About This Manual

P/N: 4710.00768A01

Release Date: May, 2016

Product Model: HDL-500X, HDL-550X

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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 instructions for use.

Signal Words

Signal words in this manual are defined as follows. Please understand their meanings clearly before reading this manual.

Signal Word	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 device.
NOTE	Indicates precautions or recommendations that should be used in operating the device.
Boldfaced Word	Indicates keys and controls located on the product.

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Contents

Chapter 1 Safety

This chapter describes important information for operating this device. To ensure the safety of both user and patient, please read relevant details in this chapter carefully before use.

You should be completely familiar with the precautions provided in this manual. Otherwise, the manufacturer is not responsible for the effects on safety, reliability and performance of the device.

1.1 Intended Use

The device is intended to provide illumination for the endoscope in clinics. It is used with the endoscope, the image processor and other peripheral devices provided or recommended by the manufacturer.

NOTE:

Do not use this device for any purposes other than its intended purposes. Please refer to Section 1.2 Device Compatibility to learn about device compatibility.

1.2 Device Compatibility

HDL-500X light source can be used with EG-500/EC-500 series endoscope and HD-500 series image processor provided by the manufacturer. HDL-550X light source can be used with EG-500/EC-500/EG-550/EC-550 series endoscope and HD-500/HD-550 series image processor provided by the manufacturer.

1.3 Safety Precautions

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

- Only the personnel authorized or trained by the manufacturer can maintain the device. Any unauthorized personnel should not assemble or disassemble the device.
- Do not operate this device in an atmosphere containing flammable gases such as anesthetic gases, hydrogen, and ethanol, because there is a danger of explosion.
- Do not use this device around strong electric field, strong electromagnetic field or mobile wireless communication devices. Using the device in improper environment may result in malfunction or damage.
- Connect the grounding terminal only before powering on the device. Disconnect the grounding cable only after powering off the device. Otherwise, there is a danger of electric shock. Ensure that the potential-equalization lead wire is connected before inserting the equipment power plug.
- The AC power connector plug for the device is a three-prong grounded plug and should never be adapted to any two-prong outlet or by using an adapter.
- Select a conforming multi-socket outlet with protective grounding, and ensure that its maximum output power exceeds the power required by this device.
- The multi-socket outlet can only be used to provide power to the recommended peripherals of this system.
- Do not place the multi-socket outlet on the floor.
- Do not connect other devices to the multi-socket outlet; otherwise, the rated output power may be exceeded and failure may be caused.

- Accessory equipment connected to the analog and digital interfaces must be certified according to the respective EN/IEC standards (for example, EN/IEC 60950 for data processing equipment and EN/IEC 60601-1 for medical equipment). Furthermore, all configurations shall comply with the system standards EN/IEC 60601-1-1.
- In the environment that patient is 1.8 meters (6 feet) around, connect peripherals to the auxiliary power outlet which is capable of isolation protection, or power the peripherals by auxiliary output cable or isolation transformer complying with IEC 60601-1-1 or the power input of the same safety level.
- Do not pour any fluid onto the surface, as fluid seepage into the electrical circuitry may cause excessive leakage current or system failure. If carelessly pour any water onto the device, immediately stop using the device and contact the sales representative immediately.
- The device is applicable for the medical endoscope of type-BF.
- To avoid electric shock and damage, power off and disconnect the device from the AC power outlet before cleaning.
- Only the peripherals (such as endoscope, image processor and etc.) provided or recommended by the manufacturer can be used. Using other devices may increase the RF radiation and degrade the device performance of anti-electromagnetic interference.
- Only the accessories provided or approved by the manufacturer can be used. Using other accessories may damage the device and cannot achieve the expected performance described in this manual.
- The device should be maintained and stored as described in the user manual after use. Improper maintenance or storage may cause cross infection, product damage or performance degradation.

1.4 Safety Symbols

The following table is provided for user's identification of important symbols located in labels on the device.

Symbol	Meaning
	Follow instructions for use
	Caution
	Date of manufacture
	Manufacturer

Symbol	Meaning
SN	Serial Number
	Non-ionizing electromagnetic radiation.
	Alternating current
	Power On/Off button
CE 0197	This product is provided with a CE marking in accordance with the regulations stated in Council Directive 93/42/EEC.
EC REP	Authorized representative in the European community
	Type BF Applied Part
	Beware of burns
	Equipotentiality
	Fuse
	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.

Chapter 2 Overview

To ensure the performance and availability of this medical device, you should be completely familiar with the operations and the functions of the device.

2.1 System Configuration

2.1.1 System Composition

The device consists of the following parts.

- Main lamp (xenon lamp)
- Emergency lamp (halogen lamp)
- Power supply
- Air pump
- Control board

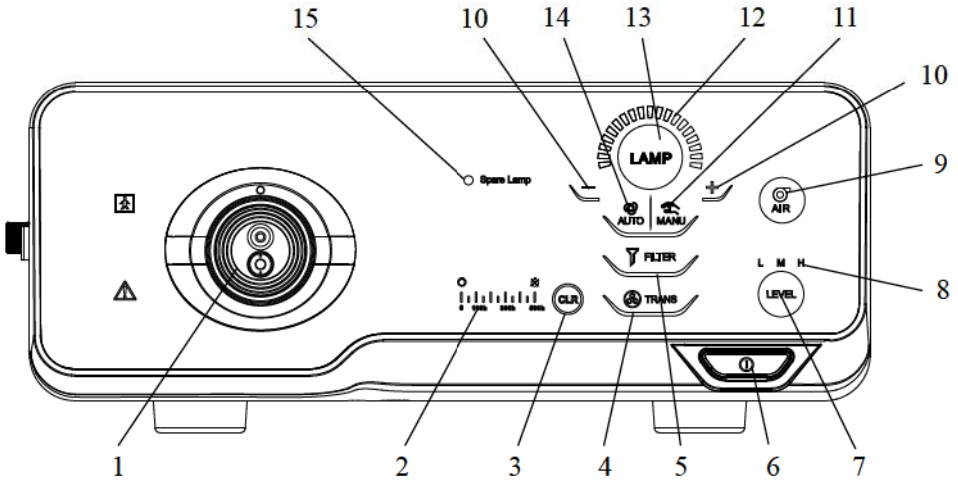
2.1.2 Accessory List

The accessory list of the device is as follows.

