors 8402ZX/8403ZX



**8403BX/BXC** **C-MAC® Video Laryngoscope MAC #4**, CMOS technology, with MACINTOSH laryngoscope blade, size 4, with C-MAC® system interface, documentation of images and video sequences via BlueButton, with catheter introduction sizes 16-18 Fr., for use with C-MAC® Connecting Cable 8403X for C-MAC® Monitor 8403ZX or C-HUB® II 20290301 as well as C-MAC® PM 8403XD



**8403AX/AXC** **C-MAC® Video Laryngoscope MAC #3**, CMOS technology, with MACINTOSH laryngoscope blade, size 3, with C-MAC® system interface, documentation of images and video sequences via BlueButton, with catheter introduction sizes 14-16 Fr., for use with C-MAC® Connecting Cable 8403X for C-MAC® Monitor 8403ZX or C-HUB® II 20290301 as well as C-MAC® PM 8403XD



**8403HX** **C-MAC® Video Laryngoscope D-BLADE**, for adults, CMOS technology, for difficult intubation, with C-MAC® system interface, documentation of images and video sequences via BlueButton, with catheter introduction sizes 16-18 Fr., for use with C-MAC® Connecting Cable 8403X for C-MAC® Monitor 8403ZX or C-HUB® II 20290301 as well as C-MAC® PM 8403XD



8403XSI

**C-MAC® S IMAGER**, for manual and machine disinfection up to 65 °C and High Level Disinfection (HLD) acc. to US standards, for use with C-MAC® Monitor 8403ZX and single-use C-MAC® S Video Laryngoscopes 051113-10, 051114-10 and 051116-10



051114-10\*

**C-MAC® S Video Laryngoscope MAC #4**, with MACINTOSH laryngoscope blade, size 4, for single use, package of 10, for use with KARL STORZ C-MAC® S IMAGER 8402XS, 8403XS or 8403XSI



051113-10\*

**C-MAC® S Video Laryngoscope MAC #3**, with MACINTOSH laryngoscope blade, size 3, for single use, package of 10, for use with KARL STORZ C-MAC® S IMAGER 8402XS, 8403XS or 8403XSI



051116-10\*

**C-MAC® S Video Laryngoscope D-BLADE**, laryngoscope blade for difficult intubation, for single use, package of 10, for use with KARL STORZ C-MAC® S IMAGER 8402XS, 8403XS or 8403XSI



8401DS

**C-MAC® GUIDE**, guide rod made of stainless steel with atraumatic tip, distal region is adapted to the blade shape of the C-MAC® video laryngoscope D-BLADE, fixation of endotracheal tube with the integrated tube holder possible, package of 10, for use with C-MAC® video laryngoscopes





- 10331BXK C-MAC® VS, Set,** rigid intubation video endoscope, with deflectable tip, CMOS technology, with C-MAC® system interface, documentation of images and video sequences via BlueButton, including Tube Holder 10331BAX and Leakage Tester 13242XL, for use with C-MAC® Connecting Cable 8403 X for C-MAC® Monitor 8403ZXK or C-HUB® II 20290301 as well as C-MAC® PM 8403XD



- 11301BNXK Flexible Intubation Video Endoscope Set 5.5 x 65,** CMOS technology, with suction valve, for use with C-MAC® Monitors 8402ZX/8403ZX, C-HUB® 20290101 and C-HUB® II 20290301
- |                                 |           |
|---------------------------------|-----------|
| Deflection up/down:             | 140°/140° |
| Direction of view:              | 0°        |
| Angle of view:                  | 100°      |
| Working length:                 | 65 cm     |
| Total length:                   | 94 cm     |
| Working channel inner diameter: | 2.1 mm    |
| Distal tip outer diameter:      | 5.5 mm    |



- 11302BDXK Flexible Intubation Video Endoscope Set 4.0 x 65,** CMOS technology, with suction valve, for use with C-MAC® Monitor 8403ZX and C-HUB® II 20290301
- |                                 |           |
|---------------------------------|-----------|
| Deflection up/down:             | 140°/140° |
| Direction of view:              | 0°        |
| Angle of view:                  | 100°      |
| Working length:                 | 65 cm     |
| Total length:                   | 93 cm     |
| Working channel inner diameter: | 1.5 mm    |
| Distal tip outer diameter:      | 4.0 mm    |



