About This Manual

P/N: 4710-03737

Release Date: April, 2023

Product Name: Veterinary Videoendoscope

Product Model: V-10L

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- The electrical installation of the relevant room complies with the applicable national and local requirements; and
- The product is used in accordance with the user manual.

Conventions

Understand the meanings of the following conventions clearly before reading this manual.

Item	Meaning
	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, may result in malfunction or damage of the system.
NOTE	Indicates precautions or recommendations that should be used in operating the system.

Item	Meaning
	Indicates a potentially biological hazardous situation which, if not avoided, may result in disease transmission.
Boldfaced Word	Indicates controls on the control panel, or on-screen objects such as menu items or keys.

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Contents

1 Safety

This chapter describes important information for operating this endoscope. To ensure the safety of both the operator and animal, please read the relevant details in this chapter carefully before using this endoscope.

The operator should be thoroughly familiar with the precautions provided in this manual. Otherwise, the manufacturer is not responsible for the effects on safety, reliability and performance of the endoscope.

1.1 Intended Use

The veterinary videoendoscope (hereinafter called endoscope) is intended to provide endoscopic images for examination and diagnosis of the animal digestive tract.

The endoscope should be used in the medical institution. The operator of the endoscope should be a physician or a medical staff supervised by a physician, both of whom have received sufficient training in clinical endoscopy technology.

- The endoscope is intended for veterinary use only.
- Strictly follow the intended use to operate the endoscope. Otherwise, it may result in personal injury or damage to the endoscope.

1.1.1 Contraindications

During clinical examination, no direct related contraindication is known.

1.2 Product Compatibility

The endoscope is used with the V-2000 veterinary video system center (hereinafter called video system center) provided by the manufacturer.

1.3 Safety Precautions

Read and understand all precautions in this manual before attempting to use the endoscope. Keep this manual with the endoscope at all times. Periodically review the procedures for operation and safety precautions.

1.3.1 Electrical Safety

- If any qualifications for an operator are stipulated by the medical administration or other official institutions, the operator should meet the qualification requirements. Otherwise, only the medical staff approved by the hospital safety administrator or by the person who is in charge of the department can perform endoscopy.
- Only the personnel authorized or trained by the manufacturer can maintain the device. Any unauthorized personnel should not assemble or disassemble the device.
- If hospital administrators or official institutions (such as endoscopic academic institutions) have established an application standard for endoscopy and endoscopic treatment, follow the standard.
- Evaluate the property, purpose, benefits and risks (including medical risks, unknown risks and possibility) thoroughly before performing endoscopy. Perform endoscopy only when benefits outweigh risks.
- Evaluate potential benefits and risks at all times during endoscopy and endoscopic diagnosis. Stop the endoscopy immediately and take appropriate measures when risks outweigh benefits.

- The operator should be capable of performing endoscopy and endoscopic diagnosis in accordance with the standards and principles developed by endoscopic academic institutions. Therefore, endoscopic clinical technologies are not detailed in this manual.
- Do not operate the device in an atmosphere containing flammable gases such as anesthetic gases, hydrogen, and ethanol, because there is a danger of explosion.
- The device is not strictly cleaned and disinfected in the factory. Therefore, the operator should strictly perform the cleaning and disinfection processes described in this manual before use.
- Prepare a spare endoscope to avoid an examination interruption caused by the device malfunction.
- The performance of the device and its accessories may be degraded over time. Perform periodic maintenance as described in this manual to ensure the safety of the device.
- Maintain and store the device as described in this manual after use. Improper maintenance and storage may cause cross infection, damage to the device or performance degradation.
- When the device is used with laser products, the operator should wear appropriate anti-filter glasses Otherwise, it may cause eye injury.
- When the device is used with the electrosurgical accessories (such as high frequency electrotome), current leakage to the animal may be increased. Use the accessories with the safety protection type of at least Type BF.
- Ensure that no flammable gas exists in animal's body when using other accessories (such as high frequency surgical instruments). Otherwise, explosion may occur.
- When the device is used with the endoscopically used accessories which are the applied parts of the high frequency surgical instruments, the isolation or insulation is provided by the endoscopically used accessories.
- Do not use the peak voltage higher than the rated one when using the high frequency surgical instruments. The maximum peak voltages in the following modes are:
  - Electrosurgical knife mode: 800 V
  - Mixed mode: 900 V
  - Coagulation electrode mode: 500 V

1.3.2 Accessory Safety

- Only the accessories provided or approved by the manufacturer can be used. Using other accessories may cause damage to the device and degrade the performance described in this manual.
- Do not reuse the single-use accessory.

1.3.3 Biohazard Considerations

- Animal's debris and chemicals for cleaning and disinfection are potentially dangerous. The operator should wear the medical protective clothing, goggles or gloves to minimize the risk of cross-contamination and disease infection. Take off the medical protective barriers before leaving the cleaning and disinfection room.
- The operator should take cautions to prevent the direct contact with the disinfectant or animal samples. If your skin is stained with them, thoroughly wash the area immediately with clean water. If the fluid comes into your eyes, flush the eyes with water immediately and seek the oculist for help.
- Dispose of the disinfectant, cleaning solution, and waste in accordance with local laws or regulations. For details, consult the relevant manufacturers or their local distributors.

1.4 Safety Symbols

The following table is provided for your identification of important symbols located in labels on the endoscope.

Symbol	Meaning
	Refer to instruction manual
	Consult instructions for use
	Caution
	Manufacturer
SN	Serial Number
	Type BF Applied Part
IPX7	Degree of protection against harmful liquid (Protection against short time immersion)
CE	CE marking
EC REP	Authorized representative in the European community
#	Model number
CHN	Country and date of manufacture, CHN is the country code of China.
	Temperature limit
	Humidity limitation
	Atmospheric pressure limitation
	Stacking limit by number
	Fragile, handle with care
	Keep away from rain
	This way up

Symbol	Meaning
	This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.

2 Overview

To ensure the performance and availability of this endoscope, the operator should be thoroughly familiar with the operations of the endoscope and its accessories before use.

2.1 Packing

Make sure that all the following items are in the packaging box of the device.

- Videoendoscope
- Biopsy valve
- Suction valve
- Air/water valve

Others: see the Packing List in the packaging box.

2.2 Component Introduction

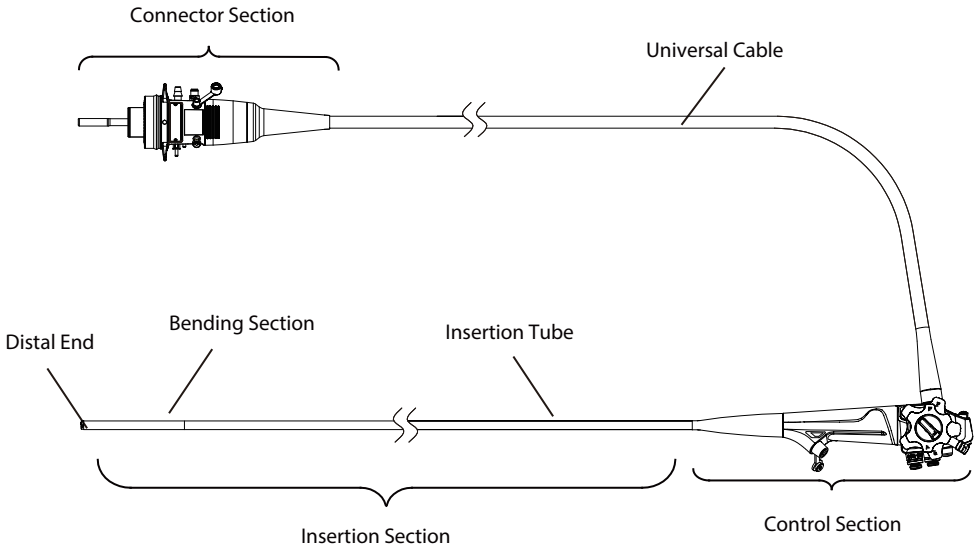

Figure 2-1 Endoscope

2.2.1 Connector Section

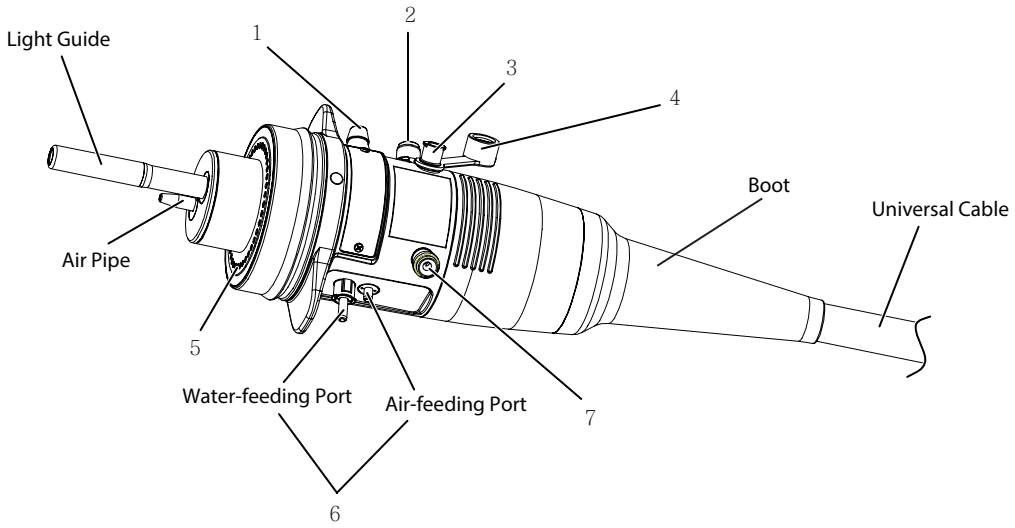

Figure 2-2 Connector Section

No.	Part Name	Description
1	Suction Port	Used for connecting to the suction pump through the suction tube.
2	Leakage Detector Port	Used for connecting the leakage detector for leakage detection.
3	Auxiliary Water-feeding Port	Used for connecting to the auxiliary water-feeding tube to feed water to the auxiliary water-feeding channel.
4	Cap for Auxiliary Water-feeding Port	• Used for protecting the auxiliary water-feeding port. • Used for preventing the auxiliary water-feeding channel from being blocked by foreign matters. • Used for preventing gas or liquid in animal's body from blowing or flowing back during examination. Cover the cap when the auxiliary water-feeding channel is not in use.
5	Electrical Contacts	Used for transmitting control signals and image signals.
6	Air/Water-feeding Port	Used for connecting to the water bottle to feed water/air to the distal end.
7	Electrosurgical Equivalent Terminal	Used for connecting the electrosurgical equipment.

2.2.2 Control and Insertion Sections

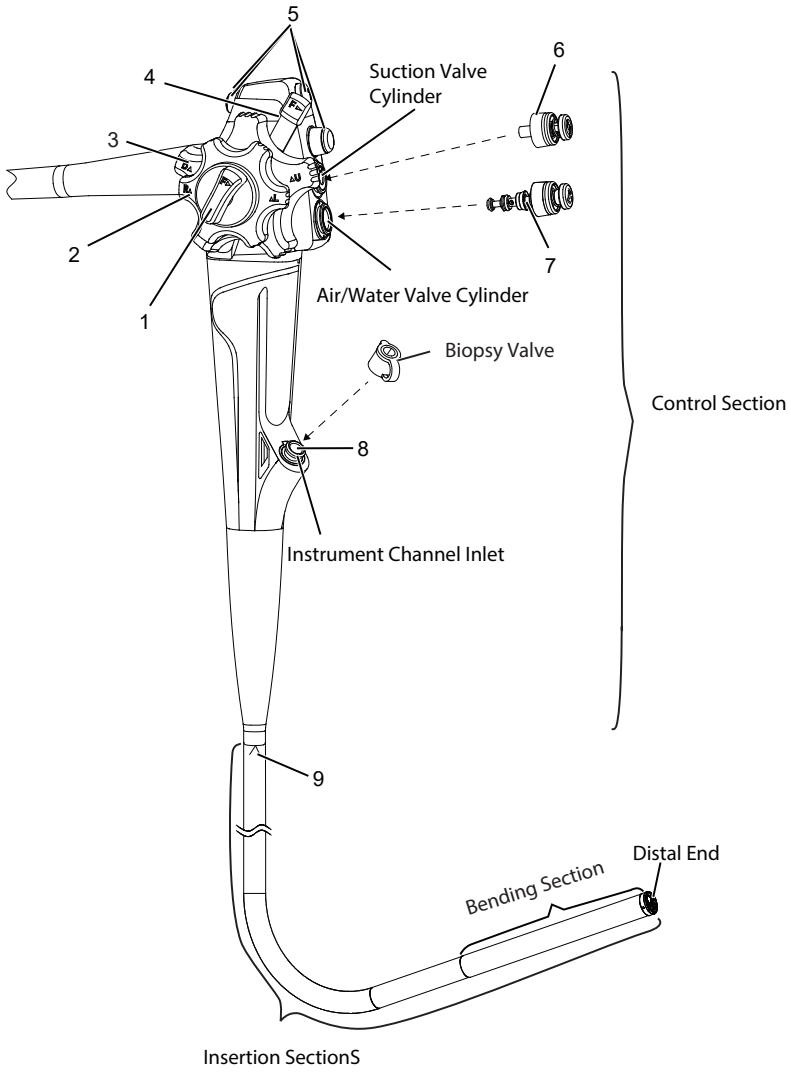

Figure 2-3 Control and Insertion Sections

No.	Part Name	Descriptions
1	Left/Right Angulation Lock (**F** ►)	• Rotate it clockwise (**F** ►) to free the bending section in the left or right direction. • Rotate it anticlockwise to lock the bending section at the current angle.
2	Left (▲**L**)/Right (**R**▲) Angulation Control Knob	• Rotate it clockwise (**R**▲) to make the bending section move right. • Rotate it anticlockwise (▲**L**) to make the bending section move left.
3	Up (▲**U**) /Down (**D**▲) Angulation Control Knob	• Rotate it anticlockwise (▲**U**) to make the bending section move up. • Rotate it clockwise (**D**▲) to make the bending section move down.
4	Up/Down Angulation Lock (**F** ►)	• Rotate it clockwise (**F** ►) to free the bending section in the up or down direction. • Rotate it anticlockwise to lock the bending section at the current angle.

No.	Part Name	Descriptions
5	Remote Buttons (0-3)	Set the functions of the four buttons through the image processor connected with the endoscope.
6	Suction Valve	Press it to aspirate liquid, debris or gas from the animal's body.
7	Air/Water Valve	● Cover the hole on the valve with a finger to feed air. ● Press it to feed water to clean the lens. The air and water can remove the blood, debris or mucous membrane adhering to the objective lens.
8	Instrument Channel	This channel should be used with the biopsy valve and the functions are as follows. ● Used to feed the liquid to the distal end of the endoscope. ● Used to insert the endotherapy accessories. ● Used as a part of the suction channel.
9	Insertion Limit Mark	Indicate the maximum length of the insertion section that can be inserted into the animal's body.

2.2.3 Distal End

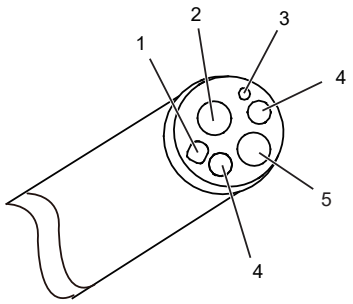

Figure 2-4 Distal End

No.	Part Name	Description
1	Air/Water Nozzle	Used as an outlet to feed air or water.
2	Objective Lens	Used for transmitting optical signals of the target tissues to the image sensor.
3	Auxiliary Water-feeding Outlet	Water spurts out from the outlet.
4	Light Guide Lens	Light is transmitted through these lenses to assist endoscopic image observation.
5	Instrument Channel Outlet	Used as an instrument (such as biopsy forceps) outlet, liquid feeding outlet or suction inlet.

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3 Preparations

Preparations are necessary before use, which include inspecting and connecting the endoscope and accessories.

Strictly follow the descriptions below to inspect the endoscope and accessories before each use and inspect the peripherals used with this endoscope by following their own user manuals. If any problem occurs, refer to Chapter 7 Troubleshooting for detailed solutions. If the problem persists, contact the local distributor of the manufacturer.

WARNING

- The endoscope is not cleaned or disinfected in the factory. Therefore, the operator should clean and disinfect the endoscope as described in Chapter 5 Cleaning and Disinfection before use.
- For the safety of the animal and operator, do not use the malfunctioning endoscope.
- The operator should inspect the device periodically to ensure the performance of the device.
- Disinfect, terminally rinse and dry the device before the first use of the device everyday.

3.1 Inspecting the Endoscope

Before inspection, clean and disinfect the endoscope as described in Chapter 5 Cleaning and Disinfection.

3.1.1 Inspecting the Appearance and Flexibility

Perform the following inspections to inspect the appearance and flexibility of the endoscope.

- Ensure that there is no scratch, deformation or slack on the control section or the connector section.
- Ensure that there is no abnormal bending, twist or other abnormality on the boot or the insertion section near the boot.
- Inspect the external surface of the entire insertion section (including the bending section and distal end) and ensure that there is no dent, bulge, swelling, scratch, breakage, deformation, adhesion of foreign matters, component missing or peeling.
- Ensure that there is no scratch or breakage on the objective lens and light guide lenses on the distal end, and no spot or crack on the edges of the objective lens.

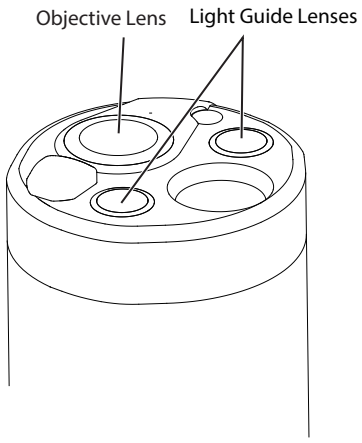

Figure 3-1 Inspecting the Objective Lens and Light Guide Lenses

- Ensure that there is no dent, protrusion or bulge on the air/water nozzle and the instrument channel outlet on the distal end.

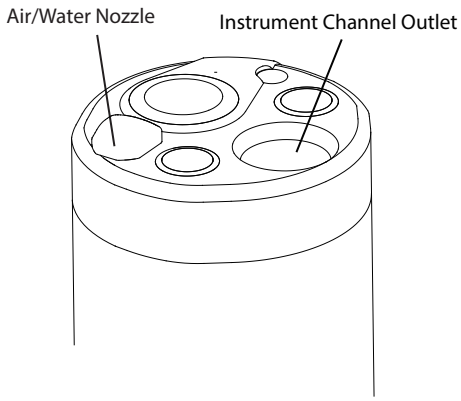

Figure 3-2 Inspecting the Air/Water Nozzle and Instrument Channel Outlet

- Hold the insertion section with two hands and bend it to a semicircle to ensure that the entire insertion section is flexible and can be smoothly bent.