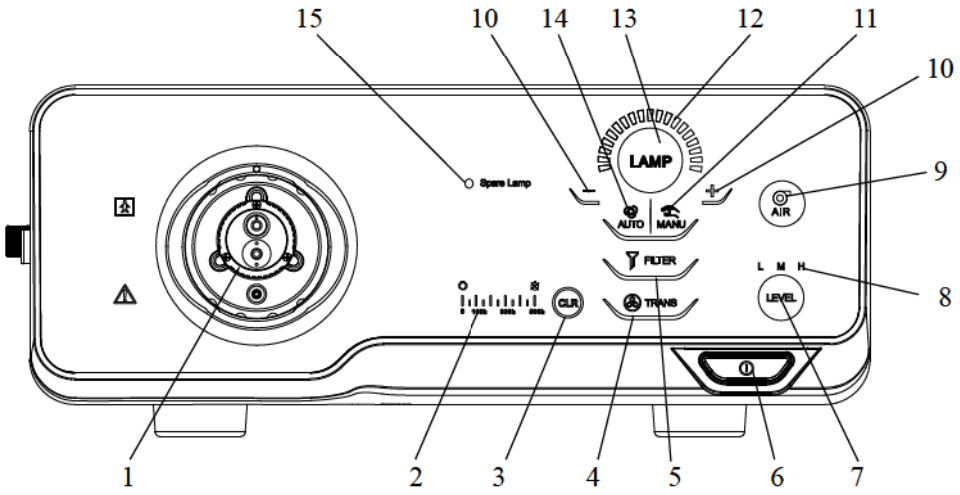
- Power cable
- Fuse
- Others: See the Packing List in the packaging box.

2.2 Part Introduction

2.2.1 Front Panel



(HDL-500X)



(HDL-550X)

Figure 2-1 Front View

No.	Part Name	Descriptions
1	Endoscope port	Used for connecting the air pipe and light guide of the endoscope.
2	Service time indicator	Indicates the accumulated working time of the main lamp. This indicator starts blinking when the lamp reaches the end of its lifespan.
3	**CLR** button	Hold it for 5 seconds to reset the time. Before the reset, ensure that the lamp is disabled.
4	**TRANS** button	When the device is connected to endoscope, select it to emit strong light for 7 seconds with the button blinking. Select it again to disable the feature.
5	**FILTER** button	Select it to enable or disable the filtration feature.
6	Power button	Select it to turn on/off the device.
7	**LEVEL** button	Select it to adjust the air pressure.
8	Air pump indicator	Indicates the current air pressure level (**L**-Low, **M**-Medium, **H**-High).
9	**AIR** button	Select it to enable or disable the air pump.
10	Intensity buttons (⊕ , ⊖)	Select them to adjust the light intensity.
11	**MANU** button	Select it to enable manual adjustment of light intensity.
12	Intensity indicator	Indicates the light intensity level.
13	**LAMP** button	Select it to turn on/off the lamp.
14	**AUTO** button	Select it to enable automatic adjustment of light intensity.
15	Emergency lamp indicator	Indicates whether the emergency lamp is in use.

Note:

Each time when the button located on the front panel is selected, you can hear a short beep and the button indicator is also illuminated accordingly.

2.2.2 Rear Panel

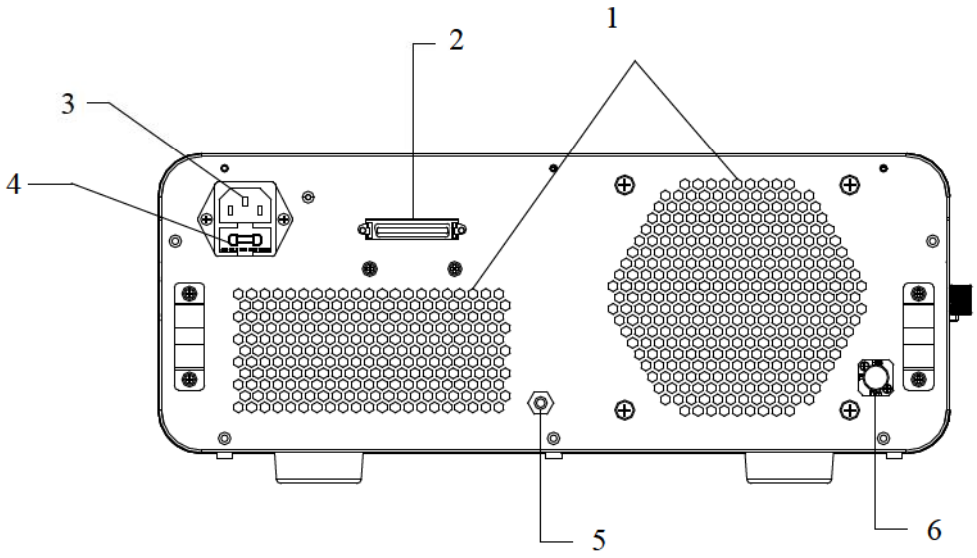


Figure 2-2 Rear View

No.	Part Name	Descriptions
1	Ventilation holes	Used for dissipating internal heat.
2	Processor port	Used for connecting the image processor through light control cable.
3	Power port	Used for connecting the power outlet through power cable.
4	Fuse box	Two fuses inside. (T5AH250V)
5	Equal potential terminal	Used for equipotential connection, balancing the protective earth potentials between the device and other electrical equipment.
6	Optical fiber interface (reserved)	Used for connecting to an optical fiber for transmitting image data.