- 8403YD Protective Bag, blue, for the C-MAC® system,** made of water-resistant and sturdy material, washable, separate compartments for the monitor and three C-MAC® video laryngoscope blades with electronic module, for use with C-MAC® Monitor 8401ZX/8402ZX/8403ZX, Electronic Module 8401X/8402X, power supply and 3x C-MAC® video laryngoscopes



- 8403YE Bag for Intubation Set -C22-, ULM model,** made of water-resistant and sturdy material, washable, separate compartments for C-MAC® video laryngoscopes with C-MAC® POCKET MONITOR and for conventional laryngoscopes, for use with C-MAC® POCKET MONITOR 8401XDK/8403XDK, C-MAC® Video Laryngoscopes 8401xxx/8403xxx and conventional laryngoscopes



UG120

**Equipment Cart**, narrow, tall, rides on 4 antistatic dual wheels equipped with locking brakes, mains switch on cover, central beam with integrated electrical subdistributors with 12 sockets, grounding plugs, Dimensions in mm (w x h x d):  
Equipment Cart: 660 x 1474 x 730,  
Shelf: 450 x 25 x 510, caster diameter: 150 mm, including:  
**Base Module**, equipment cart, narrow  
**Cover**, equipment cart, narrow  
**Beam Package**, equipment cart, large  
3x **Shelf**, narrow  
**Drawer Unit with Lock**, narrow  
2x **Equipment Rail**, long  
**Camera Holder**  
5x **Mains Cords**, length 100 cm

UG110

**Equipment Cart**, narrow, small, rides on 4 antistatic dual wheels equipped with locking brakes, mains switch on cover, energy beam with integrated electrical subdistributors with 6 sockets, grounding plugs, Dimensions in mm (w x h x d):  
Equipment Cart: 660 x 1265 x 730,  
Shelf: 450 x 25 x 510, caster diameter: 150 mm, including:  
**Base Module**, equipment cart, narrow  
**Cover**, equipment cart, narrow  
**Beam Package**, equipment cart, small  
2x **Shelf**, narrow  
**Drawer Unit with Lock**, narrow  
2x **Equipment Rail**, long  
5x **Mains Cords**, length 100 cm

8401YB

**Clamp**, VESA 75 standard, for fixation of C-MAC® monitor to round profile with diameter 20-43 mm and square profile with diameter 16-27 mm, for use with Monitors 8401ZX/8402ZX/8403ZX

8401YAB

**Crossbar**, for Stand 8401 YA, 70 cm x diameter 25 mm, for positioning C-MAC® Monitors 8401ZX, 8402ZX and 8403ZX, for use with VESA 75 Quick Clip 8401YCA and Clamp 8401YB

UG630

**Bracket**, for mounting standard bars (diameter 25 mm) to equipment rails, package of 2

UG623

**Multifunctional Holder**, 2-part, for mounting poles, diameter 25 mm, package of 2, for use with Equipment Carts UGxxx



8401YA\*

**Stand**, for C-MAC® monitor, height 120 cm, rollable with five feet and antistatic castors, crossbar 25 cm x diameter 25 mm for positioning the monitor, with tray, dimensions (w x d x h): 30 x 20 x 10 cm, for use with Crossbar 8401YAA and Crossbar 8401YAB

\* The displayed instruments are not included with the stand.



8401YH

**Holder for C-MAC®**, consisting of two parts: 1 holder for five C-MAC® video laryngoscope blades and 1 holder for one electronic module, made of thermoplastic material, wipe disinfection, to be fixed to a tray



11301BC

**ProShield Protective Tube**, for flexible telescopes, unsterile, for single use, package of 10, distal closed, for use with Holder for Flexible Endoscopes 29005IFH

29005IFH

**Holder for Flexible Endoscopes**, for mounting to standard tubes, incl. installation accessories





20020086

**C-MAC® TROLL-E Mobile Stand**, rides on 4 antistatic dual wheels, 2 equipped with locking brakes, with stainless steel tube,

Dimensions:

Mobile stand: 670 x 1500 x 670 mm (w x h x d),

Caster diameter: 100 mm

Trolley is delivered unassembled.

including:

**Subrack**, for mobile stand

**Top Cover**, with guide sleeve

**Stainless Steel Tube**, length 135 cm

**Equipment Rail**

**Cross Tube Adaptor**

**Stainless Steel Round Pipe**, length 25 cm



20020085

**TROLL-E Airway Mobile Stand**, rides on 4 antistatic dual wheels, 2 equipped with locking brakes, for mounting monitors with VESA 75/100 connection, integrated cable conduit in vertical beam and cable manager, load capacity for monitor: max. 15 kg,

