

STORZ

KARL STORZ—ENDOSKOPE

en **Instruction For Use**
C-MAC® Video Laryngoscope 8403xxx and
Connection Cable 8403X



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1 General information

1.1 Reading the instructions for use

It is recommended that the suitability of the products for the planned procedure be checked prior to use.

These instructions for use are intended to serve as an aid in the proper handling, cleaning and, if need be, sterilization of the C-MAC® video laryngoscope and the monitor 8403 ZX. All of the necessary details and actions are clearly explained. We thus ask that you read these instructions carefully before proceeding to work with the instrument. Keep these instructions available for ready reference.

If the instructions for use are not followed, patients, users, or third parties may be injured. In addition, the device may be damaged.

1. Read the instructions for use carefully and follow them completely.
2. Keep the instructions for use clearly visible next to the product.

i Note the instructions for use of the C-MAC® monitor (Art. No. 96076008D)!

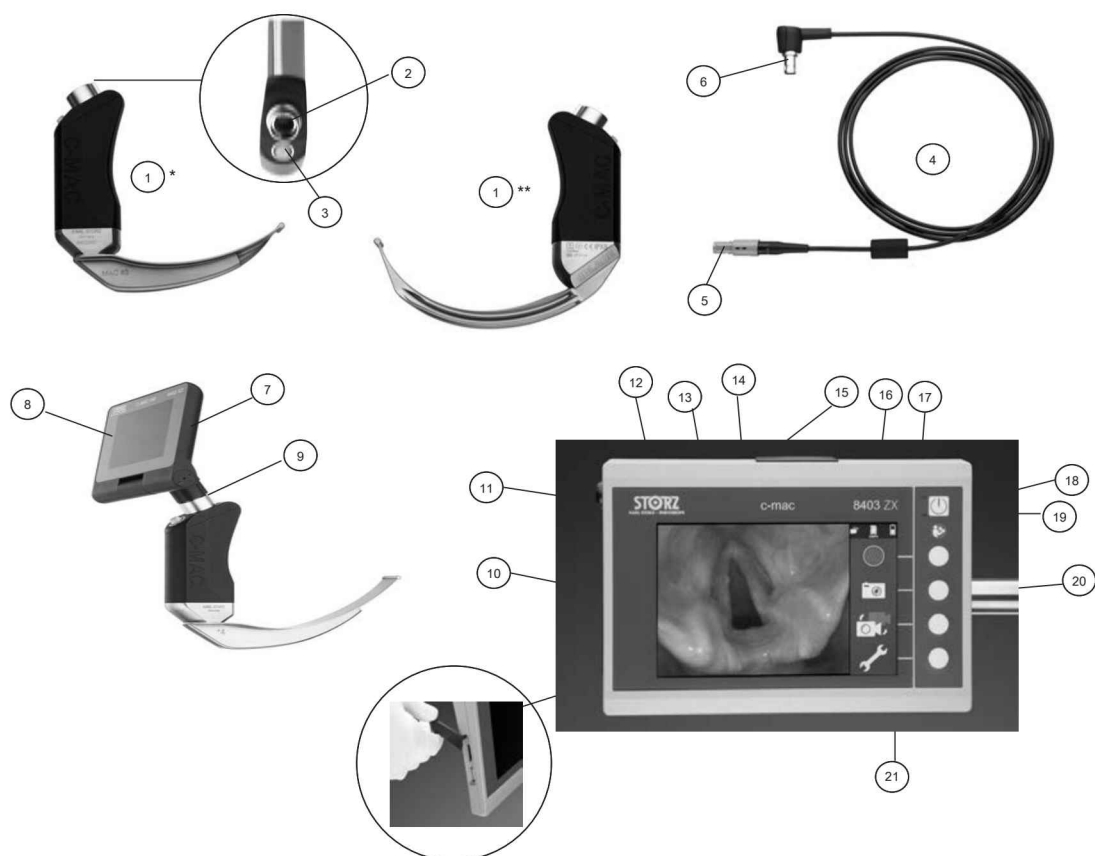
1.2 Scope

These instructions for use are valid for the following models: C-MAC® video laryngoscope 8403 AX/BX/HX/ AXC/BXC/DXC/EXC/GXC/KXC/MXC/HXP in connection with the video connecting cable 8403 X and monitor 8403 ZX or C-MAC® PM 8403 XD.

2 Product description

2.1 Product overview





* Models 8403 AXC/BXC/DXC/EXC/GXC/KXC/MXC/HXP
without guidance for suction catheter

** 8403 AX/BX/HX with guidance for suction catheter

- | | | | |
|----|-----------------------------------|----|---------------------------------------|
| 1 | C-MAC® Video Laryngoscope | 2 | Socket for video connecting cable (4) |
| 3 | Multifunction button (BlueButton) | 4 | Video connecting cable |
| 5 | Connection socket on monitor | 6 | Connection socket on laryngoscope |
| 7 | C-MAC® Pocket-Monitor | 8 | TFT display |
| 9 | Coupling element | 10 | C-MAC® Monitor |
| 11 | Second connection for videoscope | 12 | Primary connection for videoscope |
| 13 | Mains power connection | 14 | Reset button |
| 15 | Holder for SD memory card | 16 | Status bar |
| 17 | Power switch lamp | 18 | On/Off switch |
| 19 | Charge control lamp (orange) | 20 | Soft keys |
| 21 | Function symbols | 22 | HDMI port |
| 23 | USB port | | |

2.2 Packaging symbols

Symbol	Meaning
	Consult the instructions for use
	Keep away from sunlight
	Keep dry
	Temperature limit
	In accordance with US federal law (21 CFR 801.109), this product may only be sold to or on prescription from a licensed physician.
	Humidity limitation

2.3 Symbols on the product

Symbol	Meaning
	Follow the instructions for use
	Type BF device
	Serial number

3 Intended use

3.1 Intended purpose

C-MAC® Video laryngoscopes:

Video laryngoscopes are used to visualize the airways and vocal cords during endotracheal intubation and for the inspection and examination of the upper respiratory tract. Video laryngoscopes are designed for transient use in invasive procedures through a body orifice.

3.2 Contraindications

No contraindications relating directly to the product are currently known. The use of the C-MAC® video laryngoscope is contraindicated if, in the opinion of a responsible physician, the health of the patient is endangered through its use, for example, due to the patient's general condition, or if laryngoscopy as such is contraindicated.