2.2.3 Side Panel

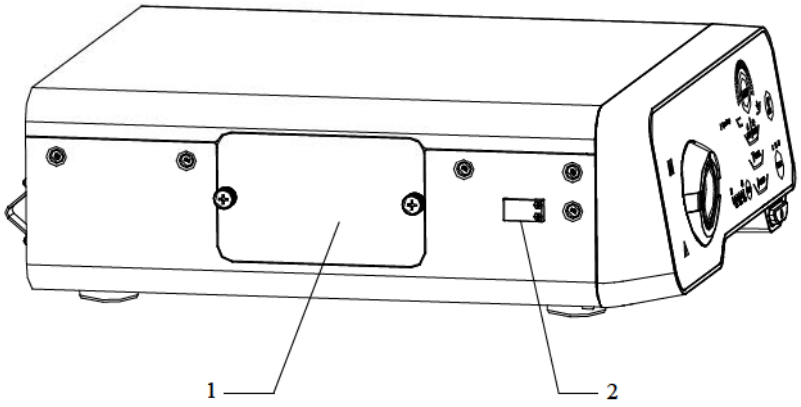


Figure 2-3 Left View

No.	Part Name	Descriptions
1	Lamp box door	Open the door to check or replace the lamp inside.
2	Water bottle bracket	Used for holding the water bottle supplying water for the endoscope.

Chapter 3 Preparations

Preparations are necessary before use, which should include device installation, connection, and inspection.

For other devices used with this device, please inspect them according to their respective user manuals. If any malfunction is found, please do not use the device.

WARNING Read through this chapter carefully before using the device to ensure that the installation and connection are correct. Otherwise, it may cause device damage or personal injury.

NOTE:

- Please place the device on a medical trolley (sold separately) or horizontal plane before using it. For details about trolley installation, please refer to the trolley user manual.
- Power off the device and all the peripherals before system connection. Otherwise, it may result in device damage or malfunction and data loss.
- Only the cables provided by the manufacturer can be used for connection. Otherwise, it may result in damage or malfunction.
- Do not block the ventilation holes of device and place the device in a location with adequate ventilation. Otherwise, the internal heat may cause damage or malfunction.

3.1 Placing the Device

Lock the foot brakes of the trolley before placing the device on it. It is recommended that four anti-slip mats be pasted under the 4 feet of the device to avoid accidental slide of the device.

NOTE:

Ensure that the 4 feet of the device are positioned within the anti-slip strips.

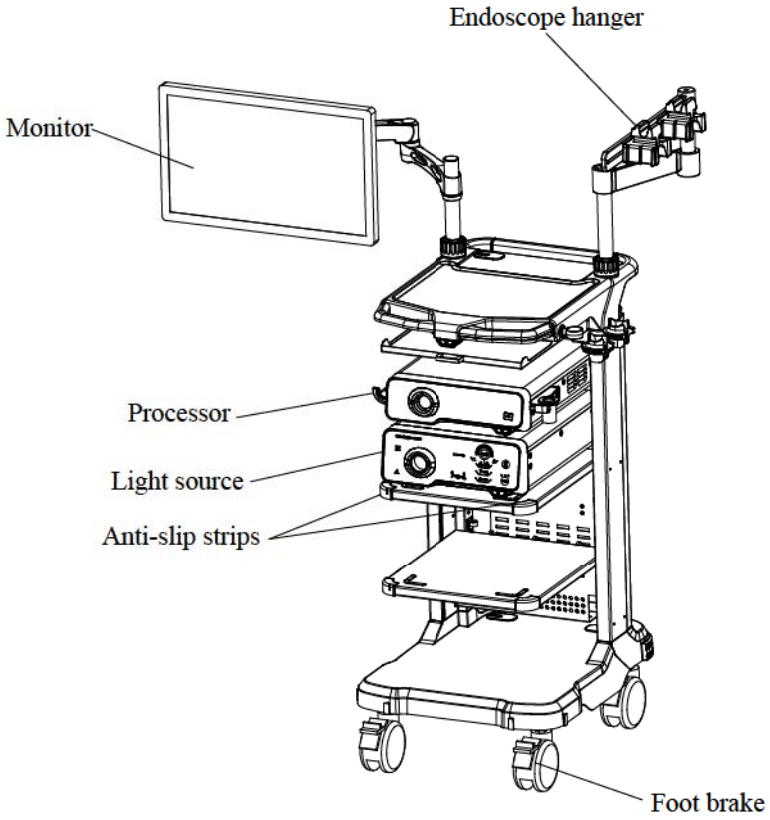


Figure 3-1 Medical Trolley

3.2 Connecting the System

After placing the device, connect to the endoscope, water bottle and power cable.
The endoscopy system is shown in Figure 3-2.