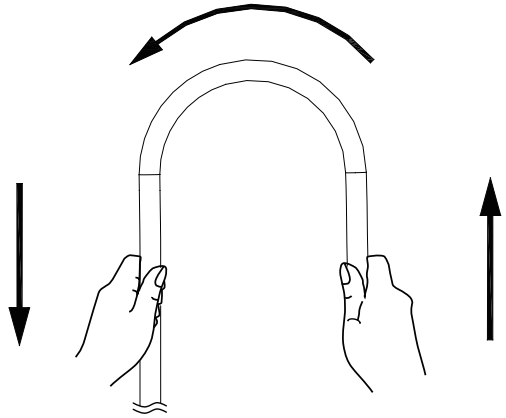

Figure 3-3 Inspecting the Flexibility of the Insertion Section

- Hold the control section with one hand and run the other hand back and forth over the entire length of the insertion section. Ensure that no metallic wire or any object protrudes from the insertion section, and the insertion section is not abnormally stiff.

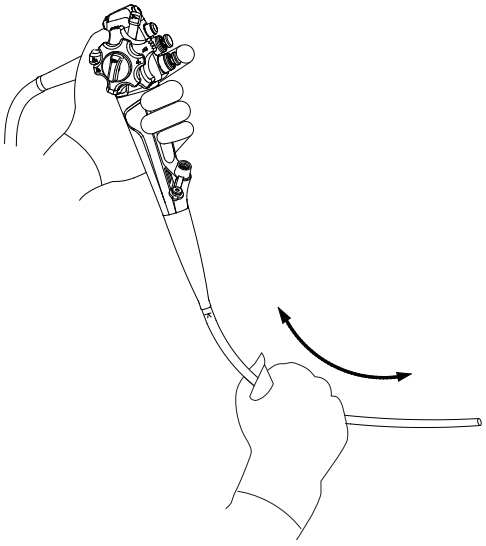

Figure 3-4 Inspecting the Insertion Section Surface

- Hold the position 20 cm from the distal end and the midpoint of the bending section respectively, and push and pull to ensure that junction between the bending section and the insertion section is not loose.

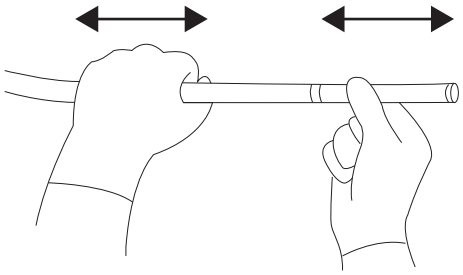

Figure 3-5 Inspecting the Connection Between Insertion Section and Bending Section

- Inspect the electrical contacts on the connector section. If any foreign matter adheres, wipe the electrical contacts with a clean lint-free cloth dampened with 75% ethyl alcohol. Ensure that the electrical contacts are clean and dry.

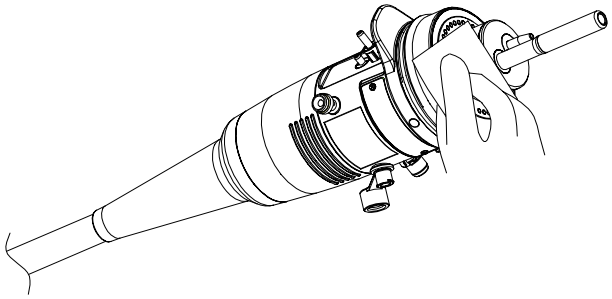

Figure 3-6 Wiping the Electrical Contacts

3.1.2 Inspecting the Angulation

WARNING Do not use the endoscope if any angulation control knob is too loose or tight. Otherwise, it may result in injury, bleeding or perforation to the animal during the examination.

Perform the following inspections only when the bending section is free.

■ To inspect the flexibility

Perform the following steps.

1. Rotate the up/down and left/right angulation locks clockwise respectively until they stop to ensure that the bending section is free.

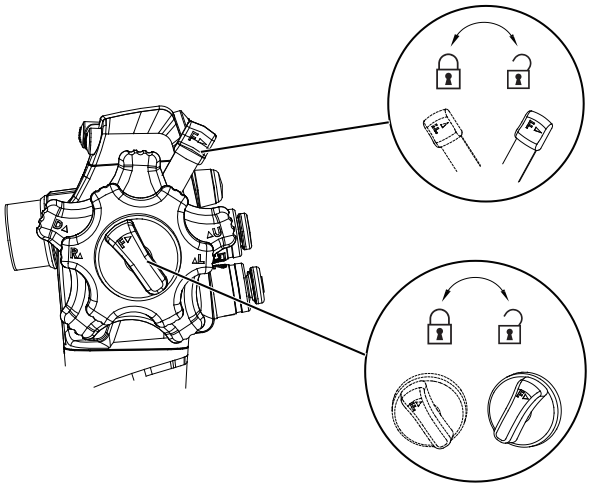

Figure 3-7 Rotating the Angulation Locks

2. Rotate the up/down and left/right angulation control knobs respectively. Ensure that the bending section can be smoothly and properly bent, and slowly return to a roughly straight condition after the knobs are released.
3. When the up/down and left/right angulation control knobs are rotated to their original positions, ensure that the bending section can return to a roughly straight condition.

■ To inspect up/down angulation

Perform the following steps.

1. Rotate the up/down angulation lock clockwise until it stops to free the up/down angulation control knob.

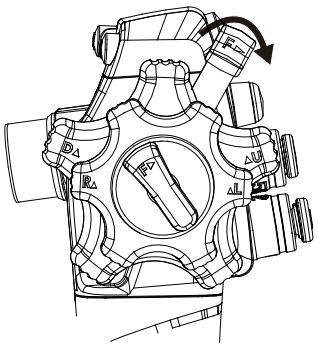

Figure 3-8 Freeing the Up/Down Angulation Control Knob

2. Rotate the up/down angulation control knob clockwise and anticlockwise respectively until it stops. Ensure that the bending section can move down and up and reach their maximum angles.

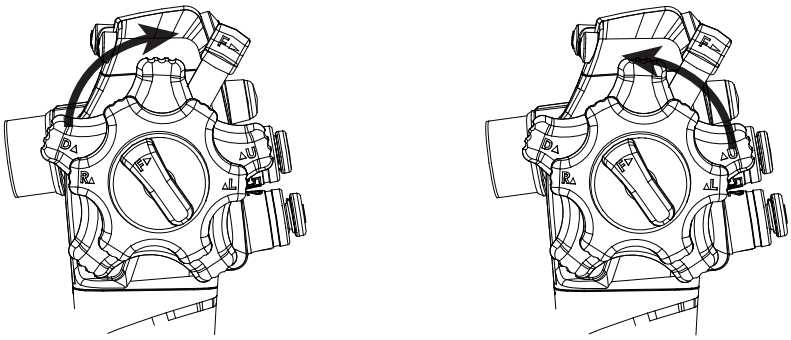

Figure 3-9 Rotating the Up/Down Angulation Control Knob

3. Rotate the up/down angulation lock anticlockwise until it stops to lock the up/down angulation control knob, and then release the knob. Ensure that the bending section can be fixed at the current angle.
4. When the bending section is fixed, rotate the up/down angulation lock clockwise until it stops to free the up/down angulation control knob, and then release the knob. Ensure that the bending section can return to a roughly straight condition.

■ To inspect left/right angulation

Perform the following steps.

1. Rotate the left/right angulation lock clockwise until it stops to free the left/right angulation control knob.

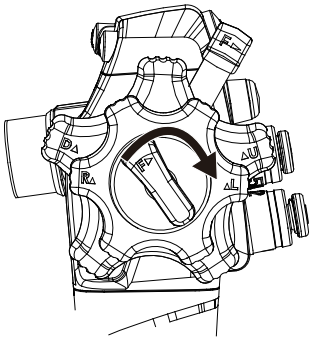

Figure 3-10 Freeing the Left/Right Angulation Control Knob

2. Rotate the left/right angulation control knob clockwise and anticlockwise respectively until it stops. Ensure that the bending section can move to the right and left and reach their maximum angles.

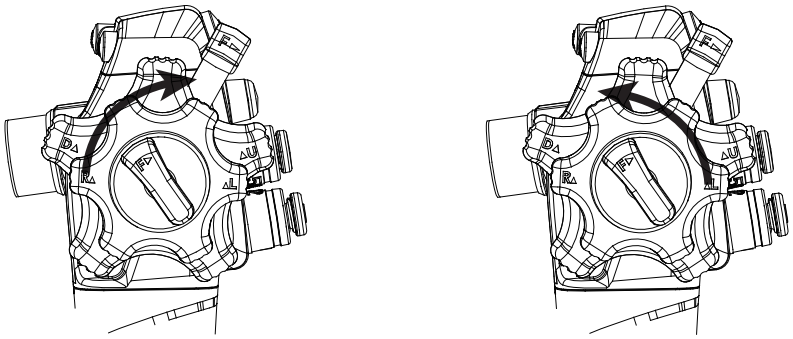

Figure 3-11 Rotating the Left/Right Angulation Control Knob

3. Rotate the left/right angulation lock anticlockwise until it stops to lock the left/right angulation control knob, and then release the knob. Ensure that the bending section can be fixed at the current angle.
4. When the bending section is fixed, rotate the left/right angulation lock clockwise until it stops to free the left/right angulation control knob, and then release the knob. Ensure that the bending section can return to a roughly straight condition.

3.2 Inspecting and Connecting the Accessories

The accessories include the ones for clinical examination and the ones for cleaning and disinfection. This section only introduces the ones for clinical examination. For the information of other accessories, please refer to Section 5.2 Cleaning and Disinfection Tools.

3.2.1 Air/Water Valve

Clean and disinfect the air/water valve before inspection. For details, refer to Chapter 5 Cleaning and Disinfection.

WARNING Ensure that the hole on the top of the air/water valve is not blocked. Otherwise, air will be continuously fed into the animal's body and it may result in personal injury.

■ Inspection

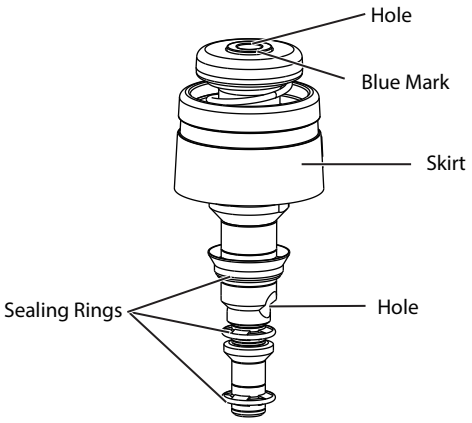

Figure 3-12 Air/Water Valve

Perform the following inspections before using the air/water valve.

- Ensure that the holes on the valve are not blocked.
- Ensure that the valve is not deformed or damaged.
- Ensure that the sealing rings are not cracked, scratched or damaged.

■ Installation

Install the air/water valve to the air/water valve cylinder of the endoscope correctly.

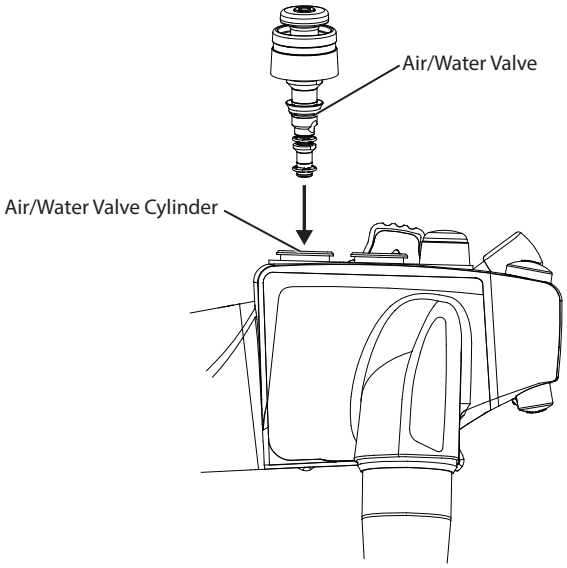

Figure 3-13 Installing the Air/Water Valve

NOTE:

- *Do not apply lubricant on the air/water valve. Otherwise, the sealing rings may bulge to cause the valve malfunction.*
- *The air/water valve may be sticky for the initial use. After being pressed and released several times, it can be operated smoothly.*
- *Blue mark is used to distinguish this valve from the suction valve.*

3.2.2 Suction Valve

■ Inspection

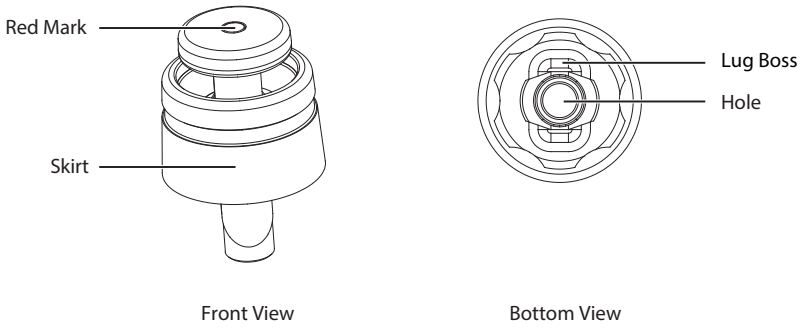

Figure 3-14 Suction Valve

Perform the following inspections before using the suction valve.

- Ensure that the suction valve is not cracked, deformed or damaged.
- Ensure that the hole on the valve is not blocked.

■ Installation

Align the lug boss on the bottom of the suction valve with the groove on the suction valve cylinder and press the suction valve until it stops. Ensure that the suction valve cannot be rotated.

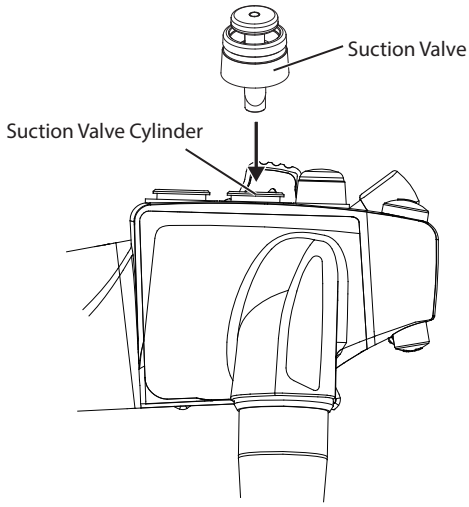

Figure 3-15 Installing the Suction Valve

NOTE:

- *Noise may be heard during use if the suction valve is dry, which does not affect the valve function.*
- *Red mark is used to distinguish this valve from the air/water valve of the endoscope.*

3.2.3 Biopsy Valve

WARNING

- The operator should ensure that the cap of the biopsy valve is intact before each use. If any abnormality is found, replace the biopsy valve immediately.
- Using a damaged biopsy valve may degrade the suction performance of the endoscope, which may result in spray or leakage of animal's debris or body liquid, posing potentially infection risks to both the operator and the animal.

■ **Inspection**

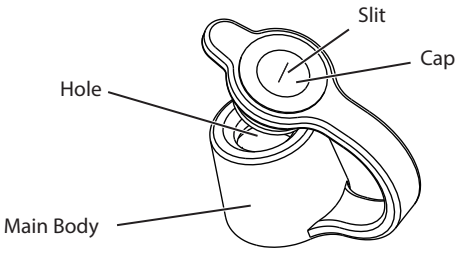

Figure 3-16 Biopsy Valve

Perform the following inspections before using the biopsy valve .

- Ensure that the hole and slit of the valve are not deformed, cracked, damaged or discolored.
- Cover the cap, and ensure that the main body and the cap are connected firmly.

■ **Installation**

Perform the following steps.

1. Cover the cap and ensure that the cap is firmly connected to the main body.

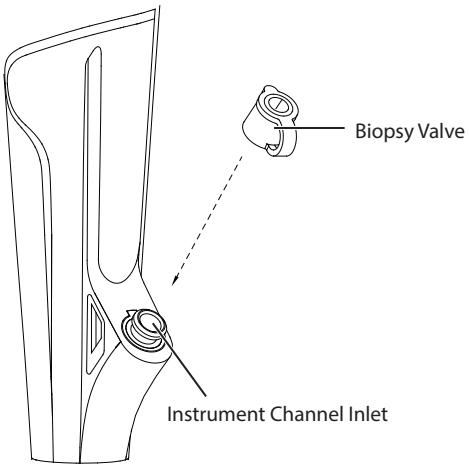

Figure 3-17 Installing the Biopsy Valve

2. Install the biopsy valve to the instrument channel inlet of the endoscope correctly.

3.2.4 Cap for Auxiliary Water-feeding Port

■ **Inspection**

Ensure that the cap for auxiliary water-feeding port is not deformed, cracked or damaged.

■ **Installation**

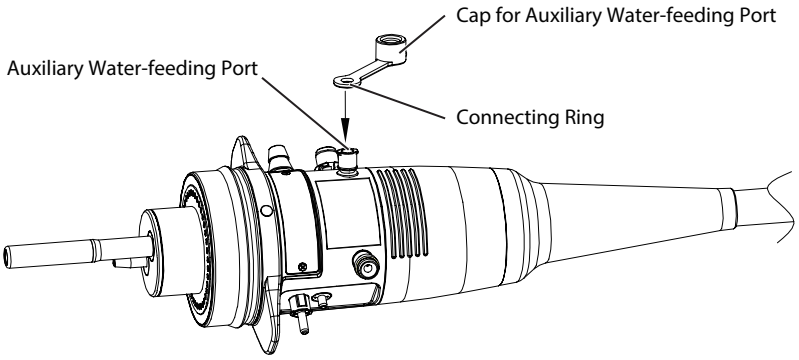

Figure 3-18 Installing the Cap for Auxiliary Water-feeding Port

Install the connecting ring to the auxiliary water-feeding port of the connector section correctly.

3.2.5 Auxiliary Water-feeding Tube

■ **Inspection**

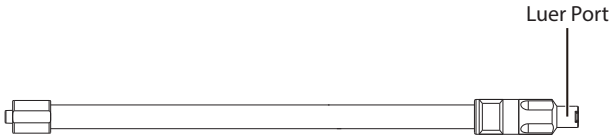

Figure 3-19 Auxiliary Water-feeding Tube

Ensure that the luer port is firmly fixed on the auxiliary water-feeding tube, and the auxiliary water-feeding tube is not cracked, scratched or damaged.

■ **Installation**

Open the cap for auxiliary water-feeding port, connect one end of the auxiliary water-feeding tube to the auxiliary water-feeding port on the connector section and rotate the tube clockwise until it stops.