3.3 Target user populations

The C-MAC® video laryngoscope may only be used by persons with an appropriate medical qualification and who are acquainted with the laryngoscopy technique. The information in these instructions for use is intended only to instruct in the correct handling, cleaning and sterilization of the C-MAC® video laryngoscope, and is not suitable as an introduction to laryngoscopy technique. The use of the C-MAC® video laryngoscopes must be used in accordance with the airway algorithm in the respective country of application or the official specifications for airway management.

3.4 Training in the operation and function of the device

Your local representative or responsible KARL STORZ member of staff is available to provide training and information on further training alternatives.

3.5 Target patient populations

Gender	No restriction
Age	No restriction
Weight	No restriction
Medical condition	Suitable for the treatment, taking into account the indications and contraindications, according to the opinion of the physician

3.6 User qualifications

Only physicians and medical support staff with a relevant specialist qualification and who have received training on the product may use the product. Only persons with appropriate specialist training may provide training. The user profile includes the following features:

- Recognized medical qualification of the user (specialist physician, qualified medical staff)
- Adequate powers of comprehension to rationally assess the current surgical situation
- Adequate language skills in the languages used in the instructions for use
- Be thoroughly trained in the operation and use of the medical device
- Knowledge of the contents of the instructions for use

- No physical impairments that could diminish perception of activation and alarm signals (visual and acoustic)

4 Safety

4.1 Serious incidents

A "serious incident" includes, according to MDD incidents, those which, directly or indirectly, had, could have had or could have any of the following consequences (MDD, Art. 2, No. 65 [1]):

- Death of a patient, user, or another person
- Temporary or permanent serious deterioration in the medical condition of a patient, user, or another person
- A serious threat to public health
- The manufacturer and appropriate authority should be notified of all serious incidents.

4.2 Description of warnings

To prevent any injury to persons or damage to property, the warning messages and safety instructions in the instructions for use must be observed. The warnings describe the following levels of danger.

⚠ WARNING

WARNING

Designates a possible imminent risk. If this is not avoided, it could lead to death or serious injuries.

⚠ CAUTION

CAUTION

Designates a possible imminent risk. If this is not avoided, it could lead to minor injuries.

ATTENTION

ATTENTION

Designates a possibly harmful situation. If this is not avoided, the product could be damaged.

4.3 Notes on use

Every user must be trained in the operation and use of the C-MAC® video laryngoscopes in combination with a C-MAC® Monitor 8403 ZX or C-MAC® PM 8403 XD, otherwise they may not be used.

The use of the C-MAC® video laryngoscopes together with a C-MAC® Monitor 8403 ZX or C-MAC® PM 8403 XD must be used in accordance with the airway algorithm in the respective country of application or the official specifications for airway management.

4.4 Unsterile instruments

These products are not sterile when delivered. The use of unsterile products poses a risk of infection for patients, users, and third parties.

- Reprocess products before first use.
- Inspect products for visible contamination before use. Do not use contaminated products.

4.5 Correct reprocessing

Incorrectly reprocessed products expose patients, users, and third parties to a risk of infection.

- ▶ The instructions for use "Cleaning, Disinfection, Care, and Sterilization of KARL STORZ Instruments" (item no. 96216003) must be downloaded from <http://www.karlstorz.com> and followed.
- ⇒ This is not applicable to U.S. market.

4.6 Risks from electric current

If several products supplied with energy are used simultaneously, the patient leakage currents accumulate. These leakage currents can exceed the limit values and injure patients.

- ▶ Only use products of the same type, for example, endotherapy device and application part of type CF.

4.7 Risks due to damaged parts

- ▶ Check the following points before and after every use of the product:
 1. Completeness
 2. Good working order
 3. Correct assembly of the components
 4. Functionality
- ▶ Inspect products for visible contamination before use. Do not use contaminated products.
- ▶ Reprocess the products before use.
- ▶ Do not leave missing or broken-off components inside the patient.

4.8 Damaged products

Damaged products can result in injury to patients, users, and third parties.

- ▶ Before every use, check all components of the product for damage.
- ▶ Do not use damaged products.

4.9 Combination with other devices and accessories

Combinations of medical devices are only assured to be safe if

- they are identified as such in the respective instructions for use or
- the intended use and interface specifications of the devices used in combination permit this.

The use of unauthorized devices and accessories or unauthorized changes to the product can result in injuries.

Additional devices connected to electrical medical equipment must comply with the relevant IEC or ISO standards (e.g. IEC 60950 for data processing equipment). Furthermore, all configurations must comply with the requirements for medical electrical systems (see IEC 60601-1-1 or clause 16 of the 3rd edition of IEC 60601-1).

Anybody connecting additional equipment to medical electrical equipment is a system configurator and is therefore responsible for the system's compliance with the standard requirements for systems. Please note that local laws take priority over the above-mentioned standard requirements. Should you have any queries, please contact your local specialist dealer or the Technical Service (Standard/directive references: IEC 60601-1+A1+A2:1995: 6.8.2.c, 19.2.b, 19.2.c, IEC 60601-1:2005: 7.9.2.5, 8.1, 16.2.d, MDD 93/42/EEC: Annex I clause 13.6.c).

4.10 Damage to the instrument

- The C-MAC® video laryngoscopes may not be cleaned in an ultrasound bath.

- The C-MAC® video laryngoscopes may not be sterilized with steam.

5 Installation and commissioning

5.1 Visual and functional test

Visual inspection



The medical device must be inspected for completeness, damage and integrity before and after every use. Tools such as a magnifying glass may be necessary to carry out the inspections.

Missing components, surface changes or other damage to the medical device limit its life span and may mean that the device can no longer be used for its intended purpose.