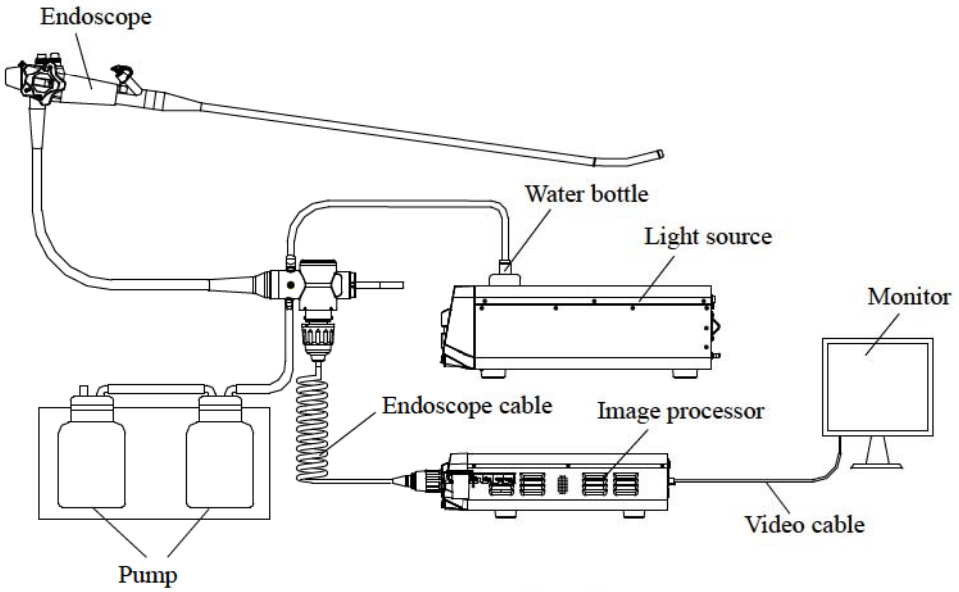


Figure 3-2 Connection of the Endoscopy System

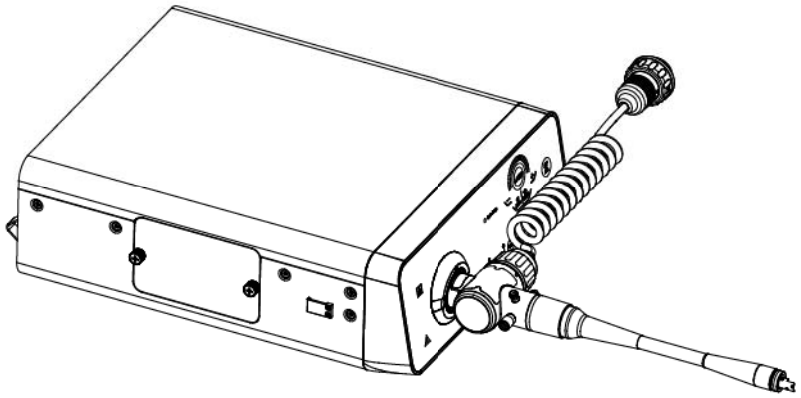
3.2.1 Connecting the Endoscope

WARNING Wipe the connector section of the endoscope carefully and ensure that it is completely dry before connection. Otherwise, there is a danger of electric shock and device damage.

NOTE:

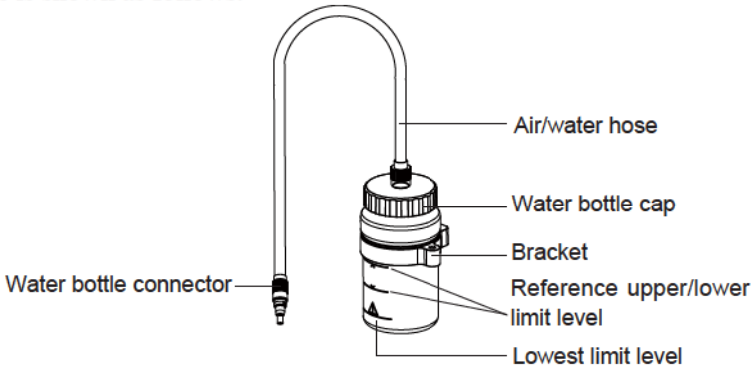
- Power off the device before connection.
- Do not touch the connector section or endoscope port when the endoscope is just removed from the device. Otherwise, the high temperature may cause skin burns.

Insert the connector section of the endoscope into the endoscope port of the device firmly.



3.2.2 Connecting the Water Bottle

The water bottle is shown as follows.



NOTE:

- Use sterile water and change it every day.
- Stop using the device when the water level is under the lowest limit and add sterile water into the bottle.

Perform the following steps to connect the water bottle.

1. Fix the water bottle on the bracket.

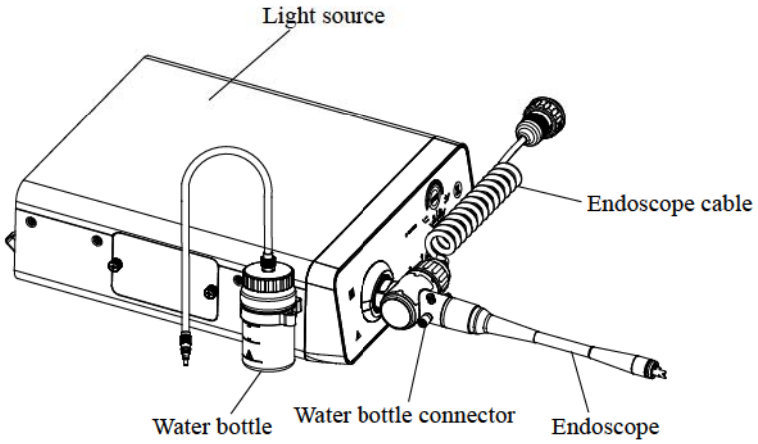


Figure 3-3 Water Bottle Installation

2. Connect the water bottle to the endoscope firmly.

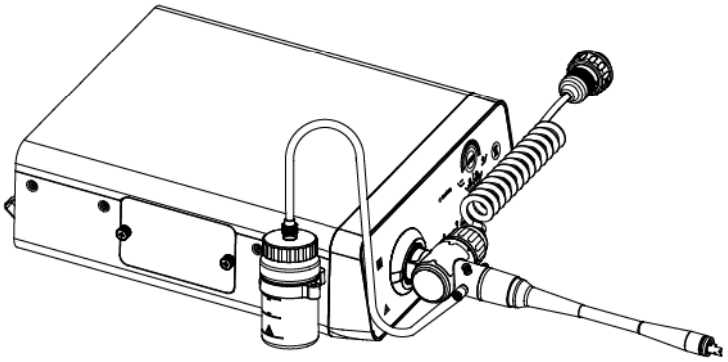


Figure 3-4 Pipe Connection

3.2.3 Connecting Power Supply

WARNING Do not bend, drag or twist the power cable excessively. Otherwise, there is a danger of fire or electric shock.

Perform the following steps to connect the power supply.

1. Connect the device to the earth or the equal potential terminals of other devices.
2. Connect one end of the power cable to the device and the other end to the AC power outlet. Ensure that both ends are properly connected.