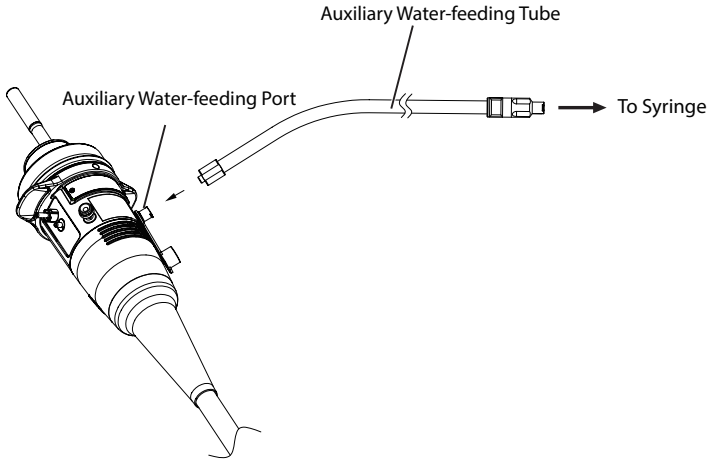

Figure 3-20 Installing the Auxiliary Water-feeding Tube

3.3 Connecting the Endoscopy System

NOTE:

- *Before connecting the endoscopy system, power off all the peripherals.*

- *Ensure that the peripherals are correctly connected to the endoscope. For the detailed description about inspection and connection of the peripherals, refer to relevant user manuals.*

Connect the endoscopy system, as shown in Figure 3-21.

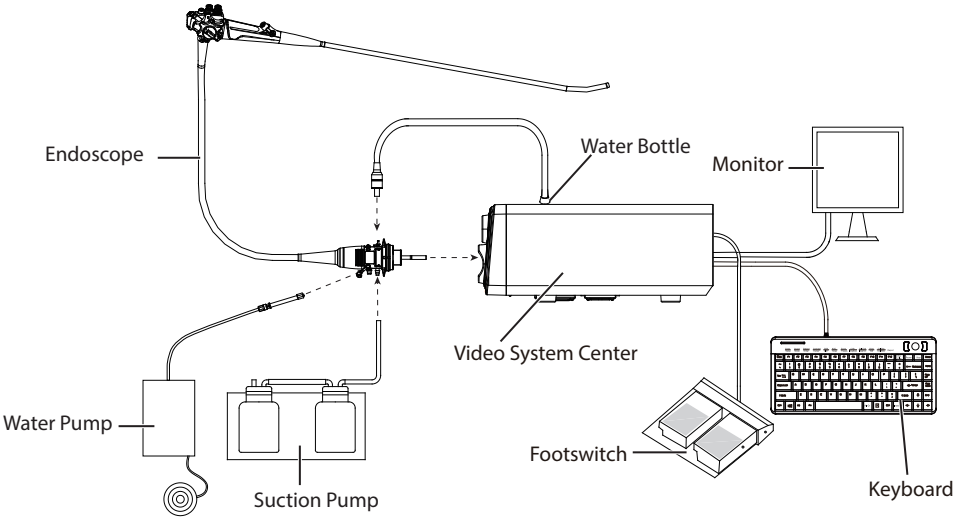

Figure 3-21 Connecting the Endoscopy System

3.3.1 Connecting the Video System Center

CAUTION Before connecting the endoscope to the video system center, ensure that the electrical contacts on the connector section are clean and dry. Otherwise, it may result in endoscope malfunction or video system center malfunction.

Perform the following steps.

1. Keep the yellow mark on the connector section upward and align the mark with the yellow mark on the endoscope port of the video system center.
2. Insert the connector section into the endoscope port firmly.

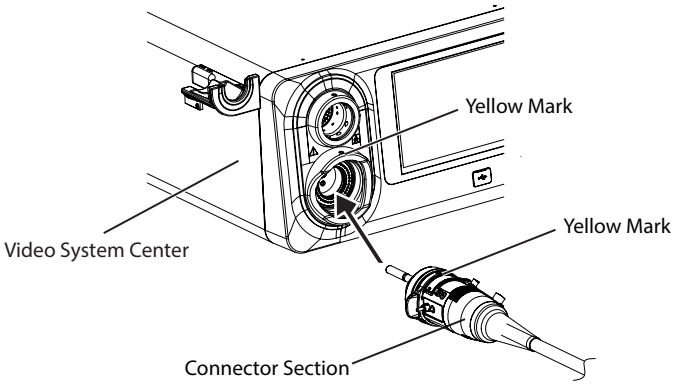

Figure 3-22 Connecting the Video System Center

3.3.2 Connecting the Water Bottle

CAUTION
- The water bottle should be installed in the water bottle bracket. Do not place the water bottle casually. Otherwise, the water-feeding tube may leak, causing endoscope malfunction.
- When disconnecting the water bottle connector from the endoscope, ensure that no water splashes out from the water bottle connector. Otherwise, the splashed water may cause device malfunction.

Perform the following steps.

1. Connect the water-feeding connector of water bottle connector to the water-feeding port on the connector section firmly.

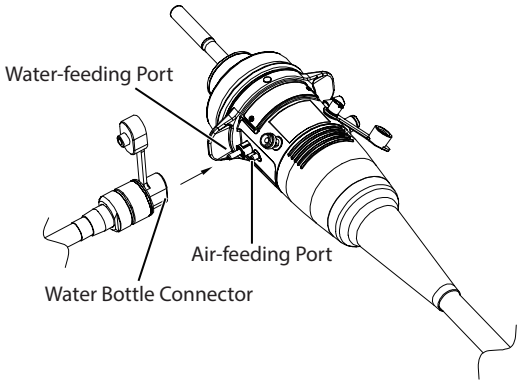

Figure 3-23 Aligning the Water-feeding Port

2. Rotate the water bottle connector 90° clockwise until the air-feeding connector is aligned with the air-feeding port on the connector section. Connect the water bottle connector firmly.

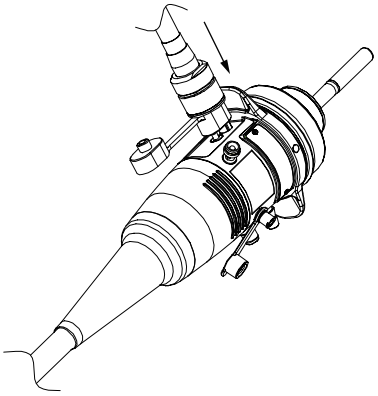

Figure 3-24 Rotating the Water Bottle Connector

3. Ensure that the water bottle connector is correctly connected and cannot be rotated.

3.3.3 Connecting the Suction Pump

WARNING

- If the suction tube is not connected firmly, animal's debris may leak from the tube during use and cause disease infection, suction degradation, and damage to the device.
- If any malfunction occurs during the examination, turn off the suction pump immediately.

Connect the suction tube to the suction port of the endoscope firmly.

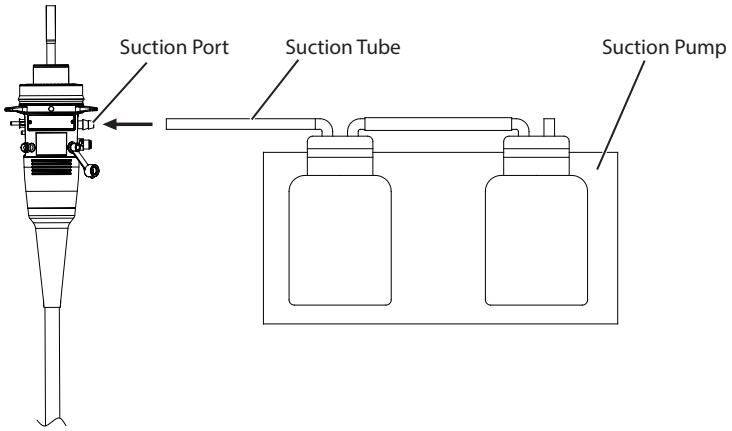

Figure 3-25 Connecting the Suction Pump

3.4 Inspecting the Endoscopy System

3.4.1 Inspecting the Image

WARNING Do not look straight at the light emitted from the distal end. Otherwise, it may result in injury to eyes.

Perform the following steps.

1. Power on the video system center and the monitor.
2. Turn on the lamp and ensure that the light emits from the distal end.
3. Place the distal end 10 mm away from your palm , and observe the image on the monitor while adjusting the brightness of the image by using relevant buttons on the video system center and the monitor.
4. Adjust the observation angle of the endoscope, and ensure that the image is normally displayed and does not disappear suddenly.

NOTE:

If the endoscopic image is unclear because the objective lens is dirty, use a soft lint-free cloth dampened with 75% ethyl alcohol to wipe the lens.

3.4.2 Inspecting the Remote Buttons

WARNING Even if the remote buttons are not intended to be used, it is also required to inspect their functions before performing an examination. Otherwise, the image may be frozen or other abnormality may occur, resulting in injury, bleeding or perforation to the animal.

Press each remote button and ensure that the preset functions can be normally achieved.

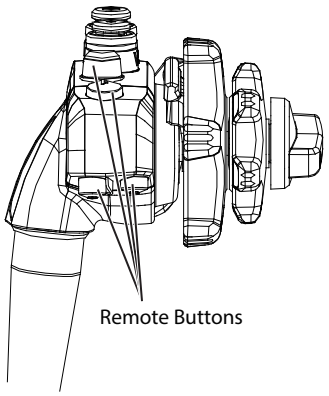

Figure 3-26 Inspecting the Remote Buttons

3.4.3 Inspecting the Air-feeding Function

WARNING Use sterile water to inspect the air-feeding function to avoid disease infection.

NOTE:

When the distal end is immersed to a depth of less than 10 cm, a few bubbles may appear even if the air/water valve is not operated. This is a normal phenomenon.

Perform the following steps.

1. Refer to the user manual of the video system center to set the air-feeding level to **H**.
2. Immerse the distal end of the endoscope in a container filled with sterile water to a depth of 10 cm. Do not operate the air/water valve and ensure that no bubble is generated from the air/water nozzle.

3. Cover the hole on the air/water valve with your finger to feed air. Ensure that continuous bubbles are generated from the air/water nozzle.

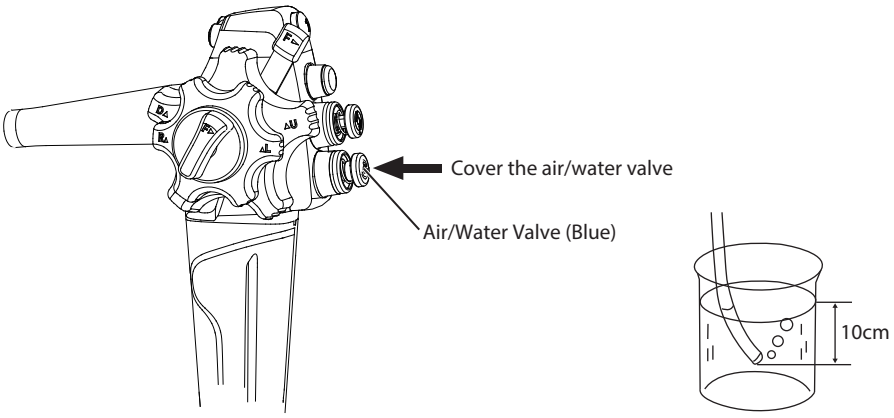

Figure 3-27 Feeding Air

4. Release your finger and ensure that no bubble is generated from the air/water nozzle.

3.4.4 Inspecting the Water-feeding Function

WARNING Use sterile water to inspect the water-feeding function to avoid disease infection.

Perform the following steps.

1. Cover the hole on the air/water valve with your finger, and press the valve to feed water. Observe the image on the monitor and ensure that water flows over the objective lens.

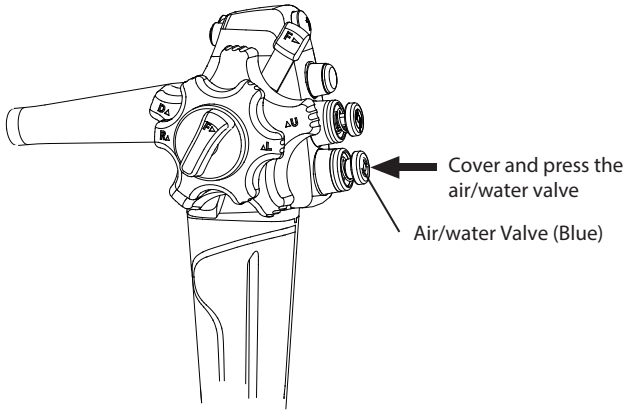

Figure 3-28 Feeding Water

2. Release your finger and ensure that no water flows out and the air/water valve restores to its original position smoothly.
3. Cover the hole with your finger and press the air/water valve again to feed water. Release the valve and cover the hole to feed air. Ensure that the residual water can be cleared away from the objective lens and the image on the monitor is clear.

NOTE:

- *If the air/water valve is pressed for the first time, it may take a few seconds before water is fed.*
- *If the air/water valve restores to the original position very slowly after water-feeding, the operator should remove the air/water valve and moisten the sealing ring with sterile water.*

3.4.5 Inspecting the Suction Function

WARNING
- If the biopsy valve is leaky, animal's debris and body liquid could leak out and cause disease infection.
- If the suction valve cannot be operated smoothly, it may result in suction malfunction and personal injury. Please re-install the suction valve or replace it with a new one. If the problem still exists after the replacement, the endoscope may be malfunctioning. Please stop using the endoscope and contact the local distributor of the manufacturer.

Perform the following steps.

1. Adjust the suction pressure of the suction pump to the clinical examination standard.
2. Immerse the distal end in the sterile water, and keep the instrument channel inlet and the sterile water surface at the same height.

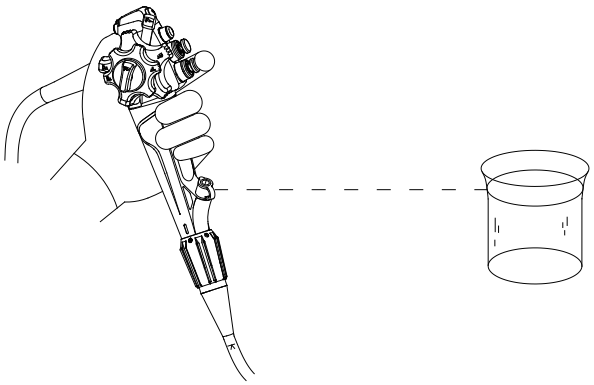

Figure 3-29 Keeping at the Same Height

3. Press the suction valve and ensure that water can be continuously aspirated to the suction bottle.

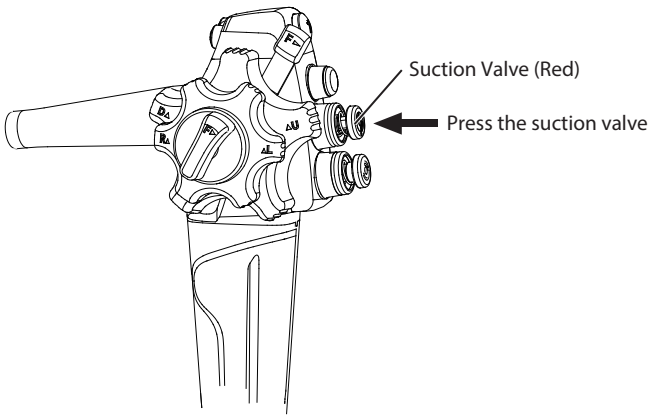

Figure 3-30 Suction

4. Release the suction valve and ensure that the suction stops, and the suction valve restores to the original position.
5. Press the suction valve to aspirate water for a few seconds, release the valve, and wait for several seconds. Repeat the operation for several times and ensure that no water leaks from the biopsy valve.
6. Take out the distal end from the container and press the suction valve to aspirate air for a few seconds to drain the water from the instrument channel and suction channel.

3.4.6 Inspecting the Instrument Channel

WARNING Keep eyes away from the distal end when the biopsy forceps or other endotherapy accessories stretch out from the distal end. Otherwise, it may result in injury to eyes.

Perform the following steps.

1. Insert the endotherapy accessory into the instrument channel inlet through the slit on the biopsy valve. Ensure that the accessory can smoothly stretch out from the instrument channel outlet without any foreign matters.

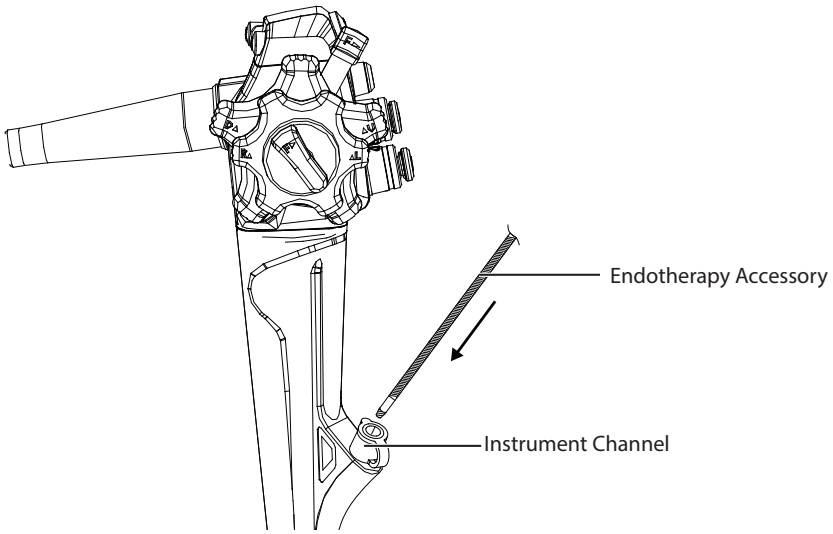

Figure 3-31 Inspecting the Instrument Channel

2. Ensure that the accessory can be smoothly withdrawn from the instrument channel.

3.4.7 Inspecting the Auxiliary Water-feeding Function

WARNING

- Use sterile water to inspect the auxiliary water-feeding function to avoid disease infection.
- The auxiliary water-feeding tube includes a back-flow preventer. Ensure that the tube is installed in position before use. Otherwise, back-flow liquid may result in device damage or personal injury.

Perform the following steps.

1. Connect one end of the auxiliary water-feeding tube to the auxiliary water-feeding port.
2. Connect the other end to a syringe filled with sterile water. Feed water and ensure that the water flows out from the distal end in stream.

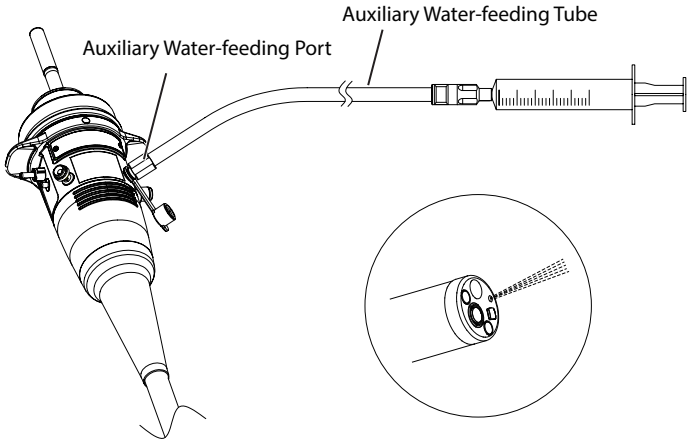

Figure 3-32 Auxiliary Water-feeding

3. Observe both the connectors of the auxiliary water-feeding tube and ensure that there is no leakage.
4. Remove the syringe from the auxiliary water-feeding tube, and ensure that no water flows out from the connector of the tube or the auxiliary water-feeding outlet at the distal end.