Check the instrument for:

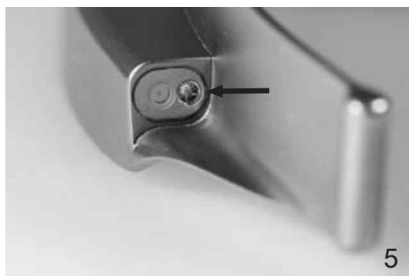
- Mechanical damage and changes, for example, sharp edges, burred edges, rough surfaces, protruding and bent parts (examples: Fig. 1 and 2)



- Signs of rust or corrosion
- Damage to the coating, such as shown in Fig. 3



- Complete and intact seals (that are not cracked, porous or swollen) and joints
- Residues and/or moisture present at the interfaces
- All components present and correctly positioned
- Mobility of all mobile components, if necessary once the components have been assembled in the case of instruments that can be dismantled
- Complete, intact and securely positioned telescope and lens systems, e.g. with a magnifying glass (examples Fig. 4 and 5)

**Test for proper operation**

Check the instrument for the following characteristics:

- Fully functional control keys
- Securely positioned connecting cable
- Functional image transmission
- Sufficient image quality
- Light transmission

5.2 Initial operation

The C-MAC® video laryngoscopes 8403 xxx can be operated with the following monitors:

- C-MAC® monitor 8403 ZX (software version: 704v300 or higher)
- C-MAC® PM Pocket-Monitor 8403 XD
- with other monitors via the camera control unit C-HUB® II 20 2903 01 (software version: 721v105 or higher)

⚠ WARNING**Danger due to user error in the wrong viewing mode**

Wrong viewing mode

- ▶ Before each use or after a change of viewing modes/settings, the user should check to ensure the view observed through the endoscope provides a live image, rather than a stored one, and has the correct image orientation.

- ① The connecting cable can be removed during operation and connected to another laryngoscope.

⚠ WARNING**Danger due to non-insulated parts**

Risk of injury due to electrical current:

- ▶ It must be ensured that the electrically non-insulated parts of the videoscope do not come into contact with conductive surfaces, e.g., voltage-carrying elements of other units, at any time.

⚠ WARNING

Optical radiation

The optical radiation of the instrument can injure the eyes of patients, users, and third parties.

- ▶ Never look into the light output of a connected light transmission or endoscope.
- ▶ Wear suitable protective equipment.

- ① To prevent the telescope from fogging up, the C-MAC®, video laryngoscope should not be cooled below 18°C (64.4°F) and should be switched on in good time to allow the optical system to warm up. In extreme situations, the anti-fogging solution 'ULTRA STOP' with article number 15006 B can also be used.

6 Application

6.1 Connection to the C-MAC® monitor

i The video laryngoscopes 8403 xxx can only be connected to the C-MAC® monitor 8403 ZX. Older monitor types (8402/8401 ZX) are not compatible.

1. Connect the video connecting cable (6) to the socket (2) of the video laryngoscope. The orientation pin on the plug and socket facilitates connection.
2. Make sure that the cable is fully inserted. There must not be a visible gap.



- Connect the video connecting cable coming from the video laryngoscope to the connection socket (12) (primary connection) or the connection socket (11) of the C-MAC® monitor.



The Monitor 8403 ZX enables two CMOS video units from KARL STORZ to be connected with Lemo connectors. Video units from other manufacturers cannot be connected.

If two cameras are connected, the user must select the camera for which the images are to be displayed in the menu (refer to the instruction manual for the C-MAC® monitor 8403 ZX Art. no. 96076008D).

- ▶ Switch on the monitor by pressing the power switch (18). The green power switch lamp (17) on the monitor and the blue multi-function button (3) of the video laryngoscope go on.
- ⇒ The video laryngoscope is immediately ready to operate. As soon as the photo/video recording function is ready, the multi-function button (3) goes on.



6.2 Connection to the C-MAC® pocket monitor

- ❗ The 8403 xxx video laryngoscopes can only be connected to the C-MAC® PM 8403 XD. The 8401 XD model is not compatible.

Note the instruction manual of the C-MAC® PM 8403 XD (Art. No. 96076020D).

1. Connect the C-MAC® PM with the socket (2) of the video laryngoscope blade. The orientation pin on the plug and socket facilitates connection.
 2. Make sure that the plug is fully inserted. There must not be a visible gap.
 3. The monitor can also be opened up when connecting both components.
- ⇒ The video laryngoscope is immediately ready to operate. As soon as the photo/video recording function is ready, the multi-function button (3) goes on.