Dimensions:

Mobile stand: 670 x 1660 x 670 mm (w x h x d),

Caster diameter: 100 mm

Trolley is delivered unassembled.

including:

**Subrack**, for mobile stand

**Beam Module**, with tube

**Drawer**

**Equipment Rail**

**Cross Tube Adaptor**

**Stainless Steel Round Pipe**, length 25 cm



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



# 75 Years

*Shaping the Future  
of Endoscopy with you*



**STORZ**  
KARL STORZ — ENDOSKOPE  
THE DIAMOND STANDARD

KARL STORZ SE & Co. KG  
Dr.-Karl-Storz-Straße 34, 78532 Tuttlingen/Germany  
Postbox 230, 78503 Tuttlingen/Germany  
Phone: +49 7461 708-0  
Fax: +49 7461 708-105  
E-Mail: [info@karlstorz.com](mailto:info@karlstorz.com)  
[www.karlstorz.com](http://www.karlstorz.com)





**8404YA\***

**Rolling Stand**, for C-MAC® Monitor, height 1340 cm, with five antistatic castors, cross tube connection and crossbar 250 mm, diameter 25 mm, for positioning the monitor, storage tray dimensions (w x d x h): 300 x 200 x 150 mm, with blade holder and cable winder, for use with ET11-367224 Crossbar 500 mm and ET11-367154 Crossbar 700 mm

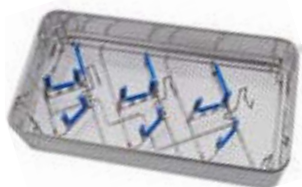
\* Please note: The instruments displayed are not delivered with the stand.



**8404AKH**

**Wire Tray**, including blade holder for C-MAC® and cable winder, for use with standard rails 10 x 25 mm, including:

**Wire Tray**  
**Blade Holder for C-MAC®**  
**Cable Winder**



**39501LC3**

**Wire Tray**, for the cleaning, sterilization and storage of three C-MAC® video laryngoscope blades, with silicone holders and lid, external dimensions (w x d x h): 480 x 250 x 105 mm



**8404IFH**

**Holder for Flexible Endoscopes**, for mounting on round profiles, including installation accessories



**11301BC**

**ProShield Protection Tube**, for flexible telescopes, unsterile, for single use, package of 10, distal closed, for use with Holder for Flexible Endoscopes 29005IFH

## Instruments



8404ZXK

**C-MAC® HD Monitor for CMOS Endoscopes**, screen size 8" with 1920 x 1200 pixel resolution, two camera inputs, a USB and a HDMI port, optimized user interface via touch screen, video and image documentation in real time on SD card, playback of recorded video clips and still images, data transfer from SD card to USB flash drive possible, splash-proof according to IP54, suitable for wipe disinfection, shock-resistant ABS plastic housing, intelligent power management with rechargeable Li-Ion batteries, VESA 75 mounting option, power adaptor for EU, UK, USA and Australia, power supply 110-240 VAC, 50/60 Hz, for use with compatible CMOS video endoscopes including:

**Protection Cap**

**VESA 75 Quick Clip**

**Mains Adaptor Set**

**SD Card Ultra, 16 GB**



8403X

**C-MAC® Connecting Cable**, with C-MAC® system interface, length 200 cm, for use with C-MAC® Monitor 8403ZXK/8404ZXK, C-HUB® II 20290301 and C-MAC® video laryngoscope series 8403/8404



8403XDK

**C-MAC® POCKET MONITOR Set**, unit with LCD monitor and power supply for all C-MAC® video laryngoscopes, with C-MAC® system interface, screen size 3.5", documentation of images and video sequences saved on internal memory, monitor movable via two rotation axes, rechargeable Li-Ion battery, 1 h operation time, exchangeable battery pack, 2 h charging time, power management with capacity indicator, protection class IPX8, for use with C-MAC® video laryngoscope series 8403/8404 including:

**Battery**, rechargeable

**USB Data Cable**

**Protection Cap**, for reprocessing



8403XDC

**C-MAC® PM Protective Cover**, made of silicone, for use with C-MAC® Pocket Monitor 8403XD