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4 Operations

The operator of this endoscope should be a physician or the medical personnel who operates under the supervision of the physician and should have received sufficient training in clinical endoscope technique. This manual, therefore, does not explain or discuss clinical endoscopic procedures. It only describes basic operation and precautions related to the operation of this endoscope.

- Animal's debris and chemicals for cleaning and disinfection are potentially dangerous. The operator should wear the medical protective clothing, goggles, or gloves to minimize the risk of cross-contamination and disease infection.
- Disconnect the endoscope from the video system center after use to avoid accidents.
- The surface temperature of the distal end of the endoscope may exceed 41°C and reach 50°C due to intense illumination, which may cause mucous membrane burns. Always use the minimum level of illumination, minimum time and suitable distance for observation. Whenever possible, avoid close stationary observation and do not leave the distal end of the endoscope close to the mucous membrane for a long time.
- Do not insert or withdraw the endoscope in any of the following cases. Otherwise, it may result in injury, bleeding or perforation to the animal.
  - When the biopsy forceps stretch out from the distal end.
  - When the bending section of the endoscope is fixed.
  - When inserting or withdrawing the endoscope encounters resistance.
  - When the image is digitally zoomed using the video system center (digital zoom).
- Before inserting the endoscope into the animal's body, the operator should ensure that the endoscope can be operated correctly. If any abnormality is found on the distal end during the endoscopy, the operator should stop using the endoscope immediately and slowly withdraw it from the animal's body to avoid injury, bleeding or perforation.
- Do not operate the angulation control knob forcibly. Otherwise, the bending section could be inversely bent and it may result in injury, bleeding or perforation to the animal.
- If the image is unclear or frozen, the operator should not operate the bending section of the endoscope, feed air or insert/withdraw the insertion section. Otherwise, it may result in injury, bleeding or perforation to the animal.
- Stop the examination in any of the following cases, and withdraw the endoscope from the animal's body. Otherwise, it may result in injury, bleeding or perforation to the animal.
  - The endoscope malfunctions.
  - The endoscopic image is frozen or disappears suddenly.
  - The angulation control knobs are locked.
  - The angluation control function fails.
  - The zoom function of the video system center is abnormal.
- If the image or the function is abnormal, stop examining even if the abnormality disappears rapidly. Slowly withdraw the endoscope from the animal's body while observing the image. Otherwise, the abnormality may occur again and it may result in injury, bleeding or perforation to the animal.
- When switching between illumination modes, the image may be interfered. Therefore, do not operate the endoscope or perform a treatment while switching. Otherwise, it may result in personal injury.

4.1 Inserting the Endoscope

Perform the following steps.

1. Hold the control section of the endoscope with the left hand, operate the air/water valve and suction valve with the index finger or middle finger, and rotate the up/down and left/right angulation control knobs with the thumb. Operate the insertion section and the up/down and left/right angulation locks with the right hand.

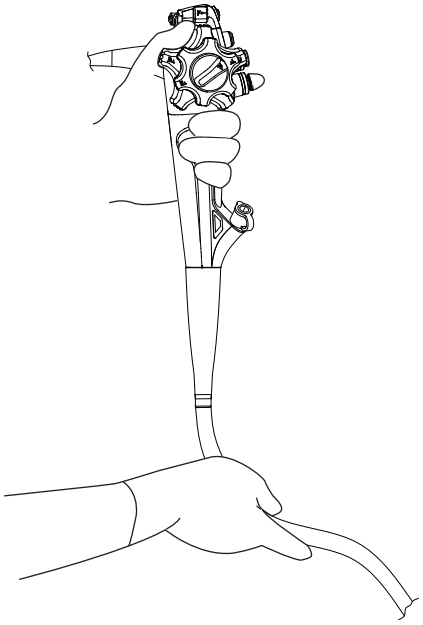

Figure 4-1 Holding the Endoscope

2. Observe the whole endoscope insertion process from the mouth to the animal's body on the monitor. Do not insert the insertion tube beyond its insertion limit mark.

4.1.1 Adjusting the Angle of Bending Section

WARNING
- Do not adjust the angle of the bending section rapidly during use. Otherwise, it may result in personal injury.
- Stop using the endoscope when the animal feels pain. Otherwise, it may result in personal injury.

CAUTION Do not adjust the angle of the bending section excessively. Otherwise, the steel wire may turn loose or be torn due to the excessive pulling and the bending section may be difficult to be adjusted.

Perform the following steps.

1. Rotate the up/down or left/right angulation control knob to adjust the bending section to a desired observation angle.
2. Rotate the up/down or left/right angulation lock to fix the bending section.

4.1.2 Feeding Air/Water and Aspirating

■ To feed air/water

WARNING If the sterile water level in the water bottle is under the lowest limit during use, add sterile water. Do not exceed the recommended upper limit.

NOTE:

If the endoscope is used at a lower temperature, water vapor may condense on the surface of the objective lens, making the image cloudy. In this case, the operator should change the sterile water to the one at 40°C - 50°C (104°F - 122°F).

The water bottle is shown in the following figure.

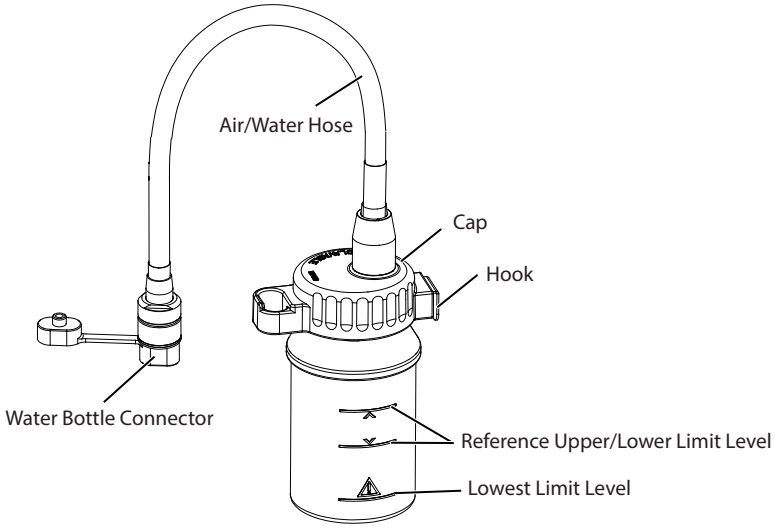

Figure 4-2 Water Bottle

Perform the following steps.

1. Cover the hole on the air/water valve to feed air through the air/water nozzle.
2. Press the air/water valve to feed water to the surface of objective lens.

■ Aspiration

WARNING

- Attach the cap of the biopsy valve firmly before suction operation. Otherwise, it may degrade the performance of the suction system, which may result in leakage of animal's debris or body liquid, posing potentially infection risks.
- During aspiration, keep the suction pressure at the lowest level required to perform the endoscopy. Excessive suction pressure may result in aspiration of mucous membranes, causing injury to mucous membranes.
- Avoid aspirating solid or sticky matters. Otherwise, it may block instrument channel, suction channel or suction valve. If the suction valve is blocked, disconnect the suction tube, turn off the suction pump, remove the suction valve, and clean the foreign matters.

CAUTION

- Empty the suction bottle before use. Otherwise, the overflow liquid may result in the suction pump malfunction.
- Discharge the waste in accordance with local laws and regulations. For details, please consult the local distributors.

Press the suction valve to aspirate excessive liquid and debris in the animal's body.

NOTE:

If air-feeding and suction are performed at the same time, the liquid drops on the objective lens can be removed effectively.

■ To feed water through the auxiliary water-feeding port

WARNING Use sterile water to avoid disease infection.

CAUTION Do not remove the auxiliary water-feeding tube until the pre-cleaning is completed. Otherwise, the residual water in the tube may splash on the peripheral devices, causing damage to the peripheral devices.

NOTE:

Cover the auxiliary water-feeding port with the cap when the port is not in use. Otherwise, debris or liquid in animal's body may flow back from the auxiliary water-feeding channel and spout from the auxiliary water-feeding port.

Use a syringe to feed water to the endoscope through the auxiliary water-feeding tube. The water will spurt out in stream from the distal end to flush the blood and debris adhering to the mucous membranes.

■ To feed liquid to the instrument channel

WARNING When using a syringe to inject liquid into the instrument channel through the biopsy valve, open the valve cap and insert the syringe into the biopsy valve diagonally. Otherwise, the biopsy valve may be damaged and the syringe may fall off from the valve opening, causing animal's debris and body liquid leakage and cross infection.

Perform the following steps.

1. Aspirate liquid into the syringe.
2. Open the biopsy valve cap and insert the syringe into the biopsy valve diagonally.

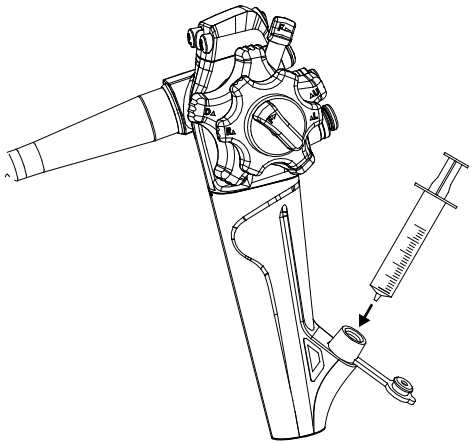

Figure 4-3 Injecting Liquid into the Instrument Channel

3. Push the syringe plunger to inject liquid.
4. Remove the syringe and cover the cap to the biopsy valve firmly.

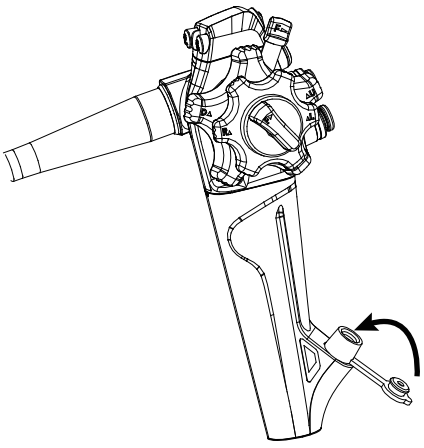

Figure 4-4 Covering the Biopsy Valve Cap

4.2 Observing the Image

Observe the endoscopic image on the monitor. For details, please refer to the user manual of the video system center.

4.3 Using the Endotherapy Accessory

WARNING

- When using the endotherapy accessory, the distance between the distal end of the endoscope and the mucous membranes should be longer than the minimum visible distance. Ensure that the accessory can be observed on the image. Otherwise, it may result in serious personal injury or endoscope damage.
- When inserting and withdrawing the endotherapy accessory, ensure that the tip of the endotherapy accessory is closed or retracted to the tube sheath. Slowly insert or withdraw the accessory and get the accessory through the slit of the biopsy valve straightly. Otherwise, the biopsy valve may be damaged and tissue loss may be caused.
- If it is difficult to insert or withdraw the endotherapy accessory, straighten the bending section while observing the image. Inserting or withdrawing endotherapy accessory forcibly may damage the instrument channel or the endotherapy accessory.
- If the distal end of the endotherapy accessory is invisible in the endoscopic image, do not stretch out or open the distal end. Otherwise, it may cause personal injury, bleeding or accessory damage.
- Do not forcibly or suddenly insert the endotherapy accessory. Otherwise, the endotherapy accessory may stretch out suddenly from the distal end, causing pain, injury, bleeding or perforation to the animal.
- Do not inject excessive air or any non-flammable gas into the animal's body during the endotherapy operation. It may result in gas embolism.
- Do not hang the endotherapy accessory on the biopsy valve. Otherwise, the biopsy valve may be damaged.

Perform the following steps.

1. Select endotherapy accessories that are compatible with the device.
2. Hold the up/down and left/right angulation control knobs.
3. Ensure that the tip of the endotherapy accessory is closed or retracted in the tube sheath. Slowly insert the endotherapy accessory straightly into the slit of the biopsy valve cap.
4. Hold the endotherapy accessory approximately 4 cm from the instrument channel inlet and slowly insert the accessory into the instrument channel while observing the endoscopic image.
5. Operate the endotherapy accessory. For details, refer to the relevant user manual.
6. Close the distal end of the endotherapy accessory or retract it into the sheath, and slowly withdraw the endotherapy accessory.

4.4 Withdrawing the Endoscope

WARNING If blood is found on the surface of the insertion section after the endoscope is withdrawn, inspect the animal's body.

Perform the following steps.

1. Press the suction valve to aspirate residual air, blood, mucus or other debris from the animal's body.
2. Ensure that the bending section of the endoscope is free.
3. Slowly withdraw the endoscope from the animal's body while observing the image.

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5 Cleaning and Disinfection

This chapter describes the methods for cleaning and disinfecting of the series endoscopes mentioned in this manual and the basic information about how to safely and effectively clean and disinfect the series endoscopes.

Many medical literature has recorded cross infection accidents caused by improper cleaning disinfection. Therefore, the operator should follow the descriptions in this manual and the manuals for the accessories of the endoscope. In addition, the operator should be familiar with the following items:

- Occupation health and the safety standards of your hospital
- Individual cleaning and disinfection standards
- Structures and usages of the endoscope and accessories
- Usage of relevant chemicals

For selecting the type and condition of cleaning and disinfection, also refer to the cleaning and disinfection regulations of the local hospital for professional judgment.

- Animal's debris, cleaning solution and disinfectant are potentially infectious. During cleaning and disinfection, the operator should follow the rules for safe operations in the disinfection room and wear medical protective clothing, goggles and gloves. Before leaving the disinfection room, the operator should take off these medical protective barriers.
- The disinfection room should be set separately and isolated from the procedure room. In addition, the room should have sufficient space and adequate ventilation to avoid accumulation of poisonous chemical gas.
- During cleaning and disinfection of the endoscope, all channels of the endoscope should be cleaned and disinfected, including the channels not used during last examination. Otherwise, the next animal may be infected.
- Before manually cleaning the endoscope each time, perform a leakage test. When leakage is found, stop using the endoscope and return it to the local distributor for repair to avoid further damage. When a leaky endoscope is used, the endoscopic image may disappear and the bending function or other functions may become abnormal.
- Do not reuse disposable accessories.
- After being used on the animal that is infected with mycobacterium tuberculosis or other mycobacterium, the endoscope should be immersed in 2.4% glutaraldehyde for at least 45 min.
- When finding that the animal is infected with unknown super bacteria after using the endoscope, please report the incident in accordance with local laws or regulations.
- After being contaminated by pathogenic bacterium that is hard to kill, such as cryptosporidium or prion virus, the endoscope and its accessories should be destroyed by melting or burning when necessary because they cannot be completely disinfected.
- Dispose of single-use endotherapy accessories in accordance with local laws or regulations.
- Use the automated endoscope reprocessor (AER) that is legally listed for sale to disinfect the endoscope.
- Before using the automated endoscope reprocessor (AER),ensure that it can thoroughly clean and disinfect the endoscope, including all channels. Otherwise, the next animal or the operator may be infected. For the operation, specifications and connector information of the AER, please consult the AER manufacturer.
- The endoscope is not strictly cleaned and disinfected in the factory. Therefore, the operator should strictly perform the cleaning and disinfection processes described in this manual before use.

- After use each time, the endoscope should be cleaned, disinfected and stored as described in this user manual. Otherwise, it may result in disease infection of the animal or operator, damage to the endoscope or performance degradation.
- Before using the endoscope each time, clean and disinfect the endoscope according to the regulations of the local hospital based on the actual disinfection and storage conditions of the endoscope.
- Before cleaning and disinfection, ensure that the insertion section of the endoscope is in natural state (unlocked). Otherwise, the endoscope may be damaged during the cleaning and disinfection process.
- Store the ethyl alcohol in a sealed container. Otherwise, a fire may be incurred. Besides, the alcohol may become invalid due to volatilization.
- The water quality for the cleaning and disinfection should meet the regulations in AAMI TIR34-2014.

5.1 Cleaning Solution, Disinfectant and Flush Fluid

- Use the cleaning solution and disinfectant that meet local laws and regulations.
- Use the cleaning solution and disinfectant recommended by the manufacturer, and ensure that their concentrations and the endoscope soak period meet the recommended conditions in this chapter. Otherwise, the endoscope may be damaged or the expected disinfection effect cannot be achieved. If you have any special purpose or requirement, please consult the manufacturer.
- Prepare, use, store and dispose of the cleaning solution and disinfectant according to the instructions provided by the manufacturers.
- Do not use expired cleaning solution and disinfectant.
- The endoscope is not autoclavable or cannot be processed by low-temperature plasma.
- Do not dry any disinfectant on the surface of the endoscope in air.
- Do not immerse the endoscope in the anhydrous ethanol or wipe the endoscope with the anhydrous ethanol.

5.1.1 Cleaning Solution

Cleaning solution can be used to dissolve and emulsify feculence and microbe, enhance the dirt-removing power, facilitate cleaning, and improve the cleaning quality.

The following cleaning solutions are recommended to clean the endoscope.

Table 5-1 Recommended Cleaning Solution and Method

Cleaning Solution	Concentration	Temperature	Contact Time	Using Method
Metrex EmPower	1:128	20°C - 40°C	≥ 1 min	Pre-cleaning and manual cleaning before manual disinfection
Dr. Weigert neodisher endo® CLEAN	5 - 10 mL/L (0.5 - 1%)	20°C - 40°C	5 - 10 min	Pre-cleaning and manual cleaning before automated cleaning and disinfection
	5 mL/L (0.5%)	35°C - 55°C	3 -10 min	Automated cleaning

NOTE:

- *Do not use the cleaning solution repeatedly.*
- *Excessive cleaning solution foaming could cause inadequate contact between the interior of the channels and the cleaning solution. Consequently, the endoscope cannot be cleaned completely.*

5.1.2 Disinfectant

The following disinfectant is recommended to disinfect the endoscope.