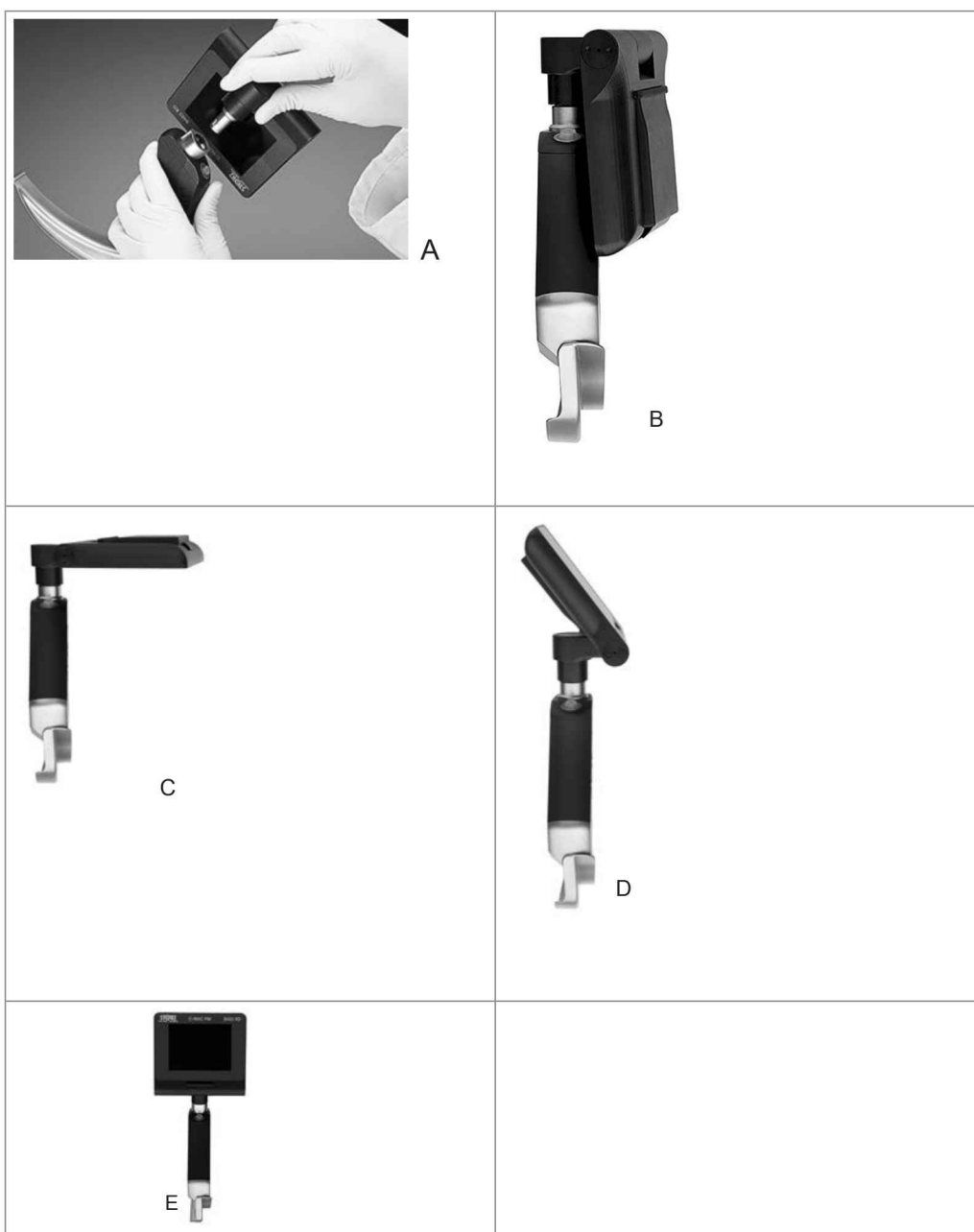


- ③ When inserting the C-MAC® PM into the video laryngoscope always ensure that the lugs of the plug connection are opposite each other.

6.2.1 Switching on the "Open-to-Intubate (OTI) displays"

If the C-MAC® PM is closed when connected to the video laryngoscope blade, the following steps must be performed (Fig. A):

1. Fold the OTI display 8 upwards (Fig. B, C).
2. Turn the OTI display to the left (Fig. D).
3. Adjust the OTI display so that the image is optimally visible (Fig. E).



i The image focus is adjusted automatically. Manual adjustment is not necessary.

The C-MAC® video laryngoscope with C-MAC® PM is ready for operation.

6.2.2 Switching off the "Open to intubate" (OTI)-Displays

1. Turn the OTI display (8) to the right (Fig. D).
2. Fold the OTI display to the right (Fig. C).
3. Fold the OTI display downwards (Fig. B).
4. The C-MAC® PM is switched off.

- ❗ You can disconnect the C-MAC® PM from the C-MAC® video laryngoscope during operation and connect it to another C-MAC® video laryngoscope without turning off the C-MAC® PM.

⚠ WARNING**Switching off the display**

After 10 minutes, the display of the C-MAC® PM turns off automatically.

- ▶ The display must be turned back on again by closing it and reopening it (switching it off and on again).

- ❗ It is not necessary to perform a white balance.

6.3 Connection to the C-Hub® II

- ❗ The video laryngoscopes 8403 xxx can only be connected to the C-HUB® II 20 2903 01 (software version 721v105 or higher). Older software versions are not compatible.

Note the instruction manual of the C-HUB® II (Art. No. 96206234D)!

- ▶ Connect the video connecting cable (6) to the socket (2) of the video laryngoscope. The orientation pin on the plug and socket facilitates connection.
- ❗ Make sure that the cable is fully inserted. There must not be a visible gap.



1. Connect the power supply unit to the C-HUB® II.
2. Connect the video connecting cable (5) coming from the video laryngoscope to the video input on the front of the C-HUB® II.



3. Connect the monitor to the S-Video or HDMI output on the rear of the C-HUB® II.



6.4 Multifunctional button of the video laryngoscope

Both single-image capture and video recording can be activated using the multifunctional button (3) on the video laryngoscope. Documentation with the multifunctional button of the video laryngoscope can be performed on the C-MAC® monitor 8403 ZX and C-MAC® PM 8403 XD. About 5 seconds after each time the C-MAC® PM is switched on, a blue information bar is displayed at the top of the screen for a few seconds. The remaining memory capacity in minutes is shown on the left-hand side, while the name of the directory in which the saved data is stored is shown on the right.





6.4.1 Color coding meanings for the "Blue Button" multifunction button

Once the multifunction button on the C-MAC® video laryngoscope lights up blue, videos and images can be recorded. The colors of the multifunction button have the following meanings:

Blue: Permanently lit. The recording function is active.

Green: Temporarily lit when recording an image, or flashes during video recording.

6.4.2 Single image capture

- ▶ Activate single-image capture by pressing the multifunction button (3) once and briefly.
- ⇒ The current image on the screen is saved on the SD memory card inserted into the connected monitor 8403 ZX. During single-image capture, the multifunction button (3) briefly lights up green and then switches back to blue.



6.4.3 Video recording

- ▶ Start video recording by pressing and holding the multifunction button (3) longer (about 2 seconds).
- ⇒ The video recording is saved on the SD memory card inserted into the connected monitor 8403 ZX. During the video recording, the multi-function button (3) on the video laryngoscope lights up in pulsating green.



- ▶ Stop the video recording by briefly pressing the multi-function button.
- ⇒ The multi-function button (3) lights up blue again.

-  The video stream can only be viewed on a PC if an MPEG 4-codec is installed on the PC.
-  If memory capacity for the C-MAC® PM 8403 XD is less than 10 minutes, the information bar is displayed in orange-red.

6.4.4 Insertion of an oxygen or suction catheter (only with 8403 AX/BX/HX)

If a blade with oxygen or suction catheter guide is used, the probe/catheter must be advanced over the guide until visibility in the image is guaranteed.

When using the blade 8403 AX, the catheters 14 Fr. and 16 Fr. can be used. When using the blades 8403 HX and 8403 BX, catheters 16 Fr. and 18 Fr. can be used.



6.5 Disassembly

1. Pull out the connection cable from the C-MAC® Monitor.
2. Pull out or disconnect the connecting cable or C-MAC® PM from the video laryngoscope.