3.3 Powering on/off the Device

Select **POWER** to power on the device. The white power indicator is illuminated and the internal fan starts working.

Select **POWER** again to power off the device. The power indicator is extinguished and the internal fan stops working.

3.4 Inspecting the Device

Before each use, please strictly follow the descriptions below to inspect the device. Follow the relevant user manuals to inspect the peripherals connected to this device. If any problem exists, please refer to 5.6 Troubleshooting. If the problem still exists, please stop using the device and contact the sales representative of the manufacturer.

3.4.1 Inspecting Air Feeding

Perform the following steps to inspect the air feeding feature.

1. Select **AIR** to activate the air feeding feature. Select **LEVEL** repeatedly to set the air pressure to **H**.

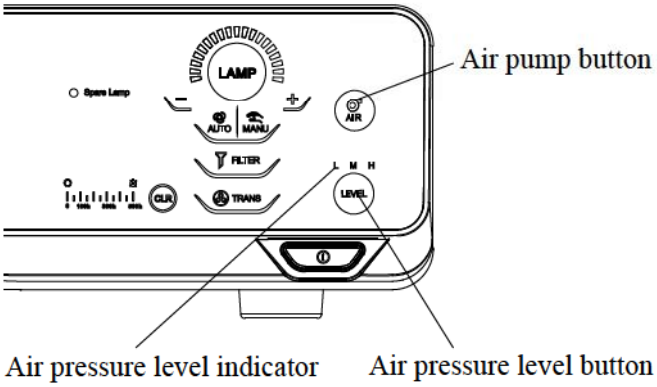


Figure 3-5 Air Feeding

2. Immerse the distal end of the endoscope in a container filled with sterile water to a depth of 10cm.

3. Cover the air/water valve with a finger to feed air. Ensure that bubbles continuously come out from the air/water nozzle as shown in figure 3-6. Refer to the relevant endoscope user manual for details.

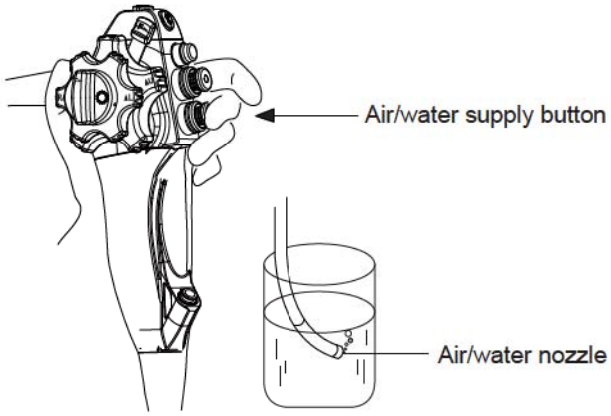


Figure 3-6 Air Feeding Inspection

NOTE:

When the distal end of the endoscope is immersed in the water to a depth less than 10cm, a few bubbles will be emitted even if the air/water valve is not operated. It is not a malfunction.

4. Select **LEVEL** repeatedly to change the air pressure. Ensure that the number of bubbles varies with the air pressure.
5. Select **AIR** to stop air feeding. Ensure that no bubble comes out from the nozzle.
6. Remove the distal end out of the sterile water. Check the water feeding feature according to the endoscope user manual.

3.4.2 Inspecting Brightness Adjustment

WARNING Do not stare at the distal end of the endoscope. Otherwise, the strong light may result in eye injury.

■ To adjust the brightness automatically

1. Select **AUTO** on front panel.

2. Select ⊕ or ⊖ to set light intensity to an appropriate level.

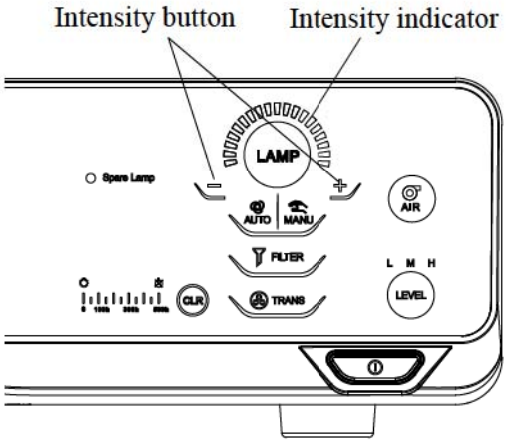


Figure 3-7 Brightness Adjustment

3. Move the insertion section of the endoscope up and down. Keep the distance between the distal end and an object (such as a table) within a range of 3mm to100mm. Ensure that the brightness of image displayed on the screen does not change obviously.

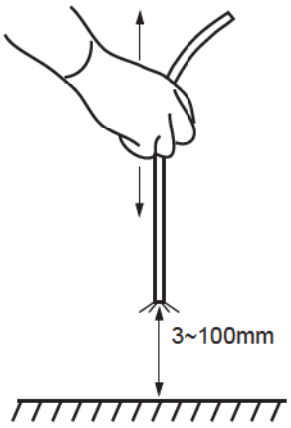


Figure 3-8 Brightness Observation

■ To adjust the brightness manually

WARNING In MANU mode, adjust the brightness to the lowest level required for general clinical observation to avoid eye injury.

1. Select **MANU** on the front panel.
2. Select ⊕ or ⊖ , and ensure that the device responds as follows:
   - Intensity indicator changes accordingly.
   - Image brightness changes accordingly.

Chapter 4 Operations

The user must be a physician or medical personnel operating the device under the guidance of a physician. This manual, therefore, does not involve any explanation or discussion about the clinical endoscopic technique. It only describes basic operations and precautions related to the device.

The device will save the current setting automatically when it is powered off.

4.1 Turning on/off the Lamp

WARNING

- To avoid eye injury, set the light intensity to the minimum before turning on the lamp.
- If the emergency lamp rather than the main lamp is illuminated during the examination, you should immediately end the examination and slowly take the endoscope out of patient body because the emergency lamp cannot provide sufficient brightness.