Table 5-2 Recommended Disinfectant and Method

Disinfectant	Concentration	Temperature	Contact Time	Using Method
MetriCide 28 Long-life Activated Dialdehyde Solution	2.5%	25°C	90 min	Manual disinfection
Dr. Weigert neodisher® Septo DN	10 mL/L (1.0%)	55°C	5 min	Automated disinfection

NOTE:

- *For the detailed usage and precautions of the disinfectant, refer to the instructions of the disinfectant manufacturer.*
- *The glutaraldehyde may incur stimulus or anaphylactic reaction of the endoscope cleaning and disinfection personnel, causing dermatitis, conjunctivitis, nasal inflammation or asthma. Therefore, this disinfectant should be used in an area with adequate ventilation and stored in a sealed container.*
- *The disinfectant used should have hygienic license (within its validation period) or the detect report, national health and safety assessment report and disinfectant production certificate published by the authority. The reference values are in the table above. If the value and using method of the disinfection are not coincident with those in the approval document of sanitary license, the latter shall prevail.*
- *The glutaraldehyde is easy to condense on the surfaces of the endoscope and the cleaning and disinfection devices.*

5.1.3 Flush Fluid

The sterile water is recommended as the flush fluid. After high-level disinfection, completely rinse the endoscope, accessories, and cleaning and disinfection tools with sterile water to remove the residual of disinfectant. If no sterile water is available, filtered water may be used only when the rinse is followed by 75% ethyl alcohol flushing and drying steps.

NOTE:

- *Do not use tap water as flush fluid.*
- *Do not use the flush fluid repeatedly.*

5.2 Cleaning and Disinfection Tools

Prepare the following items before cleaning and disinfection.

- Manual cleaning tank, rinse tank, disinfection tank and terminal rinse tank
- Manual cleaning basin, rinse basin, disinfection basin and terminal rinse basin
- Channel plug
- Injection tube
- Cleaning brush
- Channel-opening cleaning brush
- Auxiliary water-feeding tube
- Air pressure gun
- Water pressure gun
- Leakage detector
- Suction pump
- Timer
- Transport container for endoscope
- Transport container for accessories

- Sterile mat
- Clean lint-free cloth (single-use)
- Sterile lint-free cloth (single-use)
- Sterile swab
- 30cm^3 (30 mL) syringe

5.3 Accessory Inspection and Connection

For inspecting the accessories that are not mentioned below, please refer to the relevant user manuals.

5.3.1 Channel Plug

The channel plug is used to plug the instrument channel inlet, air/water valve cylinder and suction valve cylinder during cleaning and disinfecting the endoscope. The following figure shows the channel plug.

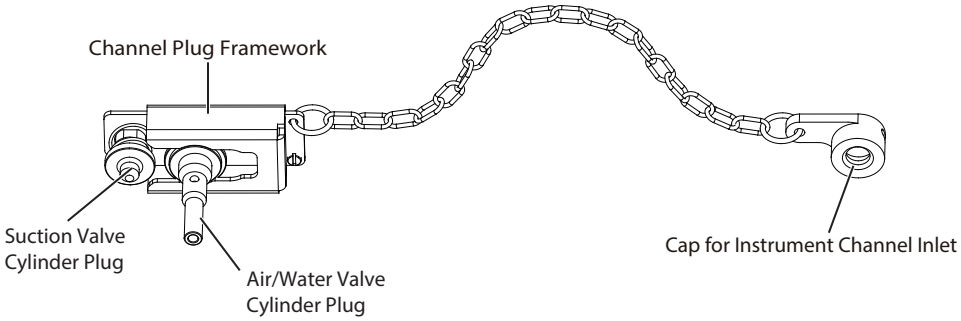

Figure 5-1 Channel Plug

NOTE:

- *Before using the channel plug, ensure that there is no crack, scratch or debris on each plug and the cap.*
- *Ensure that the channel plug and the endoscope are firmly connected.*

Perform the following steps to connect the channel plug.

1. Hold the channel plug, and install the suction valve cylinder plug and air/water valve cylinder plug into the suction valve cylinder and air/water valve cylinder of the endoscope respectively.
2. Press and push ahead the channel plug framework until the installation is firm.
3. Press the cap for instrument channel inlet into the instrument channel inlet, and ensure that the connection is firm.

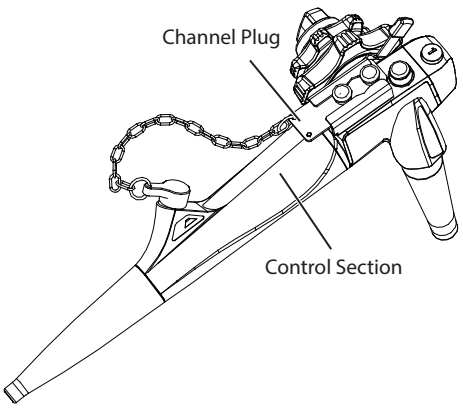

Figure 5-2 Installing the Channel Plug

5.3.2 Injection Tube

The injection tube is used to inject cleaning solution, disinfectant, flush fluid or ethyl alcohol into the air/water channel and suction channel. It is also used to feed air into these channels to discharge residual liquid. The following figure shows the injection tube.

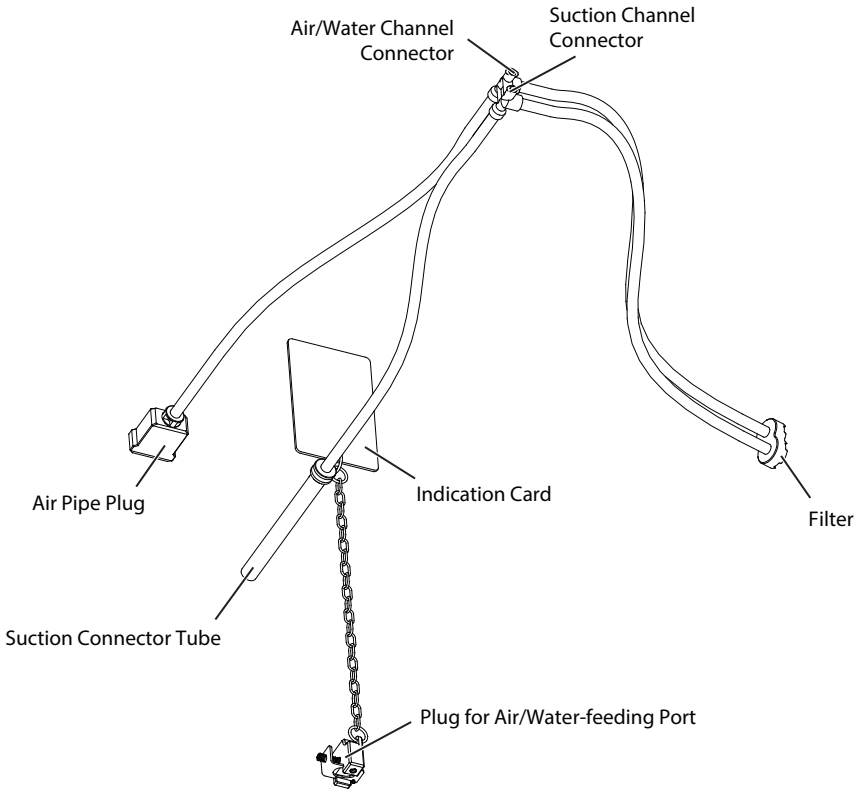

Figure 5-3 Injection Tube

NOTE:

- *Before using the injection tube, ensure that there is no crack, scratch, flaw or debris on any component.*
- *Ensure that the filter mesh is intact.*
- *Connect a 30 cm^3 (30 mL) syringe to the air/water channel connector. Immerse the filter in the filtered water, pull out the plunger of the syringe, and ensure that the filtered water is aspirated into the syringe. Then, push the plunger, and ensure that the filtered water flows from the air pipe plug and no filtered water flows from the filter.*
- *Connect a 30 cm^3 (30 mL) syringe to the suction channel connector. Immerse the filter in the filtered water, pull out the plunger of the syringe, and ensure that the filtered water is aspirated into the syringe. Then, push the plunger, and ensure that the filtered water flows from the suction connector tube and no filtered water flows from the filter.*

Connect the air pipe plug, suction connector tube and plug for air/water-feeding port of the injection tube to the air pipe, suction port and air/water-feeding port on connector section of the endoscope respectively.

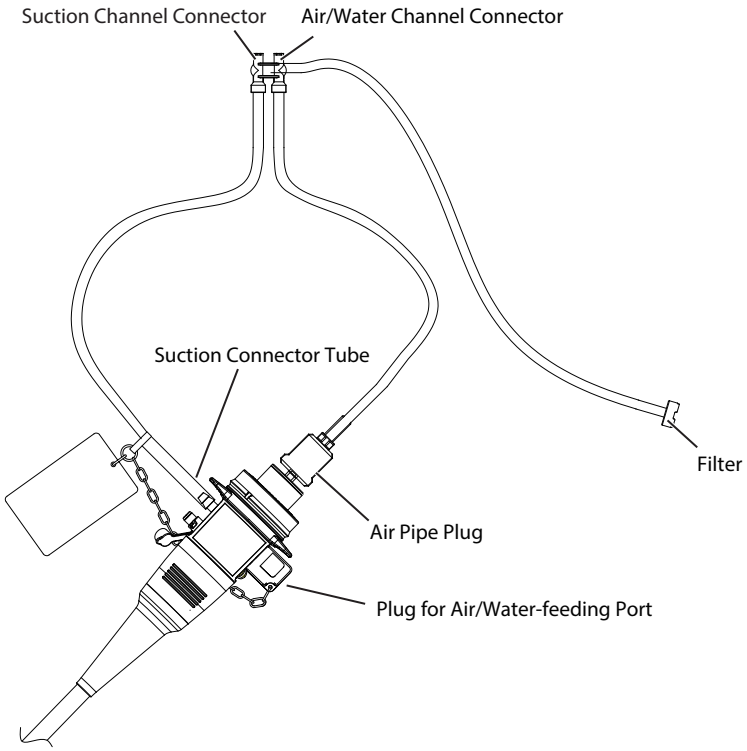

Figure 5-4 Installing the Injection Tube

5.3.3 Auxiliary Water-feeding Tube

The auxiliary water-feeding tube is used to inject cleaning solution, disinfectant, flush fluid and ethyl alcohol into the auxiliary water-feeding channel during cleaning and disinfecting the endoscope. It is also used to feed air into the channel to discharge residual liquid.

Figure 5-5 Auxiliary Water-feeding Tube

NOTE:

- *Ensure that no crack, scratch or other damage is on the auxiliary water-feeding tube.*
- *Immerse the end of a 30 mL syringe into the flush liquid and pull the plunger to aspirate flush liquid into the syringe. Then connect the syringe to the luer port of the auxiliary water-feeding tube. Push the plunger and ensure that the flush fluid flows out from the other end.*

Install the auxiliary water-feeding tube.

Open the cap for auxiliary water-feeding port and install the connecting end of the auxiliary water-feeding tube to the auxiliary water-feeding port on the connector section. Rotate clockwise until it stops.

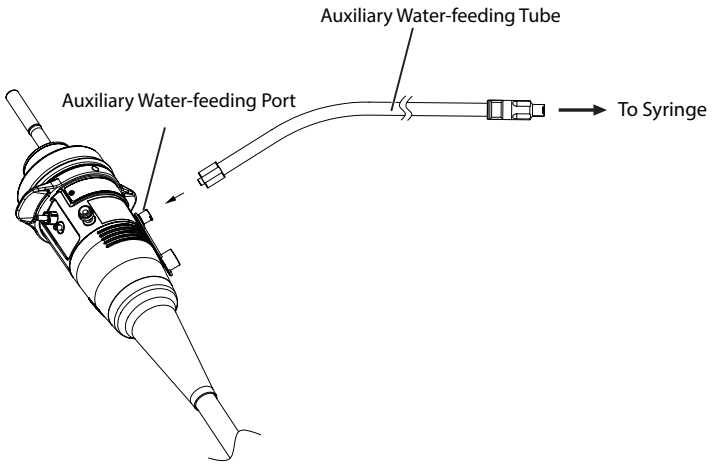

Figure 5-6 Installing the Auxiliary Water-feeding Tube

5.3.4 Cleaning Brush

The cleaning brush is used to brush the inner surfaces of the instrument channel and suction channel. The following figure shows the cleaning brush.

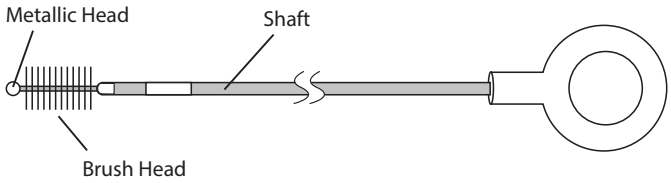

Figure 5-7 Cleaning Brush

Perform the following inspections before using the cleaning brush.

- Ensure that the brush head, metallic head and bristle are firm.
- Ensure there is no bend, scratch or other damage on the brush shaft.
- Ensure that there is no debris on the brush shaft or bristle.

NOTE:

- *Select an appropriate brush to brush the channels and accessories.*
- *Clean and disinfect the reusable cleaning brush after each use.*

5.3.5 Channel-opening Cleaning Brush

The channel-opening cleaning brush is used to brush the air/water valve, suction valve, biopsy valve and interiors and openings of the air/water valve cylinder, suction valve cylinder and the instrument channel inlet. The following figure shows the channel-opening cleaning brush.

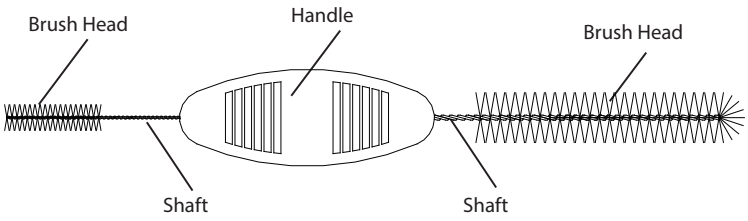

Figure 5-8 Channel-opening Cleaning Brush

Perform the following inspections before using the channel-opening cleaning brush.

- Ensure that the brush heads are firm.
- Ensure there is no bend, scratch or other damage on the brush shaft.
- Ensure that there is no debris on the brush shaft, bristle and handle.

5.3.6 Leakage Detector

The leakage detector is used to perform leakage test before cleaning and disinfecting the endoscope. The following figure shows the leakage detector.

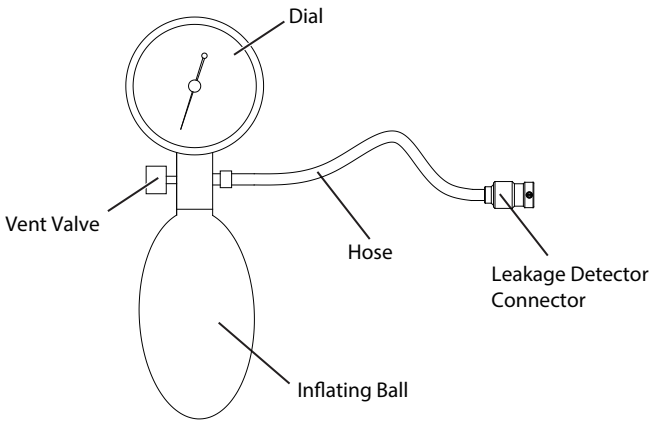

Figure 5-9 Leakage Detector

NOTE:

- *Before using the leakage detector, ensure that there is no crack, scratch, flaw or debris on any component of the leakage detector.*
- *Ensure that the hose of the leakage detector is firmly connected.*

Perform the following steps to connect the leakage detector.

1. Align the dowel pin on the inner hole of the leakage detector connector with the groove on the leakage detector port of the connector section.

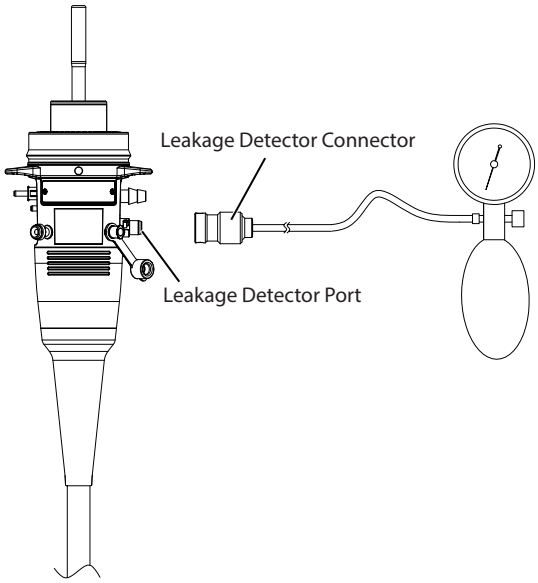

Figure 5-10 Aligning the Groove

2. Rotate the leakage detector connector clockwise until it is locked.

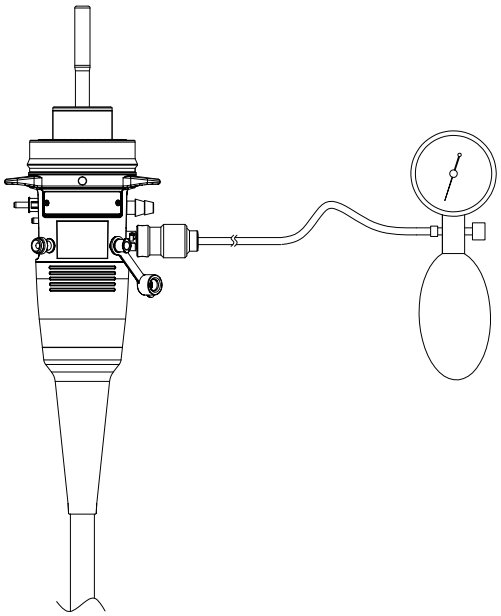

Figure 5-11 Connecting the Leakage Detector

5.4 Cleaning and Disinfection Process

Clean and disinfect the endoscope in accordance with the following diagram.

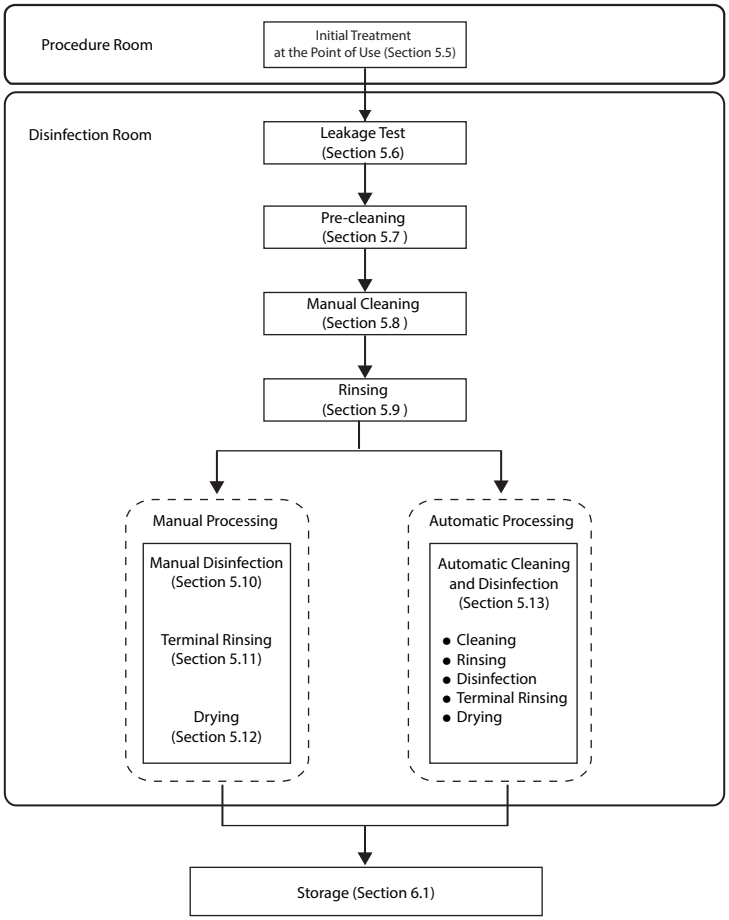

Figure 5-12 Cleaning and Disinfection Process

5.5 Initial Treatment at the Point of Use

- After being withdrawn from the animal's body, the endoscope should be pre-cleaned at the bedside immediately.
- Pre-cleaning should be performed before the endoscope is disconnected from the video system center.
- The endoscope should be pre-cleaned immediately after each examination. Otherwise, the residual debris may solidify. Consequently, cleaning and disinfection of the endoscope will be difficult.