7 Reprocessing

7.1 Overview table (worldwide, does not apply to USA and Canada)

		Pre-cleaning	Cleaning and disinfection				Sterilization							
		Manual			Machine		STERRAD							
		Wipe-down disinfection	Brushing of surfaces	Manual cleaning	Manual disinfection	Chemo-thermal disinfection (65°C)	Thermal disinfection (re- processing 93°C, drying 110°C)	STERRAD® 50, 100S, 200	STERRAD® NX	STERRAD® 100NX®	Ethylene oxide (EO)	Steris System 1®	Steris System 1E®	Steris System AMSCO1 V-PRO™1
C-MAC® Video laryngoscopes	•	○	•	•	•	•	•	•	•	•	•	•	•	•
Connecting cable	•		•	•	•	•	•	•	•	•	•	•	•	•
•	This reprocessing process is part of the validated process.													
○	This reprocessing process may be additionally carried out in order to aid cleaning.													
X	On the grounds of potential damage, this reprocessing step must NEVER be performed. NO symbol: This reprocessing step has neither been validated in respect of efficacy nor in respect of material compatibility by KARL STORZ.													

7.2 General warnings (worldwide, does not apply to USA and Canada)

⚠ WARNING

For all work on contaminated products, the guidelines of the employer's liability insurance association and equivalent organizations for personnel protection must be observed!

⚠ CAUTION

For the production and application of solutions, the chemical manufacturer's specifications regarding concentration, exposure time, and life span must be strictly adhered to. An excess exposure time or incorrect concentration can lead to damage.

- Bear in mind the microbiological range of action of the chemicals used.

⚠ CAUTION

Damage to the product!

- Only perform reprocessing using chemicals approved by KARL STORZ. A list of approved chemicals can be requested from hygiene@karlstorz.com.
- ⓘ As a general rule, all system components 8403 xxx C-MAC® video laryngoscopes and C-MAC® connection cable 8403 X are resistant to manual and mechanical cleaning and disinfection. If the optional protective cap is not used, particular care must be taken to ensure that the contacts are dry so as not to impair functionality.



ATTENTION

Observe the national regulations and A_0 value.

- ❗ For information on reprocessing of the C-MAC® monitor 8403 ZX, please refer to the corresponding instruction manual 96076008D.
- ❗ For information on reprocessing of the C-MAC® PM, please refer to the corresponding instruction manual 96076020D.

7.3 Preparation for cleaning and disinfection

1. Remove coarse impurities, corrosive solutions and drugs from the product immediately after use.
2. Clean the product by wiping and irrigating it, preferably under running cold water.

7.4 Brushing the surfaces

Required materials:

- Brush (item no. 27652)
- Clean the surfaces of the product under running cold water with a brush.

7.5 Manual cleaning

1. Immerse the product completely in a cleaning solution.
2. To ensure bubble-free wetting, fill the lumen specifically.
3. At the end of the exposure time, clean the product with brushes or a sponge.
4. Irrigate the product with cold water for neutralization.

7.6 Manual disinfection

Required materials:

- Cleaning gun with accessories (item no. 27660)
- 1. Immerse the product completely in the disinfectant solution.
- 2. To ensure bubble-free wetting, fill the lumen specifically.
- 3. At the end of the exposure time, irrigate the product several times to remove all chemical residue.
- 4. Dry surfaces, joints, openings, channels and lumens with medical compressed air from the cleaning gun.

7.7 Machine cleaning and disinfection

The following machine decontamination procedures have been validated and approved in accordance with the process parameters described in the manual "Cleaning, Disinfection, Care and Sterilization of KARL STORZ Instruments" (Art. No. 96216003D).

The selection of a suitable slide-in tray or instrument holder, which should ensure that the medical device is thoroughly rinsed out or through, must take place in consultation with the manufacturer of the device.

- Irrigating the product in a slide-in trolley or instrument holder.

Machine cleaning/thermal disinfection

1. Carry out the thermal disinfection taking into account the national regulations and the A₀ value (reprocessing 93°C, drying 110°C).
2. If necessary, dry the product again.

Machine cleaning/chemical-thermal disinfection

- ▶ A maximum temperature of 65°C must not be exceeded for this product. The relevant national regulations and the chemical manufacturer's instructions must be taken into account when using this method.

7.8 Assembly, inspection and care

1. Check the product visually for purity, completeness, damage and dryness.
2. In case of soiling or residue, post-clean the product manually and carry out a complete cleaning and disinfection process.
3. Sort out damaged and corroded products.
4. Assemble disassembled products.
5. Perform a functional check.
6. For care of the product, refer to the articles in the "Care, Sterilization and Storage Technology" catalog.

7.9 Packaging

- ▶ Only use standardized and approved packaging materials and packaging systems (EN 868 Part 2 – 10, EN ISO 11607 Part 1 + 2, DIN 58953).

7.10 Sterilization

The procedures as well as the process-relevant parameters for the individually validated methods are described in the manual "Cleaning, Disinfection, Care and Sterilization of KARL STORZ Instruments" (Art. no. 96216003D). The method must be selected taking into account the respective applicable national requirements and in consultation with the device and product manufacturers.

The following sterilization methods have been validated and approved for this product by KARL STORZ:

7.10.1 Hydrogen peroxide (H₂O₂) sterilization - ASP STERRAD®

⚠ WARNING**Risk of infection!**

The use of STERRAD® processes on lubricated, oiled or pre-assembled products does not lead to sufficient sterilization.

- ▶ Sterilize only products that are not oiled and not greased.
- ▶ Sterilize products in disassembled state.

⚠ WARNING**Different STERRAD® sterilization systems**

Please note that materials and lumen dimensions determine what products can be sterilized using the various STERRAD® sterilization systems.

ATTENTION**Follow the instructions manual for the sterilizer!**

- ❗ The "STERRAD® Sterility Guide" can be used to verify whether the relevant medical device can be sterilized using the different STERRAD® devices.

The following STERRAD® sterilization methods have been validated and approved for this medical device by KARL STORZ:

- STERRAD® 50, 100S, 200 without booster
- STERRAD® NX® Standard Cycle
- STERRAD® 100NX® Standard Cycle

7.10.2 Hydrogen peroxide (H₂O₂) sterilization - STERIS® AMSCO® V-PRO™ 1

Detailed information on choosing the appropriate cycles in the various device generations is available from the manufacturer STERIS®.

ATTENTION

Follow the instructions manual for the sterilizer!

⚠ WARNING

Risk of infection!

The use of STERRAD V-PRO® processes on lubricated, oiled or pre-assembled products does not lead to sufficient sterilization.

- ▶ Sterilize only products that are not oiled and not greased.
- ▶ Sterilize products in disassembled state.