■ To turn on main lamp
Select **LAMP** to turn on the lamp, and the light is emitted from the distal end of the endoscope.

■ To turn off main lamp
Hold **LAMP** for about 2 seconds to turn off the lamp.

NOTE:

- If the main lamp fails to be illuminated after **LAMP** is selected, the emergency lamp will be illuminated automatically with the emergency lamp indicator illuminating and **LAMP** blinking. In this case, you should restart the device. If the main lamp still fails to be illuminated, please refer to Section 5.2 to replace it immediately.
- The lifetime of the main lamp is about 500 hours. If the service time exceeds the lifetime, the main lamp turns dimmer or is damaged, please refer to Section 5.2 to replace the main lamp immediately.
- Once the lamp is turned on, it should keep illuminating for at least 30 minutes. Otherwise, it may shorten the lamp lifetime.
- Wait over 5 minutes to turn on the lamp again after it is turned off. Otherwise, it may shorten the lamp lifetime.

4.2 Adjusting the Brightness

WARNING To avoid burns during endoscope examination, adjust the brightness to the lowest level required for providing the optimal luminous effects during clinical observation.

Select **AUTO** or **MANU** to adjust the brightness automatically or manually as required.

■ To adjust the light intensity automatically

1. Select **AUTO** on the front panel.
2. Select ⊕ or ⊖ to adjust the light intensity to the desired level.
Once you set the light intensity to the desired level in auto mode, the light intensity will be automatically adjusted to keep the image brightness roughly the same.

NOTE:

When the endoscope is not being operated (for example, hung on the endoscope hanger) and in AUTO mode, the system will enter and stay in low light mode to avoid overheating of the distal end, thereby avoiding patient burns, and the prompt "Low light mode, select FREEZE/LAMP/MANU to exit." is displayed on the screen. You can press **FREEZE/LAMP/MANU** to exit this mode.

■ To adjust the light intensity manually

1. Select **MANU** on the front panel.
2. Select ⊖ or ⊕ to set the light intensity to the desired level.
   Light intensity is fixed once it is set in MANU mode. However, the image brightness will be affected by the distance between the distal end and object.

NOTE:

Set the light intensity as low as possible to guarantee safe operation. If the endoscope keeps working at high light intensity for a long time, it may generate evaporation of organic material (blood, moisture on the tool, etc.) near the lens due to the heat of light, which causes spots in the image. If the examination is affected by the vapor, you should take out the endoscope and wipe the distal end with a lint-free cloth dampened with 70% isopropyl or alcohol, reinsert the endoscope, and continue the examination.

4.3 Using Light Transmission

WARNING Use the light transmission feature only when necessary.

You can locate the distal end of the endoscope inside the patient's body by using the light transmission feature.

Select **TRANS** to enable the light transmission feature. After this feature is enabled, the light automatically reaches the maximum intensity and starts twinkling. Seven seconds later, the light intensity is automatically adjusted to the original intensity.

NOTE:

You can disable this feature by selecting **TRANS** again or other buttons (except **POWER**, **LAMP** and **CLR**) on the front panel.

4.4 Adjusting Air Pressure

Perform the following steps to adjust air pressure.

1. Select **AIR** to start air feeding, select **LEVEL** to adjust air pressure to the desired level (**L, M, H**).
2. Perform the air feeding operation according to the endoscope user manual.

You can select **AIR** again to stop air feeding.

4.5 Using Filtration (Optional)

WARNING Do not enable the filtration feature without installation of a light filter. Otherwise, it may result in device damage or patient injury.

Filtration feature changes the light into specified color like red or green by the filter and help user to observe the organs clearly.

Power on the device, select **FILTER** to change the color of light.

Select **FILTER** again to disable this feature.

NOTE:

Contact the sales representative of the manufacturer to install the filter.

Chapter 5 Maintenance

To ensure the safety and functionality of the device, you should maintain and clean the device and its accessories at regular intervals.

5.1 Cleaning the Device

WARNING

- Ensure that the device is completely dry before use. Otherwise it may result in electric shock.
- Wear personal protective barriers during the cleaning. Otherwise, the blood, mucous membrane and other potential source of infection adhered to the device may result in cross-contamination.
- Do not wipe the endoscope port or other ports. Otherwise, it may result in deformation of the pins inside the ports or poor contact.

NOTE:

If the device is contaminated during use, please clean it immediately after use. If cleaning is delayed, the debris may dry up and become difficult to be cleared up.

■ To clean the surface

1. Power off the device and disconnect it from the AC power outlet.
   In case of potential infectants like blood or body fluid, use a lint-free soft cloth dampened with neutral detergent solution to clean the surface.
2. Dampen a lint-free soft cloth with 75% ethyl alcohol or 75% isopropyl alcohol and use it to clean the surface. Ensure that the device is completely dry.

■ To clean and disinfect the water bottle

1. Disconnect the water bottle connector from the endoscope and remove the bottle from the bracket.
2. Remove the water bottle cap, and separate the hose from the cap.
3. Immerse the water bottle and the hose into high-level non-corrosive chemical disinfectant solution to rinse the inner faces.
4. Wash out the residual disinfectant using sterile water. Dry it completely for further use.

WARNING Do not immerse the water bottle and the hose for over 60 min.

NOTE:

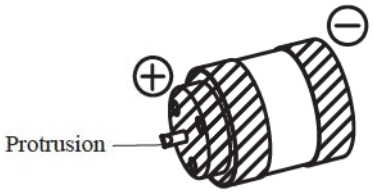
Change water in the wattle bottle every day and ensure that sterile water is used.

5.2 Replacing the Lamp

WARNING

- Ensure that the lamp is cool before replacement. Please do not touch a lightening lamp or any one just turned off. Otherwise, the high temperature may result in skin burns.