5.5.1 Wiping the Insertion Section

NOTE:

When wiping the endoscope, do not bend the insertion section excessively. Otherwise, the outer rubber of the insertion section may be damaged.

After the endoscope is withdrawn from the animal's body, use a clean lint-free cloth dampened with cleaning solution to wipe the surface of the endoscope insertion section to remove all visible soil.

5.5.2 Flushing the Suction Channel

NOTE:

During aspiration, observe the liquid in the suction bottle carefully to avoid overflow, which might damage the suction pump.

Perform the following steps.

1. Turn on the suction pump.
2. Install the biopsy valve correctly.
3. Immerse the distal end of the endoscope in the cleaning solution, and press the suction valve to aspirate cleaning solution into the instrument channel for 15s.
4. Take out the distal end from the cleaning solution, and press the suction valve to aspirate air for 10s.
5. Turn off the suction pump.

5.5.3 Flushing the Air/Water Channel

Perform the following steps.

1. Turn on the air pump of the video system center, and adjust the air-feeding pressure to the maximum.
2. Cover the hole on the air/water valve and press the valve to feed water into the air/water channel for 15s.
3. Release the air/water valve and cover the hole on the valve to feed air into the air/water channel for 10s.
4. Power off the video system center.

5.5.4 Flushing the Auxiliary Water-feeding Channel

NOTE:

- *Do not remove the auxiliary water-feeding tube during pre-cleaning. Otherwise, the liquid may flow out from the auxiliary water-feeding channel.*
- *Pre-clean the auxiliary water-feeding channel even if the channel is not used during the previous examination.*
- *Directly use the water pump to rinse the auxiliary water-feeding channel if it is used in the examination. Otherwise, use a syringe to rinse the auxiliary water-feeding channel.*

Perform the following steps.

1. Ensure that the auxiliary water-feeding tube is connected to the endoscope firmly.
2. Use a 30 mL syringe to inject at least 150 mL (5 times) cleaning solution into the auxiliary water-feeding channel through the auxiliary water-feeding tube .

3. Use a 30 mL syringe to inject at least 150 mL (5 times) air into the auxiliary water-feeding channel through the auxiliary water-feeding tube.

5.5.5 Disconnecting the Reusable Parts

WARNING After the endoscope is disconnected from the video system center, do not touch the light guide on the connector section. Otherwise, it may cause skin burns.

NOTE:

The pre-cleaned endoscope can be directly transported to the disinfection room for short distance, but should be transported in a sealed container for long distance.

Perform the following steps.

1. Disconnect the suction tube and water bottle connector from the endoscope.
2. Disconnect the endoscope from the video system center.
3. Remove the air/water valve, suction valve and biopsy valve, and place these valves into the transport container for accessories filled with cleaning solution.
4. Transport the endoscope to the disinfection room with the transport container for endoscope.

5.6 Leakage Test

A leakage test should be performed before manual cleaning.

CAUTION When leakage is found on the endoscope, do not use the endoscope. Otherwise, the endoscope may be damaged and electric shock may occur. In case of leakage, please contact the local distributor.

NOTE:

- *The endoscope should be pre-cleaned before the leakage test, and the test should be conducted at least once a day if no condition allows.*
- *It is normal that the rubber surface of the bending section starts swelling as the pressure in the endoscope increases after connected with the leakage detector.*
- *Before leakage test, ensure that the leakage detector is firmly connected. Otherwise, the pressure in the endoscope cannot be increased and the accurate leakage test cannot be conducted.*
- *Do not place the leakage detector into the liquid during the test.*

Perform the following steps.

1. Connect the leakage detector. For details, refer to Section 5.3.6 Leakage Detector.
2. Fasten the vent valve of the leakage detector clockwise, use the inflating ball to increase the pressure to 22 kPa, and wait for 3 minutes. If the reading on the dial decreases continuously, the endoscope is leaky. In this case, stop testing and contact the local distributor.
3. Immerse the entire endoscope that the pressure has been increased in the filtered water, and use a syringe to inject water into all channels to remove air. Use the up/down and left/right angulation control knobs to adjust the angle of the bending section and wait for 3 minutes. Check if there are bubbles generating at the insertion section, the control section or the connector section. If bubbles generate continuously, the endoscope is leaky. The leaky endoscope cannot be cleaned and disinfected. Contact the local distributor.
4. Take out the endoscope from the filtered water.
5. Rotate the vent valve anticlockwise until the pointer on the dial goes back to the zero position again.
6. Disconnect the leakage detector.

5.7 Pre-cleaning

- To ensure the effectiveness of disinfection, clean the endoscope and accessories completely before disinfection to remove the microorganism or organism that may affect high-level disinfection.
- Ensure the instrument channel and the suction channel are sufficiently cleaned. Insufficient cleaning and disinfection of the endoscope may pose a disease infection risk to the next animal who uses this endoscope.
- To prevent cleaning solution spatter, pull out the cleaning brush in the water.
- The brush may bend or knot and the brush head may even fall off due to repeated use. The operator should ensure that there is no damage or other abnormalities on the brush before and after each use.
- If the brush head falls off in the channel, remove it immediately, and insert a new cleaning brush or other endotherapy accessory into the channel to ensure that no part is left inside the instrument channel or suction channel.

NOTE:

- *Gently pull out the cleaning brush from the instrument channel or suction channel to ensure that the shaft of the brush will not rub against the suction valve cylinder. Otherwise, the brush may be damaged and the suction valve cylinder may be scratched, causing suction performance degradation or leakage.*
- *Do not attempt to insert the cleaning brush from the distal end or the suction port. Otherwise, the cleaning brush could get stuck and cannot be pulled out.*
- *Do not immerse the endoscope together with its accessories to avoid damaging the endoscope.*
- *To avoid endoscope leakage, please clean the endoscope gently.*

After the endoscope passes the leakage test, perform the following steps to clean the endoscope manually.

1. Place the endoscope, channel plug, injection tube and auxiliary water-feeding tube into the cleaning tank. Disconnect the air/water valve, suction valve, biopsy valve and auxiliary water-feeding tube for examination from the endoscope, and place them in the transport container for accessories filled with cleaning solution.
2. Prepare the cleaning solution in accordance with the temperature and concentration recommended in Table 5-1. Fill the tank with sufficient cleaning solution, and ensure that the entire endoscope can be immersed in the cleaning solution.

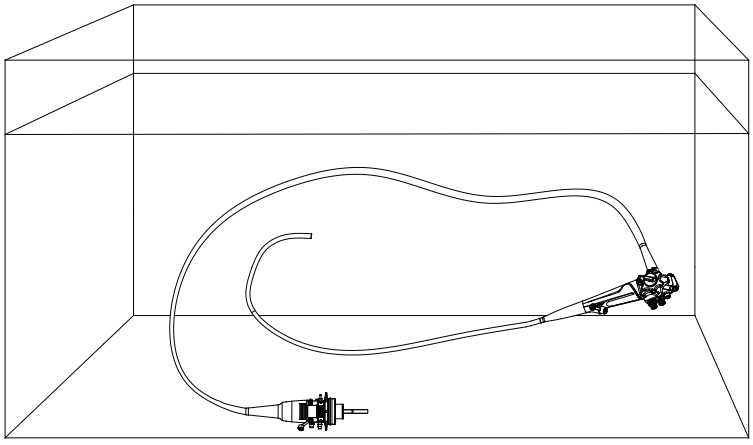

Figure 5-13 Immersing the Endoscope

3. Wipe the outer surface of the entire endoscope in the cleaning solution with a clean lint-free cloth, especially the insertion section and control section. Ensure that the outer surface of the endoscope is cleaned completely.
4. If necessary, use the channel-opening cleaning brush to clean the distal end of the endoscope.
5. Immerse the endoscope in the cleaning solution, and brush channels in steps as shown in the following figure.

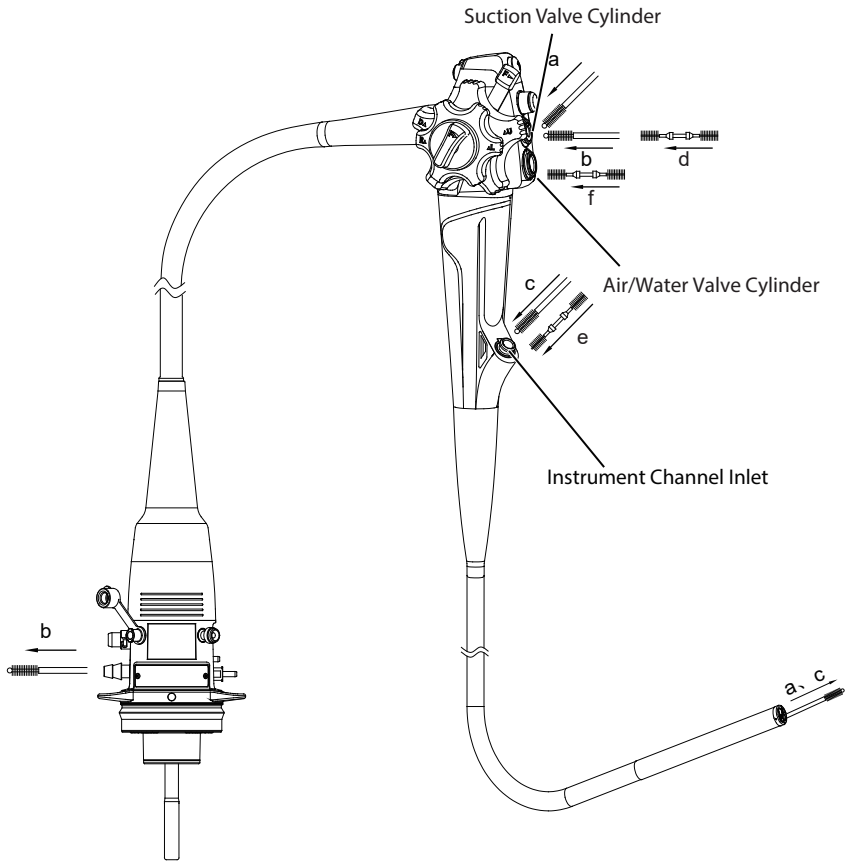

Figure 5-14 Brushing Channels

a. **To brush the suction channel from the control section to the distal end**: Straighten the bending section, insert the cleaning brush at a 45° angle into the suction valve cylinder, and slowly advance the brush until the brush head emerges from the distal end. Clean the bristles with your fingertips in the cleaning solution, and then pull out the brush from the suction valve cylinder carefully. Clean the bristles with your fingertips in the cleaning solution again. Repeat the procedure at least 3 times to ensure that no debris is left.

b. **To brush the suction channel from the control section to the connector section:** Insert the cleaning brush vertically into the suction valve cylinder, and slowly advance the brush until the brush head emerges from the suction port. Clean the bristles with your fingertips in the cleaning solution, and then pull out the brush from the suction valve cylinder carefully. Clean the bristles with your fingertips in the cleaning solution again. Repeat the procedure at least 3 times to ensure that no debris is left.

c. **To brush the instrument channel from the instrument channel inlet to the distal end:** Straighten the bending section, insert the cleaning brush into the instrument channel inlet and slowly advance the brush until the brush head emerges from the distal end. Clean the bristles with your fingertips in the cleaning solution, and then pull out the brush from the instrument channel inlet. Clean the bristles with your fingertips in the cleaning solution again. Repeat the procedure at least 3 times to ensure that no debris is left.

d. **To brush the suction valve cylinder:** Insert the channel-opening cleaning brush into the suction valve cylinder and slowly advance the brush until the brush handle touches the cylinder. Rotate the brush once, pull out the brush, and clean the bristles with your fingertips in the cleaning solution. Repeat the procedure at least 3 times to ensure that no debris is left.

e. **To brush the instrument channel inlet:** Insert the channel-opening cleaning brush into the instrument channel inlet and slowly advance the brush until the brush handle touches the instrument channel inlet. Rotate the brush once, pull out the brush, and clean the bristles with your fingertips in the cleaning solution. Repeat the procedure at least 3 times to ensure that no debris is left.

f. **To brush the air/water valve cylinder:** Insert the channel-opening cleaning brush into the air/water valve cylinder and slowly advance the brush until the brush handle touches the cylinder. Rotate the brush once, pull out the brush, and clean the bristles with your fingertips in the cleaning solution. Repeat the procedure at least 3 times to ensure that no debris is left.

5.8 Manual Cleaning

NOTE:

- *Do not clean the endoscope with excessive force to avoid leakage.*
- *Do not immerse the endoscope together with its accessories to avoid damaging the endoscope.*

Perform the following steps.

1. Use a 30 mL syringe to inject at least 90 mL (3 times) cleaning solution into the instrument channel through the instrument channel inlet.
2. Connect the channel plug, injection tube and auxiliary water-feeding tube to the endoscope firmly. Ensure that the endoscope is completely immersed in the cleaning solution, and the filter of the injection tube is immersed in the cleaning solution.
3. Use a 30 mL syringe to inject at least 180 mL (6 times) cleaning solution into the suction channel through the injection tube to fill the channel.
4. Use a 30 mL syringe to inject at least 180 mL (6 times) cleaning solution into the air/water channel through the injection tube to fill the channel.

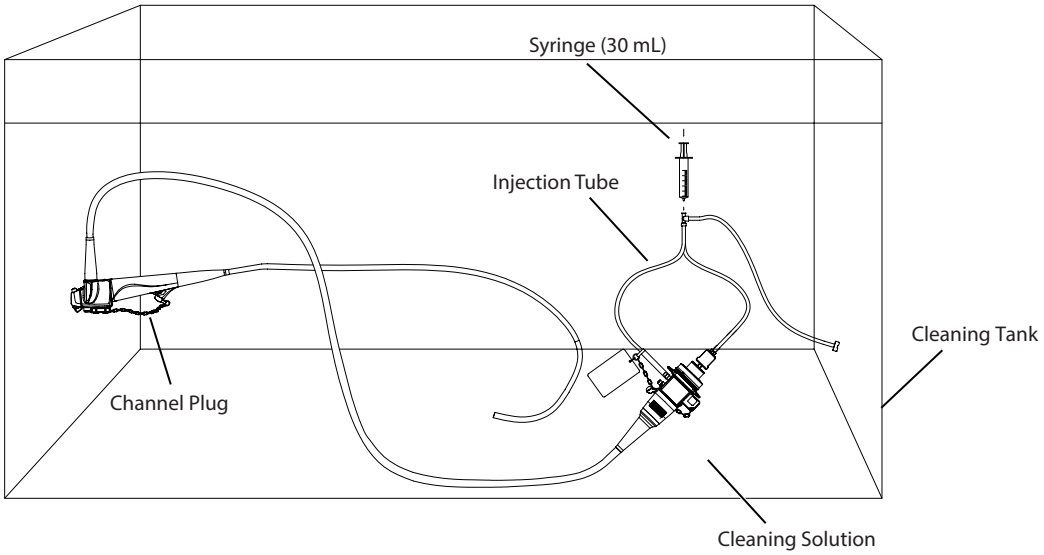

Figure 5-15 Injecting Cleaning Solution

5. Use a 30 mL syringe to inject at least 150 mL (5 times) cleaning solution into the auxiliary water-feeding channel through the auxiliary water-feeding tube to fill the channel.
6. Disconnect the channel plug, injection tube and auxiliary water-feeding tube from the endoscope, and immerse them in the cleaning solution.
7. During the immersion, use a clean lint-free cloth or a channel-opening cleaning brush to clean the outer surface and connectors of the endoscope until no debris is left.
8. Cover the manual cleaning tank with a sealing cover to reduce cleaning solution volatilization.
9. Immerse the endoscope, channel plug, injection tube and auxiliary water-feeding tube in accordance with the time, temperature and concentration recommended in Table 5-1.

5.9 Rinsing

NOTE:

Do not use immobile filtered water to rinse the endoscope.

Perform the following steps.

1. Place the cleaned endoscope, channel plug, injection tube and auxiliary water-feeding tube into the rinse tank.
2. Wipe the outer surface of the entire endoscope with a clean lint-free cloth.
3. Use the water pressure gun to inject running filtered water into the instrument channel for at least 30s through the instrument channel inlet.

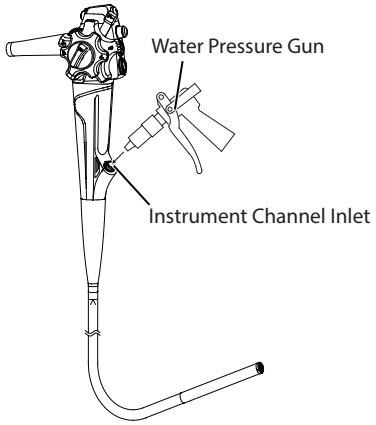

Figure 5-16 Injecting Water to Instrument Channel

4. Connect the channel plug, injection tube and auxiliary water-feeding tube to the endoscope firmly.
5. Use the water pressure gun to inject running filtered water into the air/water channel for at least 30s through the injection tube.

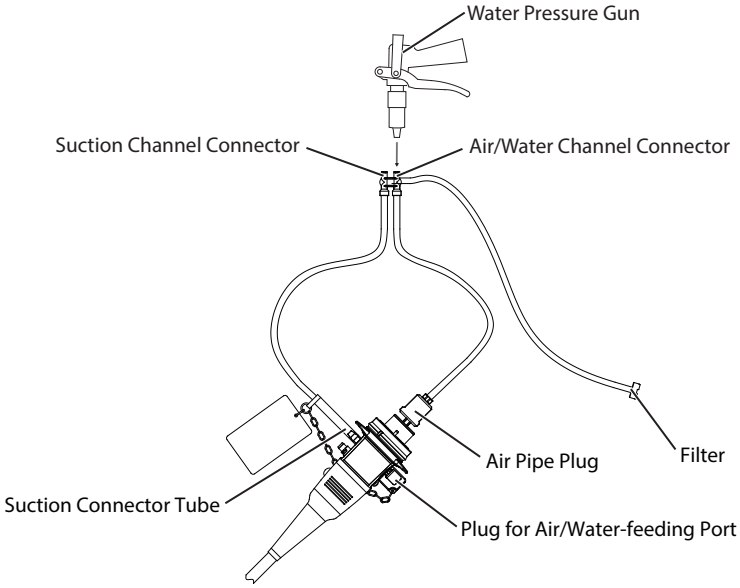

Figure 5-17 Injecting Water to Air/Water Channel

6. Use the water pressure gun to inject running filtered water into the suction channel for at least 30s through the injection tube.