7.10.3 Ethylene oxide sterilization (EO)

The ethylene oxide procedure is validated with 100% ethylene oxide at 55°C and a hold time of 30-45 minutes.

⚠ WARNING

Risk of infection!

Application of the EO process to lubricated, oiled or already assembled products does not lead to sufficient sterilization.

- ▶ Sterilize only products that are not oiled and not greased.
- ▶ Sterilize products in disassembled state.

⚠ CAUTION

Airing times

For gas sterilization with ethylene oxide, the airing times for instruments stipulated by the device manufacturer must be observed due to gas absorption of the materials. The airing times depend on the process engineering of the EO sterilizer (concentration, process control).

7.10.4 Chemical low-temperature sterilization with peracetic acid – STERIS® - System 1®

For detailed information on the selection of sterilization parameters and on the STERIS® Quick Connect Kit (QCK) required to flush lumina, please contact the manufacturer STERIS®.

i NOTE: Sterilization is not possible on surfaces which have been lubricated and oiled.

7.10.5 Chemical low-temperature sterilization with peracetic acid – STERIS® System 1E®

For detailed information on the selection of sterilization parameters and on the STERIS® Quick Connect Kit (QCK) required to flush lumina, please contact the manufacturer STERIS®.

i Sterilization is not possible on surfaces which have been lubricated and oiled.

7.11 Reprocessing limits

The end of the device's life span is largely determined by wear, reprocessing methods, the chemicals used and any damage resulting from use.

8 Reprocessing USA and Canada

8.1 Overview table

	Cleaning and disinfection		Sterilization							
	Manual		STERRAD							
	Manual cleaning	High-level disinfection	STERRAD® 50, 100S, 200	STERRAD® NX	STERRAD® 100NX®	Ethylene oxide (EO)	Steris System 1E®	Steris System AMSCO1 V-PRO™1	V-PRO maX	V-PRO 60
C-MAC® Video laryngoscopes	•	•	•	•	•	•	•	•	•	•
Connecting cable	•	•	•	•	•	•	•	•	•	•
•	This reprocessing process is part of the validated process.									
○	This reprocessing process may be additionally carried out in order to aid cleaning.									
X	On the grounds of potential damage, this reprocessing step must NEVER be performed. NO symbol: This reprocessing step has neither been validated in respect of efficacy nor in respect of material compatibility by KARL STORZ.									

8.2 General warnings (applies only to USA and Canada)

These products are not sterile when delivered. The use of unsterile products poses a risk of infection for patients, users, and third parties.

1. Reprocess products before first use.
2. Inspect products for visible contamination before use. Do not use contaminated products.

⚠ WARNING

For all work on contaminated products, the guidelines of the employer's liability insurance association and equivalent organizations for personnel protection must be observed!

⚠ CAUTION

For the production and application of solutions, the chemical manufacturer's specifications regarding concentration, exposure time, and life span must be strictly adhered to. An excess exposure time or incorrect concentration can lead to damage.

- Bear in mind the microbiological range of action of the chemicals used.

⚠ CAUTION**Damage to the product!**

- ▶ Only perform reprocessing using chemicals approved by KARL STORZ. A list of approved chemicals can be requested from hygiene@karlstorz.com.
- ❗ As a general rule, all system components 8403 xxx C-MAC® video laryngoscopes and C-MAC® connection cable 8403 X are resistant to manual and mechanical cleaning and disinfection. If the protective cap is not being used, then manual rinsing and drying of the contacts may be necessary in order to ensure that functioning is not impaired.
- ❗ For information on reprocessing of the C-MAC® monitor 8403 ZX, please refer to the corresponding instruction manual 96076008D.
- ❗ For information on reprocessing of the C-MAC® PM, please refer to the corresponding instruction manual 96076020D.

8.3 Brushing the surfaces

Required materials:

- Brush (item no. 27652)
- ▶ Clean the surfaces of the product under running cold water with a brush.

8.4 Water Quality Requirements

Utility water

Water as it comes from the tap that meets specifications as defined per AAMI TIR34:2014 (Water for Reprocessing of Medical Devices). Tap water is acceptable for pre-cleaning and cleaning of the instruments.

Specially treated water

Water that has generally been treated by a multistep treatment process (for example, carbon filtration, softening, deionization and reverse osmosis, or distillation) to ensure that the microorganisms and the inorganic and organic material are removed from the water. A final submicron filtration could also be part of the treatment process. Specially treated water is recommended for rinsing after high-level disinfection.

8.5 Pre-cleaning

1. Immediately after a procedure, at the point of use (for example, operating room), wipe the device with a soft, lint-free disposable cloth moistened with water or diluted mild/neutral pH enzymatic cleaning solution to remove all heavy soiling.
 2. Place the device in a tray or container and transport them to the decontamination area per your institution's policy.
- ❗ If immediate cleaning is not feasible, soak the instruments in a diluted mild/neutral pH enzymatic cleaning solution. Do not soak for longer than 30 minutes.

8.6 Manual cleaning

1. Thoroughly rinse the device using a commercial overhead sprayer nozzle with cold water to remove all gross debris. Rinse for a minimum of two minutes.
2. Completely immerse the device in a diluted mild/neutral pH enzymatic cleaning solution (e.g., Enzol). Keep immersed for a minimum of one minute.

3. While immersed, use a soft bristle brush (Art. no.: 27652/3) to brush all the surfaces of the device. Brush for a minimum of 1 minute.
4. Use a low-lint wipe to wipe the entire length of the connecting cable.
5. After the immersion and brushing period, remove the device from the cleaning solution and rinse using a commercial overhead sprayer nozzle with cold water. Rinse for a minimum of two minutes.
6. Dry the device and the contacts with a soft, lint-free cloth or dry, oil-free compressed air (<5 psi).

8.7 Assembly, inspection and care

1. Check the product visually for purity, completeness, damage and dryness.
2. In case of soiling or residue, post-clean the product manually and carry out a complete cleaning and disinfection process.
3. Sort out damaged and corroded products.
4. Assemble disassembled products.
5. Perform a functional check.
6. For care of the product, refer to the articles in the "Care, Sterilization and Storage Technology" catalog.

8.8 Packaging

- Only use standardized and approved packaging materials and packaging systems (EN 868 Part 2 – 10, EN ISO 11607 Part 1 + 2, DIN 58953).