- Do not leave any foreign material e.g. gauze, in the lamp box during the replacement. Otherwise, it may lead to fire or malfunction.
- Do not use the lamp not approved by the manufacturer. Otherwise, it may cause fire or device damage.
- During disposal of a dumped lamp, wear protective goggle and gloves and use a tweezer to remove the protrusion on the positive pole for deflation.



NOTE:

- Do not touch the lamp or glass surface of the light filter. Otherwise, it may cause glass breakage, device damage or glass surface containmination.
- Do not hit or scrape the lamp during lamp installation. Otherwise, it may cause lamp damage, lifetime shortening or malfunction.
- Wipe off the residual complexes on the cooling block during the replacement. Otherwise, it may cause poor dissipation or shorten the lamp lifetime.

Perform the following steps to replace the lamp.

1. Power off the device and disconnect the power cable from the AC power outlet.
2. Open the lamp box door and ensure that the inside has been cooled down.
   If it is still hot inside, please close the lamp box door and power on the device. The cooling fan will start working to dissipate heat. Wait for a while and start from step 1 again.

NOTE:

Do not open the lamp box door during heat dissipation. Otherwise, the safety switch will immediately cut off the power.

3. Loosen the two fixing knobs by rotating them 90° counterclockwise.

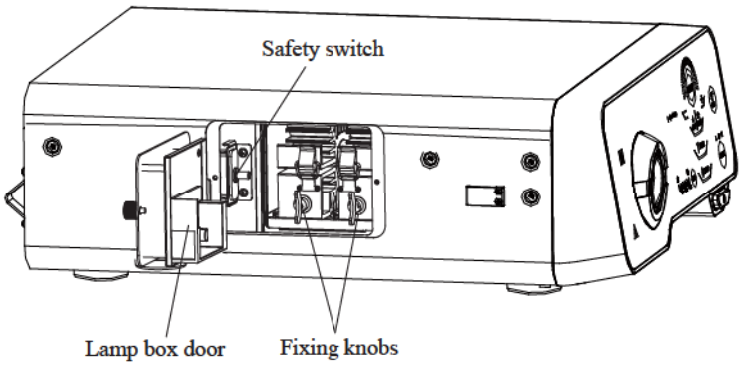


Figure 5-3 Fixing knobs A and B

4. Hold the knobs or the protrusions of cooling blocks A and B to take out the blocks.

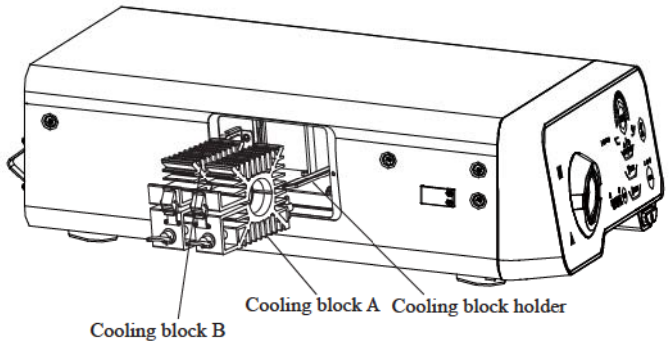


Figure 5-4 Cooling Blocks

5. Remove the hasp on each block, and take out the xenon lamp from the blocks.

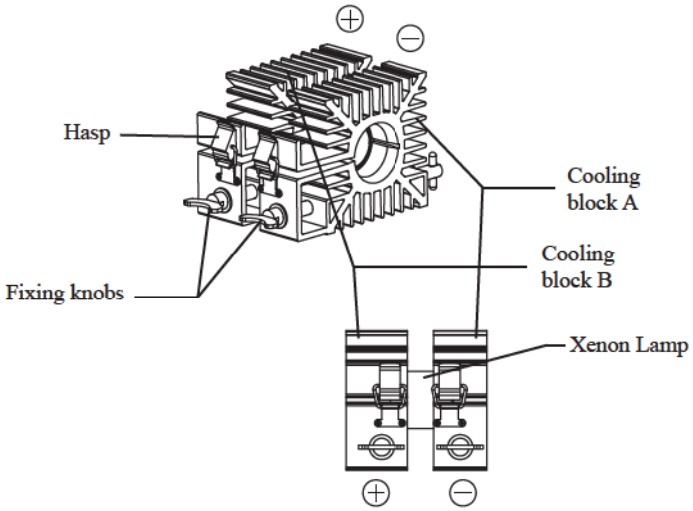
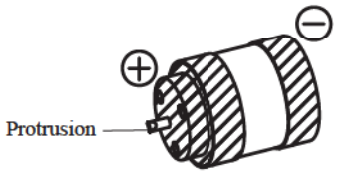


Figure 5-5 Enlarged Drawing of Heat Dissipation Blocks

6. Use clean gauze to wipe off all the residual complexes on the blocks.
7. Take out the complexes in the packing box of a new lamp, and then apply them evenly on the positive pole and negative pole of the new lamp respectively with a finger. It is recommended that the two poles be completely covered by the complexes.
8. Insert the positive pole and negative pole into blocks B and A respectively.



9. Ensure that block A is parallel with block B, fasten their hasps, and insert blocks A and B back into the lamp box.

NOTE:

Ensure that the hasps are firmly fastened. Otherwise, it may cause poor dissipation, device and lamp damage, and lifetime shortening.

10. Rotate the knobs 90° clockwise to fasten the knobs.
11. Close the lamp box door and fasten the screws.
12. Power on the device, and hold **CLR** for over 5 seconds to clear the service time. Confirm that the reading on the service time indicator is 0.

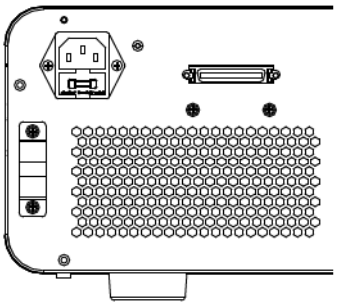
NOTE:

Do not clear the service time when the main lamp is on.