7. Use the water pressure gun to inject running filtered water into the auxiliary water-feeding channel for at least 30s through the auxiliary water-feeding tube.

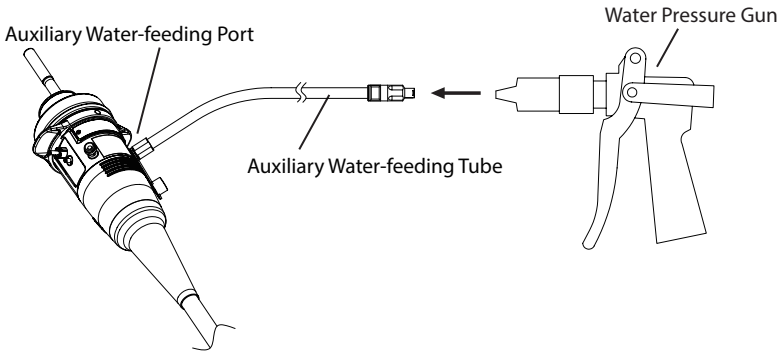

Figure 5-18 Injecting Water to Auxiliary Water-feeding Channel

8. Disconnect the channel plug, injection tube and auxiliary water-feeding tube from the endoscope.
9. Flush the outer surfaces of the endoscope and all its accessories with running filtered water.
10. Take out the endoscope and all its accessories from the running filtered water.
11. Cover the distal end and control section with a clean lint-free cloth.
12. Use the air pressure gun to inject air into the instrument channel for at least 30s through the instrument channel inlet.
13. Connect the channel plug, injection tube and auxiliary water-feeding tube to the endoscope firmly.
14. Use the air pressure gun to inject air into the air/water channel for at least 30s through the injection tube.
15. Use the air pressure gun to inject air into the suction channel for at least 30s through the injection tube.
16. Use the air pressure gun to inject air into the auxiliary water-feeding channel for at least 30s through the auxiliary water-feeding tube.
17. Disconnect the channel plug, injection tube and auxiliary water-feeding tube from the endoscope.
18. Remove the clean lint-free cloth from the distal end and control section.
19. Wipe the outer surfaces of the endoscope and all its accessories with a clean lint-free cloth.
20. Ensure that no debris is left on the endoscope or any of its accessories. Otherwise, repeat the procedures in Section 5.7 Pre-cleaning, Section 5.8 Manual Cleaning and Section 5.9 Rinsing.

5.10 Manual Disinfection

- For sufficient high-level disinfection, ensure that the outer surfaces of the endoscope and all its accessories are in full contact with the disinfectant.
- Bubbles adhering to the channels may degrade the disinfection effect. The operator can forcibly inject disinfectant into the endoscope channels to ensure that no bubble exists. If any bubbles adhere to the outer surface of the endoscope and its accessories, you should use a clean lint-free cloth to wipe them off.
- The endoscope and its accessories should be completely immersed in the disinfectant for high-level disinfection.

Perform the following steps.

1. Place the endoscope, channel plug, injection tube and auxiliary water-feeding tube into the disinfection tank.

2. Prepare the disinfectant in accordance with the temperature and concentration recommended in Table 5-2. Fill the tank with sufficient disinfectant, and ensure that the entire endoscope and all its accessories can be immersed in the disinfectant.
3. Use a 30 mL syringe to inject at least 90 mL (3 times) disinfectant into the instrument channel through the instrument channel inlet.
4. Connect the channel plug, injection tube and auxiliary water-feeding tube to the endoscope firmly.
5. Use a 30 mL syringe to inject at least 180 mL (6 times) disinfectant into the suction channel through the injection tube to fill the channel. Ensure that no bubble generates from the distal end.

   NOTE:

   - *Ensure that the air/water channel connector or suction channel connector of the injection tube is completely immersed in the disinfectant.*
   - *Ensure that all channels of the endoscope are filled with disinfectant.*
6. Use a 30 mL syringe to inject at least 180 mL (6 times) disinfectant into the air/water channel through the injection tube to fill the channel. Ensure that no bubble generates from the distal end.
7. Use a 30 mL syringe to inject at least 150 mL (5 times) disinfectant into the auxiliary water-feeding channel through the auxiliary water-feeding tube to fill the channel. Ensure that no bubble generates from the distal end.
8. Disconnect the channel plug, injection tube and auxiliary water-feeding tube from the endoscope, and immerse them in the disinfectant.
9. If bubbles adhere to the endoscope surface or the tools, wipe the bubbles with a clean lint-free cloth.
10. Cover the disinfection tank with a sealing cover to reduce disinfectant volatilization.
11. Immerse the endoscope and all its accessories in accordance with the time, temperature and concentration recommended in Table 5-2 for high-level disinfection.
12. Take out the endoscope and all its accessories from the disinfectant.
13. Use the air pressure gun to inject air into the instrument channel for at least 30s through the instrument channel inlet to remove the disinfectant in the channel.
14. Connect the channel plug, injection tube and auxiliary water-feeding tube to the endoscope firmly.
15. Use the air pressure gun to inject air into the air/water channel for at least 30s through the injection tube to remove the disinfectant in the channel.
16. Use the air pressure gun to inject air into the suction channel for at least 30s through the injection tube remove the disinfectant in the channel.
17. Use the air pressure gun to inject air into the auxiliary water-feeding channel for at least 30s through the auxiliary water-feeding tube to remove disinfectant in the channel.
18. Disconnect the channel plug, injection tube and auxiliary water-feeding tube from the endoscope.

5.11 Terminal Rinsing

After high-level disinfection, the operator should use filtered water and 75% ethyl alcohol or sterile water to completely rinse the outer surfaces and all channels of the endoscope to remove residual of high-level disinfectant.

■ To use sterile water

Perform the following steps.

1. Place the endoscope, channel plug, auxiliary water-feeding tube and injection tube into the terminal rinse tank.
2. Fill the tank with sufficient sterile water, and ensure that the entire endoscope and accessories can be immersed in the sterile water.
3. Thoroughly wipe the outer surface of the entire endoscope with a sterile lint-free cloth.
4. Use the water pressure gun to inject sterile water into the instrument channel for at least 2 min through the instrument channel inlet. Ensure that no disinfectant is left in the channel.
5. Connect the channel plug, injection tube and auxiliary water-feeding tube to the endoscope firmly.
6. Use the water pressure gun to inject sterile water into the air/water channel for at least 2 min through the injection tube. Ensure that no disinfectant is left in the channel.
7. Use the water pressure gun to inject sterile water into the suction channel for at least 2 min through the injection tube. Ensure that no disinfectant is left in the channel.
8. Use the water pressure gun to inject sterile water into the auxiliary water-feeding channel for at least 2 min through the auxiliary water-feeding tube. Ensure that no disinfectant is left in the channel.
9. Disconnect the channel plug, injection tube and auxiliary water-feeding tube from the endoscope.
10. Flush the outer surface the endoscope and all its accessories with sterile water.
11. Take out the endoscope and accessories from the sterile water.
12. Cover the distal end and control section with a sterile lint-free cloth.
13. Use the air pressure gun to inject air into the instrument channel for at least 30s through the instrument channel inlet. Ensure that no sterile water is left in the channel.
14. Connect the channel plug, injection tube and auxiliary water-feeding tube to the endoscope firmly.
15. Use the air pressure gun to inject air into the air/water channel for at least 30s through the injection tube. Ensure that no sterile water is left in the channel.
16. Use the air pressure gun to inject air into the suction channel for at least 30s through the injection tube. Ensure that no sterile water is left in the channel.
17. Use the air pressure gun to inject air into the auxiliary water-feeding channel for at least 30s through the auxiliary water-feeding tube. Ensure that no sterile water is left in the channel.
18. Remove the sterile lint-free cloth from the distal end and control section.
19. Disconnect the injection tube, injection tube and auxiliary water-feeding tube from the endoscope.
20. Use the air pressure gun to dry the endoscope and all its accessories.

■ To use filtered water and 75% ethyl alcohol

Perform the following steps.

1. Place the endoscope, channel plug, injection tube and auxiliary water-feeding tube into the terminal rinse tank.
2. Fill the tank with sufficient filtered water, and ensure that the entire endoscope and accessories can be immersed in the filtered water.
3. Thoroughly wipe the outer surface of the entire endoscope with a clean lint-free cloth.
4. Use the water pressure gun to inject filtered water into the instrument channel for at least 2 min through the instrument channel inlet. Ensure that no disinfectant is left is in the channel.

5. Connect the channel plug, auxiliary water-feeding tube and injection tube to the endoscope firmly.
6. Use the water pressure gun to inject filtered water into the air/water channel for at least 2 min through the injection tube. Ensure that no disinfectant is left is in the channel.
7. Use the water pressure gun to inject filtered water into the suction channel for at least 2 min through the injection tube. Ensures that no residual disinfectant is left in the channel.
8. Use the water pressure gun to inject filtered water into the auxiliary water-feeding channel for at least 2 min through the auxiliary water-feeding tube. Ensure that no disinfectant is left is in the channel.
9. Disconnect the channel plug, injection tube and auxiliary water-feeding tube from the endoscope.
10. Flush the outer surfaces the endoscope and all its accessories with the filtered water.
11. Take out the endoscope and all its accessories from the filtered water.
12. Cover the distal end and control section with a clean lint-free cloth.
13. Use the air pressure gun to inject air into the instrument channel for at least 30s through the instrument channel inlet. Ensure that no filtered water is left in the channel.
14. Connect the channel plug, injection tube and auxiliary water-feeding tube to the endoscope firmly.
15. Use the air pressure gun to inject air into the air/water channel for at least 30s through the injection tube. Ensure that no filtered water is left in the channel.
16. Use the air pressure gun to inject air into the suction channel for at least 30s through the injection tube. Ensure that no filtered water is left in the channel.
17. Use the air pressure gun to inject air into the auxiliary water-feeding channel for at least 30s through the auxiliary water-feeding tube. Ensure that no filtered water is left in the channel.
18. Remove the clean lint-free cloth from the distal end and control section.
19. Wipe the outer surface of the endoscope and all its accessories with a clean lint-free cloth.
20. Disconnect the channel plug, injection tube and auxiliary water-feeding tube from the endoscope.
21. Place the endoscope and all its accessories on a sterile mat which is placed on the medical drying table.
22. Prepare 75% ethyl alcohol.
23. Wipe the outer surfaces of the endoscope and its accessories with a clean lint-free cloth dampened with ethyl alcohol.
24. Use a 30 mL syringe to inject at least 90 mL (3 times) ethyl alcohol into the instrument channel through the instrument channel inlet to remove filtered water in the channel.
25. Connect the channel plug, injection tube and auxiliary water-feeding tube to the endoscope firmly, and immerse the filter of the injection tube into the ethyl alcohol.
26. Use a 30 mL syringe to inject at least 90 mL (3 times) ethyl alcohol into the air/water channel through the injection tube to remove filtered water in the channel.
27. Use a 30 mL syringe to inject at least 90 mL (3 times) ethyl alcohol into the suction channel through the injection tube to remove filtered water in the channel.
28. Use a 30 mL syringe to inject at least 90 mL (3 times) ethyl alcohol into the auxiliary water-feeding channel through the auxiliary water-feeding tube to remove filtered water in the channel.
29. Cover the distal end and control section with a clean lint-free cloth.
30. Use the air pressure gun to inject air into the air/water channel for at least 30s through the injection tube. Ensure that no ethyl alcohol is left in the channel.

31. Use the air pressure gun to inject air into the suction channel for at least 30s through the injection tube. Ensure that no ethyl alcohol is left in the channel.
32. Use the air pressure gun to inject air into the auxiliary water-feeding channel for at least 30s through the auxiliary water-feeding tube. Ensure that no ethyl alcohol is left in the channel.
33. Disconnect the channel plug, injection tube and auxiliary water-feeding tube from the endoscope.
34. Use the air pressure gun to inject air into the instrument channel for at least 30s through the instrument channel inlet. Ensure that no ethyl alcohol is left in the channel.
35. Remove the clean lint-free cloth covering the distal end and control section.
36. Use the air pressure gun to thoroughly dry the endoscope and all its accessories.

5.12 Drying

- After cleaning and high-level disinfection, the operator should dry all channels of the endoscope completely to avoid breeding of bacteria that might cause disease infection to the next animal or operator.
- The sterile mat should be replaced every 4 hours.

Perform the following steps.

1. Place the endoscope and all its accessories on a sterile mat which is placed on the medical drying table.
2. Prepare 75% ethyl alcohol.
3. Wipe the outer surface of the entire endoscope and all its accessories with a sterile lint-free cloth dampened with 75% ethyl alcohol.
4. Use a 30 mL syringe to inject at least 90 mL (3 times) ethyl alcohol into the instrument channel through the instrument channel inlet to remove the filtered water in the channel.
5. Connect the channel plug, injection tube and auxiliary water-feeding tube to the endoscope firmly, and immerse the filter of the injection tube in the ethyl alcohol.
6. Use a 30 mL syringe to inject at least 90 mL (3 times) ethyl alcohol into the air/water channel through the injection tube.
7. Use a 30 mL syringe to inject at least 90 mL (3 times) ethyl alcohol into the suction channel through of the injection tube.
8. Use a 30 mL syringe to injectat least 90 mL (3 times) ethyl alcohol into the auxiliary water-feeding channel through the auxiliary water-feeding tube.
9. Cover the distal end and control section with a sterile lint-free cloth.
10. Use the air pressure gun to inject air into the air/water channel for at least 30s through the injection tube. Ensure that no ethyl alcohol is left in the channel, and the channel inner surface is thoroughly dry.
11. Use the air pressure gun to inject air into the suction channel for at least 30s through the injection tube. Ensure that no ethyl alcohol is left in the channel, and the inner surface is thoroughly dry.
12. Use the air pressure gun to inject air into the auxiliary water-feeding channel for at least 30s through the auxiliary water-feeding tube. Ensure that no ethyl alcohol is left in the channel, and the inner surface is thoroughly dry.
13. Disconnect the injection tube, auxiliary water-feeding tube and channel plug from the endoscope.
14. Use the air pressure gun to inject air into the instrument channel for at least 30s through the instrument channel inlet. Ensure that no ethyl alcohol is left in the channel, and the inner surface is thoroughly dry.
15. Remove the sterile lint-free cloth that covers the distal end and control section.
16. Use the air pressure gun to thoroughly dry the endoscope and all its accessories.

5.13 Automated Cleaning and Disinfection

Before automated cleaning and disinfection, the endoscope should be initially treated at the point of use, pre-cleaned, manually cleaned and rinsed, and the leakage should be detected.

The AER can be used for cleaning and disinfecting the air/water valve, suction valve and biopsy valve. Before placing the valves into the AER, these valves should be pre-cleaned, manually cleaned and rinsed. For details, refer to Section 5.7 Pre-cleaning, Section 5.8 Manual Cleaning and Section 5.9 Rinsing.

For the cleaning and disinfection of other accessories, refer to Section 5.14 Reusable Parts and Cleaning and Disinfection Tools.

■ Recommended Automated Endoscope Reprocessor

The Endoscope WD BHT INNOVA® E3 CMS DC that meets EN ISO 15883-4 is recommended by the manufacturer in Table 5-3.

Table 5-3 Automated Endoscope Reprocessor

Equipment Name	Model	Manufacturer
Endoscope WD BHT INNOVA® E3 CMS DC	Innova E3-CMS DC-1000	BHT Disinfection Technology

■ Reprocessing Procedure

NOTE:

- *Ensure that the AER is used in the room temperature.*
- *If the AER does not support the drying function, the endoscope and all accessories should be dried after automated cleaning and disinfection. For details, refer to Section 5.12 Drying.*

Perform the following steps to clean and disinfect the endoscope and valves.

1. Prepare the cleaning solution and disinfectant for automated cleaning and disinfection in accordance with the temperature and concentration recommended in Table 5-1 and Table 5-2 respectively.
2. Place the endoscope, air/water valve, suction valve and biopsy valve into the AER.
3. Connect the channel plug to the air/water valve cylinder and suction valve cylinder.
4. Connect the plug for air/water-feeding port to the air/water-feeding port.
5. Connect one end of air pipe plug to the air pipe, and connect the other end to the AER.
6. Connect the suction port, auxiliary water-feeding port and instrument channel inlet to the AER.
7. Select the Normal GA Sonoscape (P052) program, and set the processing parameters and check the values on the screen.

   The recommended reprocessing parameters are as follows.

Table 5-4 Automated Reprocessing

Stage	Procedure	Temperature	Contact Time	Solution	Note
1	Pre-cleaning	/	4 min	Cold tap water	/
2	Cleaning	35°C	3 min	Cleaner	5 mL/L in cold tap water
3	Rinsing	/	2 min	Demineralized water	/
4	Disinfection	55°C	5 min	Disinfectant	10mL/L in demineralized water

Stage	Procedure	Temperature	Contact Time	Solution	Note
5	Terminal rinsing	20°C	4 min	Demineralized water	/

8. Start the automated cleaning and disinfection procedures.
9. Take out the endoscope after the reprocessing finishes.

5.14 Reusable Parts and Cleaning and Disinfection Tools

After being used each time, the reusable parts and cleaning and disinfection tools should be cleaned and disinfected. Otherwise, the animal or operator may be infected.

The following reusable parts and cleaning and disinfection tools can be cleaned and disinfected.

- Air/water valve
- Suction valve
- Biopsy valve
- Auxiliary water-feeding tube
- Injection tube
- Cleaning brush
- Channel-opening cleaning brush

5.14.1 Pre-cleaning

NOTE:

- *Ensure that the parts and tools immersed in the cleaning solution are not in contact with each other.*
- *Ensure that the sealing rings on the air/water valve are not scratched.*
- *Remove the cap from the main body of biopsy valve. Otherwise, the biopsy valve cannot completely cleaned* and *disinfected.*

Perform the following steps.