8.9 Sterilization

The following sterilization method has been validated and approved for this product by KARL STORZ:

8.9.1 Hydrogen peroxide (H₂O₂) sterilization - ASP STERRAD®

⚠ WARNING

Risk of infection!

The use of STERRAD® processes on lubricated, oiled or pre-assembled products does not lead to sufficient sterilization.

- Sterilize only products that are not oiled and not greased.
- Sterilize products in disassembled state.

⚠ WARNING

Different STERRAD® sterilization systems

Please note that materials and lumen dimensions determine what products can be sterilized using the various STERRAD® sterilization systems.

ATTENTION

Follow the instructions manual for the sterilizer!

- ❗ The "STERRAD® Sterility Guide" can be used to verify whether the relevant medical device can be sterilized using the different STERRAD® devices.

The following STERRAD® sterilization methods have been validated and approved for this medical device by KARL STORZ:

- STERRAD® 50, 100S, 200 without booster
 - STERRAD® NX® Standard Cycle
 - STERRAD® 100NX® Standard Cycle
1. Place the device in a FDA-cleared sterilization tray.
 2. Double wrap the sterilization tray with polypropylene wrap.
 3. Select the correct cycle and start sterilization.

8.9.2 Hydrogen peroxide (H₂O₂) sterilization - STERIS® AMSCO® V-PRO™

- V-PRO 1 Plus "Lumen" and "Non-Lumen" Cycle
- V-PRO maX Lumen and Non-Lumen Cycle
- V-PRO 60 "Non-Lumen" Cycle

⚠ CAUTION

Changes to the camera head

V-PRO sterilization may cause cosmetic changes to the camera head that do not necessarily impact the camera's functionality.

- ① For sterilization with gas/Steris Amsco V-Pro, nationally applicable laws and regulations must be observed.
- ① Please use the protective cap 8403 YZ (see Fig.) for sterilization with Steris Amsco V-Pro 1.



1. Place the camera head in a FDA-cleared sterilization tray.
2. Double wrap the sterilization tray with polypropylene wrap.
3. Select the correct cycle and start sterilization.

8.9.3 Ethylene oxide sterilization (EO)

1. Place the camera head in a FDA-cleared sterilization tray.
2. Double wrap the sterilization tray with polypropylene wrap.

3. Start the sterilization using the following parameters:

Conditioning Parameters:

Temperature: 55°C (131°F)

Humidity: 70% relative humidity

Conditioning dwell time: 30 minutes

Sterilization Parameters:

Sterilant: 100% ethylene oxide

Temperature: 55°C (131°F)

Gas concentration: 735±30 mg/l

Exposure Time: 180 minutes

Aeration Parameters

Time: At least 12 hours

Temperature: 55°C (131°F)

8.9.4 Chemical low-temperature sterilization with peracetic acid – STERIS® System 1E®

⚠ CAUTION

Processing in the STERIS System 1E® must occur immediately prior to use, since wet devices cannot maintain sterility.

- ① For sterilization with Steris® System 1E®, country-specific laws and regulations must be observed.
- ① Use protective cap 8403 YZ for sterilization with Steris® System 1E® (see figure).



- ▶ Place the video laryngoscope in the appropriate tray.
- ▶ Place the tray correctly into the SS1E and start the system.

NOTE: Please consult the SS1E Operator Manual for complete instructions on the proper use of the SS1E Liquid Chemical Sterilant processing system.

8.10 High-level disinfection

▲ WARNING

Damage to the product

High-level disinfection should **ONLY** be used for instruments which come into contact with intact mucous membranes.

▲ CAUTION

Damage to the product

Before disinfection, the device must be thoroughly cleaned, rinsed, and dried.

▲ CAUTION

Damage to the product

Hydrogen-peroxide-based disinfectants may cause cosmetic changes to the devices that do not impact the functionality of the devices.

▲ CAUTION

For the production and application of solutions, the chemical manufacturer's specifications regarding concentration, exposure time, and life span must be strictly adhered to. An excess exposure time or incorrect concentration can lead to damage.

- ▶ Bear in mind the microbiological range of action of the chemicals used.

This device may be chemically disinfected using CIDEX, a 2.4% glutaraldehyde solution, CIDEX OPA, a 0.55% ortho-phthaldehyde solution, or Resert XL HLD, a 2% concentration of hydrogen peroxide.

1. Activate the disinfecting solution per manufacturer's instructions.
 2. Place device in disinfectant solution. Ensure that no air bubbles are present on the surface of the device.
 3. The following KARL STORZ validated conditions must be met to achieve high-level disinfection:
 - CIDEX: Immerse for 45 minutes at 25°C (77°F).
 - CIDEX OPA: Immerse for 12 minutes at 20°C (68°F).
 - Resert XL HLD: Immerse for 8 minutes at 20°C (68°F).
- ▶ After disinfection is complete, remove the device from the disinfection solution and completely immerse in distilled/demineralized water. Keep immersed for one minute. Discard the water and repeat with fresh water for a total of 3 immersion rinses.

NOTE: If using Resert XL HLD, only one immersion rinse cycle is necessary.

- ▶ Dry the device and the contacts with a soft, lint-free, sterile cloth or clean, dry, oil-free compressed air (< 5psi).

8.11 Reprocessing limits

The product's service life and correct functioning are largely determined by mechanical stress and chemical influences within the scope of reprocessing and application.

9 Service and repair

9.1 Servicing and repair program

Defective instruments must be serviced and repaired exclusively by persons authorized by us; all repair work must employ original parts.

To bridge the repair period, you will generally receive a device on loan, which must then be returned to KARL STORZ as soon as you receive the repaired device. In Germany you can refer repairs directly to:

KARL STORZ SE & Co. KG

Abt. Reparaturservice

Take-off Gewerbepark 83

78579 Neuhausen, Germany

Service hotline: +49 7461/708 980

E-mail: technicalsupport@karlstorz.com

In other countries, please contact your local KARL STORZ subsidiary or authorized dealer for details on repair timeframes and terms.

9.2 Complaint shipments

In the interests of our employees' health, only sterilized or disinfected products are accepted as return shipments. These should be marked as such; otherwise no further processing may be performed.