1. Place all parts and tools into the manual cleaning basin.
2. Prepare the cleaning solution in accordance with the temperature and concentration recommended in Table 5-1. Fill the basin with sufficient cleaning solution, and ensure that all parts and tools can be immersed in the cleaning solution.
3. Wipe the outer surface of the parts and tools in the cleaning solution with a clean lint-free cloth.
4. Use the channel-opening cleaning brush to thoroughly clean the openings of the air/water valve and the suction valve to remove all debris.
5. Use a channel-opening cleaning brush to thoroughly clean the interiors and openings of the biopsy valve to remove all debris.

5.14.2 Manual Cleaning

Perform the following steps.

1. Use a 30 mL syringe to inject at least 90 mL (3 times) cleaning solution into the auxiliary water-feeding tube.
2. Use a 30 mL syringe to thoroughly flush the interiors and openings of all the parts and tools to remove all bubbles.
3. During the immersion, press the pistons of the air/water valve and suction valve to the end and release them for at least 3 times to remove all bubbles.

4. Clean the bristles of the cleaning brush and channel-opening cleaning brush in the cleaning solution to remove all bubbles.
5. Cover the basin with a sealing cover to reduce cleaning solution volatilization.
6. Immerse the parts and tools in accordance with the time, temperature and concentration recommended in Table 5-1.
7. Take out all parts and tools from the basin and ensure that no debris is left on the parts and tools.

5.14.3 Rinsing

Perform the following steps.

1. Place all cleaned parts and tools into the rinse basin.
2. Clean the outer surfaces of parts and tools in the running filtered water with a clean lint-free cloth.
3. Use the water pressure gun to inject running filtered water into the auxiliary water-feeding tube for at least 30s.
4. Take out the auxiliary water-feeding tube, and use the air pressure gun to inject air into the auxiliary water-feeding tube for at least 30s.
5. Thoroughly flush the interiors and openings of all the parts and tools with running filtered water to remove all bubbles.
6. During the immersion, press the pistons of the air/water valve and suction valve to the end and release them for at least 3 times to remove all bubbles.
7. Clean the bristles of the cleaning brush and channel-opening cleaning brush in the filtered water to remove all bubbles.
8. Take out all parts and tools and wipe the outer surfaces of the parts and tools with a clean lint-free cloth.
9. Ensure that no debris is left on any part and tool. Otherwise, repeat the procedures in Section 5.14.1 Pre-cleaning, Section 5.14.2 Manual Cleaning and Section 5.14.3 Rinsing.

5.14.4 Manual Disinfection

- Ensure all the bubbles adhering to the parts and tools are removed. Otherwise, it may degrade the disinfection effect.
- Perform the high-level disinfection when all parts and tools are immersed in the disinfectant. For sufficient high-level disinfection, ensure that all parts and tools are in full contact with the disinfectant.

Perform the following steps.

1. Prepare the disinfectant in accordance with the temperature and concentration recommended in Table 5-2. Fill the basin with sufficient disinfectant, and ensure that all the parts and tools can be immersed in the disinfectant.
2. Immerse all parts and tools into the disinfectant.
3. Wipe the outer surfaces of the parts and tools in the disinfectant with a clean lint-free cloth to remove all bubbles.
4. Use a 30 mL syringe to inject at least 90mL (3 times) disinfectant into the auxiliary water-feeding tube.
5. Use a 30 mL syringe to thoroughly flush the interiors and openings of all the parts and tools to remove all bubbles.
6. During the immersion, press the pistons of air/water valve and suction valve to the end and release them for at least 3 times to remove all bubbles.

7. Clean the bristles of the cleaning brush and channel-opening cleaning brush to remove all bubbles and debris.
8. Cover the disinfection basin with a sealing cover to reduce disinfectant volatilization.
9. Immerse all parts and tools in accordance with the time, temperature and concentration recommended in Table 5-2 for high-level disinfection.
10. Take out all parts and tools and wipe the outer surface of all parts and tools with a clean lint-free cloth.

5.14.5 Terminal Rinsing

After high-level disinfection, completely rinse the endoscope accessories and cleaning and disinfection tools with sterile water or filtered water.

■ **To use sterile water**

Perform the following steps.

1. Fill the terminal rinsing basin with sufficient sterile water, and ensure all parts and tools can be immersed in the sterile water.
2. Place all parts and tools in the and immerse them in the sterile water.
3. Clean the outer surfaces of the parts and tools in the sterile water with a sterile lint-free cloth.
4. Use the water pressure gun to inject sterile water into the auxiliary water-feeding tube for at least 30s.
5. Use a 30 mL syringe to thoroughly flush the interiors and openings of the parts and tools to remove all bubbles.
6. During the immersion, press and release the pistons of air/water valve and suction valve for at least 3 times to remove all air bubbles.
7. Clean the bristles of cleaning brush and channel-opening cleaning brush in the sterile water to remove all bubbles.
8. Take out all the parts and tools.and wipe the outer surface of all parts and tools with a sterile lint-free cloth.
9. Use the air pressure gun to thoroughly dry all parts and tools.

■ **To use filtered water and 75% ethyl alcohol**

Perform the following steps.

1. Place all parts and tools into the terminal rinse basin.
2. Fill the basin with sufficient filtered water and ensure that all parts and tools can be immersed in the filtered water.
3. Gently stir the filtered water to thoroughly clean all parts and tools.
4. Clean the outer surfaces of all parts and tools in the water with a sterile lint-free cloth.
5. Use the water pressure gun to inject filtered water into the auxiliary water-feeding tube for at least 30s.
6. Use a 30 mL syringe to thoroughly flush the interiors and openings of all parts and tools to remove all bubbles.
7. During the immersion, press the pistons of air/water valve and suction valve to the end and release them for at least 3 times to remove all bubbles.
8. Clean the bristles of the cleaning brush and channel-opening cleaning brush in the filtered water to remove all bubbles.
9. Take out all parts and tools and wipe the outer surface of all parts and tools with a sterile lint-free cloth.

10. Fill a basin with 75% ethyl alcohol.
11. Immerse all the parts and tools in the ethyl alcohol and gently stir them.
12. Use a 30 mL syringe to inject at least 30 mL (1 time) ethyl alcohol into the auxiliary water-feeding tube.
13. Use a 30 mL syringe to inject ethyl alcohol into the interiors and openings of all parts and tools to remove all bubbles.
14. During the immersion, press the pistons of air/water valve and suction valve to the end and release them for at least 3 times to remove all bubbles.
15. Clean the bristles of the cleaning brush and channel-opening cleaning brush in the ethyl alcohol to remove all bubbles.
16. Take out all parts and tools and wipe outer surfaces of all parts and tools with a sterile lint-free cloth.
17. Use the air pressure gun to thoroughly dry all parts and tools.

5.14.6 Drying

Perform the following steps .

1. Place all parts and tools in the container with 75% ethyl alcohol, and ensure that all parts and tools can be immersed in the ethyl alcohol.
2. Use a 30 mL syringe to inject t least 30 mL (1 time) ethyl alcohol into the auxiliary water-feeding tube.
3. Use a 30 mL syringe to inject ethyl alcohol into the interiors and openings of all parts and tools to remove all bubbles.
4. During the immersion, press the pistons of air/water valve and suction valve to the end and release them for at least 3 times to remove all bubbles.
5. Clean the bristles of the cleaning brush and channel-opening cleaning brush in the ethyl alcohol to remove all bubbles.
6. Take out all parts and tools and wipe outer surfaces of all parts and tools with a sterile lint-free cloth.
7. Use the air pressure gun to thoroughly dry all parts and tools.

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6 Storage and Disposal

Please store and dispose of the endoscope and its accessories as described in this chapter.

- Before storage, the endoscope should be cleaned and disinfected completely.
- After being dried, the endoscope should be hung in the endoscope cabinet.
- Do not store the endoscope in a carrying case.
- The cabinet wall should be wiped with 0.05% chlorine solution twice a week. The cabinet should be handled immediately once it is contaminated.
- If the endoscope has been stored for more than 24 hours, it should be cleaned and disinfected again.

6.1 Storage

6.1.1 Storing the Endoscope

NOTE:

Before storing the endoscope, ensure that the surface of the endoscope and the interior of all channels are dry.

Perform the following steps.

1. Disconnect all accessories from the endoscope, including the air/water valve, suction valve and biopsy valve.
2. Ensure that the outer surface of the entire endoscope is dry.
3. Rotate the up/down and left/right angulation locks to free the bending section of the endoscope completely.
4. Hang the endoscope in the endoscope cabinet and ensure that the insertion section is vertically hung and completely stretched.

6.1.2 Storing the Accessories

NOTE:

Before storing the accessories, ensure that the reusable accessories and cleaning and disinfection tools are dry.

Perform the following steps.

1. Store the accessories in the endoscope cabinet, and ensure that they are not in contact with each other.
2. Place all cleaning and disinfection tools in the carrier and store the carrier in the endoscope cabinet.

6.2 Transportation

6.2.1 Indoor Transportation

Perform the following steps.

1. Rotate the up/down and left/right angulation locks of the endoscope to free the bending section completely.

2. Hold the connector section and control section with one hand, hold the insertion section with the other hand gently, and ensure that the distal end is upward.

6.2.2 Outdoor Transportation

WARNING The endoscope should be cleaned and disinfected before being placed into the carrying case. Otherwise, the carrying case may be contaminated or cross-contamination may be incurred.

Perform the following steps.

1. Rotate the up/down and left/right angulation locks of the endoscope to free the bending section completely.
2. Place the endoscope into the carrying case provided by the manufacturer and lock the carrying case for transportation.

6.3 Disposal

The manufacture date of the device is on the nameplate as shown in Figure 6-1. The expected service life of the endoscope is five years with normal use, and its service life can be prolonged according to its using frequency and maintenance. Dispose of the discarded endoscope according to local laws or regulations, or contact the manufacturer for maintenance.

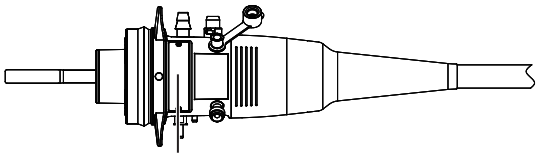


Figure 6-1 Date of Manufacture

6.4 Customer Service

Only the service personnel of or authorized by the manufacturer can service the device. Any feedback or inquiries concerning our product or services should be directed to the manufacturer.

Contact address: 2F, 12th Building, Shenzhen Software Park Phase II, Keji Middle 2nd Road, Nanshan District, Shenzhen, 518057, Guangdong, China

Tel: +86-755-26722890

E-mail: service@sonoscape.net

7 Troubleshooting

This endoscope should be repaired by the qualified technical personnel. If the problem still exists after resolving as described in this chapter, stop using the endoscope immediately and return it to the manufacturer for repair.

The manufacturer is not responsible for repairing the accessories of this endoscope. If an accessory is damaged, please contact the local distributor of the manufacturer for replacement. During use, any serious incident that has occurred in relation to the device should be reported to the local distributor and the competent authority of the Member State.

Item	Descriptions	Level	Cause	Solution
Leakage	The leakage detector does not function or continuous bubbles appear.	B	The rubber wrapping the bending section of the endoscope is damaged.	Stop using the endoscope.
		B	The sealing ring is aging.	Stop using the endoscope.
		B	The channel is broken.	Stop using the endoscope.
Image	No image	C	The devices are not powered on.	Power on all devices.
		C	The connector section is not connected correctly.	Connect the connector section again.
		C	Foreign matters adhere to the electrical contacts of the connector section.	Use a clean lint-free cloth dampened with 75% ethyl alcohol to clean the electrical contacts and dry them. Connect the endoscope to the video system center again.
		B/A	Others	Stop using the endoscope.
	Image is too bright or too dim.	C	The intensity of the lamp is improper.	Adjust the intensity as described in the video system center user manual.
		C	Foreign matters adhere to the light guide lenses on the distal end.	Use a clean lint-free cloth dampened with 75% ethyl alcohol to clean the light guide lenses.
	Image is abnormal.	C	The objective lens is dirty.	Feed water to flush the dirt on the objective lens.
		B	Water drops or color bar appears in the field of view.	Stop using the endoscope.

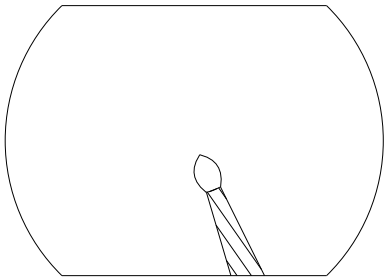
Item	Descriptions	Level	Cause	Solution
Feed air/ water	Air/water cannot be fed.	C	The air/water valve is damaged.	Replace the air/water valve.
		C	The air pump does not function.	Turn on the air pump of the video system center as described in the user manual.
	Water cannot be fed.	C	There is no water in the bottle.	Pour an appropriate amount of sterile water into the water bottle.
	The air/water is insufficient.	C	The air/water nozzle is blocked.	Immerse the distal end in the soapy water at the appropriate temperature and feed air to remove the objects by the air/water nozzle.
		C	The water bottle cap is loose.	Fasten the cap of the water bottle.
	The air is insufficient.	B	Others	Stop using the endoscope.
	The air/water valve cannot be pressed.	C	The air/water valve is dirty.	Clean and disinfect the air/water valve.
		C	The air/water valve is damaged.	Replace the air/water valve.
	The air/water valve cannot be installed.	C	The air/water valve is incompatible.	Use the compatible the air/water valve.
		C	The air/water valve is damaged.	Replace the air/water valve.
	Air/water is continuously fed.	C	The air/water valve is damaged.	Turn off the air pump of the video system center and replace the air/water valve.
Suction	Cannot aspirate or the aspirated amount decreases.	C	The suction valve is blocked.	Remove the suction valve, and clean the hole with a cotton swab.
		C	The suction valve is damaged.	Replace the suction valve.
		C	The channel is blocked.	Stop using the endoscope. Brush the suction channel.
		C	The biopsy valve is damaged.	Replace the spare biopsy valve.

Item	Descriptions	Level	Cause	Solution
Suction	The suction valve cannot be pressed.	C	The suction valve is dirty.	Clean and disinfect the suction valve.
		C	The suction valve is damaged.	Replace the suction valve.
	The suction valve cannot be installed.	C	The suction valve is incompatible.	Use the compatible suction valve.
		C	The suction valve is damaged.	Replace the suction valve.
	The instrument channel leaks.	B	The instrument channel is damaged by improper using of the accessories such as biopsy forceps.	Stop using the endoscope.
	Liquid or air leaks from the biopsy valve.	C	The biopsy valve is aging or damaged.	Replace the spare biopsy valve.
		C	The biopsy valve is installed incorrectly.	Install the biopsy valve again.
Bending Section	It is hard to rotate the angulation control knob.	C	The angulation control knob is locked.	Unlock the angulation control knob.
		B	Others	Stop using the endoscope.
	The bending section is not sensitive.	B	The elasticity of steel wires inside the endoscope degrades after being used for a long period.	Stop using the endoscope.
	The bending section cannot reach the maximum angle.	B	The elasticity of steel wires inside the endoscope degrades after being used for a long period.	Stop using the endoscope.
	The bending section does not function.	A	The steel wires inside the endoscope are damaged.	Stop using the endoscope.
Accessories	Other problems	B	----	Stop using the endoscope.

NOTE:

- *Level C means that you can solve the problem by yourself.*
- *Level B means that you should contact the local distributor.*
- *Level A means that you should return the endoscope to the authorized local distributor for repair.*

Appendix A Specifications

Dimensions	Working length	3300 mm, allowance: ± 10%
	Min. inner diameter of the instrument channel	≥ Φ3.8 mm
	Outer diameter of the insertion tube	Φ12.5 mm, allowance: + 10%, not considering lower limit
	Outer diameter of the distal end	Φ12.0 mm, allowance: + 5%, not considering lower limit
Optical System	Field of view	145°, allowance: ±10%
	Depth of filed	2 mm - 100 mm
	Resolution	≥ 11.1 lp/mm (working distance: 10 mm)
	Biopsy entrance position	
Water/air-feeding & Suction System	Amount of fed water	≥ 40 mL/min
	Amount of fed air	≥ 800 mL/min
	Aspirated amount	≥ 400 mL/min
Bending Angle		Up 200°, down 180°, left 160°, right 160°
Operation Environment	Temperature	5 °C - 40 °C
	Relative humidity	30% - 80%
	Atmosphere pressure	700 hPa - 1060 hPa
Storage Environment	Temperature	-5 °C - +40 °C
	Relative humidity	30% - 80%
	Atmospheric pressure	700 hPa - 1060 hPa
Transportation Environment	Temperature	-20 °C - +55 °C
	Relative humidity	20% - 90%
	Atmosphere pressure	700 hPa - 1060 hPa
Safety Types	Degree of protection against electric shock	Type BF applied part
	Degree of protection against harmful liquid	IPX7

Essential performance	In expected use scenario, the device can continuously output normal real-time image signals without affecting the basic observation effect (such as unexpected image flip, black screen, blurred screen, and severe screen flickering).

Appendix B EMC Guidance and Manufacturer's Declaration

CAUTION

- The device is suitable for use in professional healthcare facility environment. Do not use it in domestic establishments and those directly connected to the public low voltage power supply network that supplies buildings used for domestic purposes.
- Do not use this device around strong electric field, electromagnetic field (e.g. MRI scan room) and mobile wireless communication devices. Using the device in an improper environment may cause malfunction or damage.
- Only the peripherals (video system center, etc.) provided or recommended by the manufacturer can be used. Using other devices may increase RF radiation and degrade the device performance of anti-electromagnetic interference.
- Use of this device adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this device and the other equipment should be observed to verify that they are operating normally.
- Use of accessories and cables other than those specified or provided by the manufacturer of this device could result in increased electromagnetic emissions or decreased electromagnetic immunity of this device and result in improper operation.
- Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the device, including cables specified by the manufacturer. Otherwise, degradation of the performance of this device could result.

B.1 Electromagnetic Emissions

Emissions Test	Compliance
Conducted and Radiated RF Emissions CISPR 11	Group 1 Class A
Harmonic Distortion IEC 61000-3-2	Not Applicable
Voltage Fluctuations and Flicker IEC 61000-3-3	Not Applicable

B.2 Electromagnetic Immunity

Immunity Test	Compliance Level
Electrostatic Discharge (ESD) IEC 61000-4-2	±8kV Contact, ±2kV, ±4kV, ±8kV, ±15kV Air
Radiated RF EM fields IEC 61000-4-3	3V/m
Electrical Fast Transient and bursts IEC 61000-4-4	±2kV for power supply lines, ±1kV for SIP/SOP ports

Immunity Test	Compliance Level
Surges IEC 61000-4-5	±1kV differential mode ±2kV common mode
Conducted Disturbances IEC 61000-4-6	3V 6V at ISM bands
Voltage dips and interruptions IEC 61000-4-11	0% U_T for 0.5 cycle at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°
	0% U_T for 1 cycle Single phase: at 0°
	70% U_T for 25 cycle Single phase: at 0°
	0% U_T for 250 cycle
Power frequency Magnetic field IEC 61000-4-8	30A/m