10 Limitation of Liability

As a supplier of this instrument, we consider ourselves responsible for the safety, reliability and performance of the instrument only if: Assembly, extension, new adjustments, changes or repairs are carried out by persons authorized by KARL STORZ and the instrument is used in accordance with the instructions for use.

11 Guarantee

For information concerning the guarantees provided, please see the Standard Conditions of Business of KARL STORZ. The medical device must always be sent to your local subsidiary (see the section 'Subsidiaries'), even during the warranty period. Opening of the equipment or performance of any repairs or modifications to the equipment by unauthorized persons shall relieve us of any liability for its performance. Any such opening, repair, or modification performed during the warranty period shall void all warranty.

12 Electromagnetic compatibility

The applied part described in these instructions for use has been tested as a system with the following basic devices. For relevant electromagnetic compatibility (EMC) information, refer to 'Electromagnetic Compatibility (EMC) information' in the instructions for use for these basic devices:

Basic device	Instructions for use
C-MAC® Monitor 8403 ZX	96076008 D
C-MAC® Pocket Monitor 8403 XD	96076020 D
C-HUB® II 20 2903 20	96206529 D

The EMC warning statements, precautions, notes and Emission/Immunity limits specified in the instructions for use for the basic devices also apply to the applied part described in these instructions for use.

13 Standards, directives and regulations

13.1 Standards, directives and regulations



According to Medical Device Directive (MDD):

Class I medical devices. These medical devices bear the CE mark in accordance with the Medical Device Directive (MDD) 93/42/EEC.

13.2 Standard compliance

(for 8403 AX, BX, HX, AXC, BXC, DXC, EXC, GXC, KXC, MXC, HXP, X, XD, ZX)

Complies with EN 60601-1, EN 60601-2-18, UL 2601, CSA 601.1:



- Provides Type BF protection when used in conjunction with a KARL STORZ camera control unit with a BF symbol on the connection port.

14 Disposal



This device has been marked in accordance with the European Directive on waste electrical and electronic equipment (WEEE). At the end of its useful operating life, dispose of the unit as electronic scrap. Please ask KARL STORZ SE & Co. KG, a KARL STORZ subsidiary or your authorized dealer about the collection point in your area. Within the scope of application of this directive, KARL STORZ SE & Co. KG is responsible for the proper disposal of this device. National regulations/laws must be observed.

15 Technical specifications

Video laryngoscope 8403 AX/BX/HX/AXC/BXC/KXC/HXP	
Immersion protection:	IPX8
Camera technology	CMOS
Resolution:	640 x 480
Illumination:	LED, white, 1 W
Video laryngoscope 8403 DXC/EXC/GXC/MXC/NXC	
Immersion protection:	IPX8
Camera technology	CMOS
Resolution:	300 x 400
Illumination:	LED, white, 1 W
Operating/storage conditions for C-MAC®	
Operating conditions:	0°C ... +40°C 30% ... 70% rel. humidity
Conditions of storage:	-20°C ... +50°C 5% ... 95% rel. humidity
Optimal application conditions	18°C ... 40 °C
Average life cycle	
Reprocessing cycles:	200*

* Value indicates the number of tested cycles. The device's life span may be compromised if the recommended number of cycles is exceeded.

Inspect the device for damage before and after every use (see the Section "Safety [11]" and the Section "Visual and functional test [14]").

16 Fault correction

16.1 Troubleshooting



WARNING

Always unplug the device before doing any cleaning and maintenance work on the device.

Symptom	Possible causes	Remedy
Complete failure of the device. Possible lighting up of status display.	– No power from the power line. – Power cord connector is not properly connected to device socket. – System error	– Check the power supply. – Push the power supply plug firmly into the socket on the device. – Reset.
No picture, TFT screen dark.	– Connecting cable/C-MAC® PM not connected properly. – Defective camera electronics. – TFT screen defective.	– Connect connecting cable/C-MAC® PM correctly – Send electronics module/C-MAC® PM or supply unit to KARL STORZ for repair.
Cloudy picture, stripes, streaks, or similar.	– Telescope of the laryngoscope is soiled. – Contacts of the connection cable/C-MAC® PM are dirty.	– Clean with cotton swab and alcohol solution or special cleaning paste. – Clean the contacts of the connection cable/C-MAC® PM.
Color distortions.	– White balance not carried out correctly. – Electronic module defect.	– Carry out new white balance. – Send the supply unit for repairs to KARL STORZ.
Color rendering alternates.	– Camera connecting cable is defect.	– Have a new camera connecting cable fitted.
Image cannot be saved.	– No memory card inserted. – Memory card full. – Memory card is not recognized.	– Insert memory card. – Change memory card. – Insert the memory card while the C-MAC® Monitor is switched off and then turn the monitor on again. – Perform a reset. – Format the memory card on the PC with FAT (standard).

Video stream cannot be played back on the PC monitor.	– No MPEG-4 Codec installed.	– Install an MPEG-4 Codec on the PC.
SD memory card cannot be written on.	– SD memory card is formatted incorrectly.	– Format the SD memory card on the PC with FAT (standard).

17 Accessories and spare parts

17.1 Accessories

809125 MAGILL forceps, modified by BOEDEKER, length 25 cm, suitable for the endoscopic removal of foreign bodies, for use with video laryngoscopes of sizes 2 – 4	
809120 MAGILL forceps, for children, modified by BOEDEKER, length 20 cm, suitable for the endoscopic removal of foreign bodies, for use with video laryngoscopes of sizes 1 – 2	
8403YE Bag for intubation set -C22-, model ULM, made of water-repellent and hard-wearing surface material, washable, the bag contains two compartments with several holding possibilities for C-MAC® video laryngoscopes with C-MAC® pocket monitor and for conventional laryngoscopes, for use with C-MAC® pocket monitor 8403 XD, C-MAC® video laryngoscopes and conventional laryngoscopes	
8403YZ Protective cap, for the C-MAC®, system interface to C-MAC®, video laryngoscope 8403xxx and C-MAC® PM 8403 XD, as well as C-MAC® connecting cable 8403 X, for protecting the plug contacts during reprocessing, cap is reusable, for use with: C-MAC® connecting cable 8403 X, C-MAC® pocket monitor 8403 XD, C-MAC® video laryngoscopes 8403xxx, electronics modules 8401 X/8402 X and flexible intubation video endoscopes (FIVEs)	

18 Subsidiaries

KARL STORZ SE & Co. KG

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