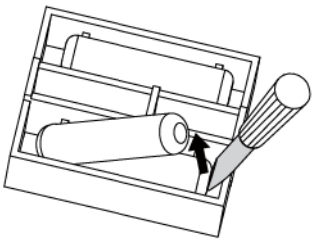
5.3 Replacing Fuse

Perform the following steps to replace the fuse.

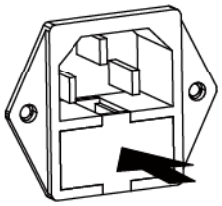
1. Power off the device and disconnect the power cable.
2. Take out the fuse box with a slotted screwdriver.



3. Replace the burnt fuse. Push the fuse box back into the place.



4. Fasten the screws on the fuse box.



5. Connect the power cable, and select **POWER** to turn on the device. Ensure that the indicator is illuminated. You should contact the sales representative of the manufacturer if the device cannot be powered on.

5.4 Storing the Device

You should operate, store and transport the device according to Appendix A Specifications.

1. Power off the device and remove the power cable.
2. Disconnect all the peripherals from the device.
3. Place the device on a clean and level surface at room temperature.

NOTE:

- To avoid malfunction, cable damage, electric shock, or fire, do not excessively bend, pull, twist or squeeze the power cable during storage.
- Store the device in an environment with good ventilation and avoid direct sunlight.

5.5 Disposing the Device

You should dispose of the device or other accessories consistent with the local laws or regulations. Manufacture date of the device can be found on nameplate, and device lifetime is about 5 years (43800h, continuous operation).

For detailed disposal information, consult the manufacturer or local distributor. The manufacturer is not responsible for any device content or accessories that have been discarded improperly.

5.6 Troubleshooting

The troubleshooting should be performed by qualified technical personnel. If a problem persists after the troubleshooting, please stop using the device immediately and contact the sales representative of the manufacturer for repair.

Descriptions	Inspection Items	Solution
The device cannot be connected to endoscope.	Endoscope and the device	Ensure that they are compatible with each other and connect them following figure 3-2.
The device cannot be powered on.	Power cable	Ensure that the device is properly connected to the power source.
	Lamp box door	Ensure that the door is firmly closed.
	Fuse	Open the fuse box and replace the T5AH250V fuse
The main lamp fails to be illuminated.	Main lamp	Ensure that the lamp is installed properly. Check if the lamp is burnt out. If yes, replace the lamp.
	Device temperature	Power off the device and ensure that the ventilation holes are not blocked.

Descriptions	Inspection Items	Solution
No light emits from the distal end.	Connection of the endoscope and the device	Ensure that the endoscope is properly connected to the device.
	Filtration feature	Check if the filtration feature is enabled. If yes, select **FILTER** to switch to normal observation mode.
The intensity buttons do not work.	Intensity indicator	Check if the intensity is adjusted to the maximum.
The image and the view are too bright or too dim.	Main lamp	Check if the lamp is burnt out. If yes, replace the lamp.
	Connection of the endoscope and the device	Ensure that the endoscope is properly connected to the device.
	Emergency lamp	Check if the emergency lamp is illuminated. If yes, contact the sales representative of the manufacturer for lamp replacement.
	Light transmission	Check if strong light transmission is enabled. If yes, disable this feature.
The image color is too poor.	Filtration mode	Check if filtration is enabled. If yes, select **FILTER** to switch to normal observation mode.
	The emergency lamp	Check if the emergency lamp is on. If yes, replace the main lamp.
Unable to feed water/air.	Connection of the endoscope and the device	Ensure that the endoscope is properly connected to the device.
	Water bottle	Ensure that there is enough sterile water inside the bottle.

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Appendix A Specifications

Technical Parameters		Product Model	
		HDL-500X	HDL-550X
Endoscope port		Apply to the video endoscope with a Φ32.5mm connector.	Apply to the video endoscope with a Φ59.5mm or Φ32.5mm connector.
Power supply	Rated voltage	AC 100-240V	
	Frequency	50Hz/60Hz	
	Input power	500VA	
	Fuse	250V/5A	
Main lamp	Lamp	300W xenon lamp	
	Max. output light flux	≥550lm	
	Average lifetime	≥500 hours	
	CCT	5900K~7000K	
	CRI	≥90	
	Brightness adjustment	Auto, Manual	
Emergency lamp	Lamp	12V 60W halogen lamp	
	Max. output light flux	≥45 lm	
	Average lifetime	4000 hours	
Air feeding	Pressure range	45-65Kpa	
	Max. flux	H Level: 3.7L/min ~ 5.5L/min M Level: 3.0L/min ~ 4.7L/min L Level: 2.0L/min ~ 3.7L/min	

Technical Parameters			Product Model	
			HDL-500X	HDL-550X
Safety Type	Type of protection against electric shock		Class I	
	Degree of protection against electric shock		Type-BF applied part	
	Degrees of protection against harmful liquid		Non-waterproof enclosed equipment	
	According to the degree of safety of application		The equipment is not suitable for use in the presence of a flammable anesthetic mixture with air, oxygen or nitrous oxide.	
Environment Conditions	Operation	Environment Temperature	0°C ~ +40°C	
		Relative humidity	30% ~ 80% (non-condensing)	
		Atmosphere Pressure	700hPa ~ 1060hPa	
	Storage	Environment Temperature	-5°C ~ +40°C	
		Relative humidity	30% ~ 80% (non-condensing)	
		Atmosphere Pressure	700hPa ~ 1060hPa	
	Transportation	Environment Temperature	-20°C ~ +55°C	
		Relative humidity	20% ~ 90% (non-condensing)	
		Atmosphere Pressure	700hPa ~ 1060hPa	

Appendix B EMC Guidance and Manufacturer's Declaration

B. 1 Electromagnetic Emissions

The equipment is intended for use in the electromagnetic environment specified below. The customer or the user of the EQUIPMENT should assure that it is used in such an environment.

Emissions Test	**Compliance**	**Electromagnetic Environment and Guidance**
RF emissions CISPR 11	Group 1	The equipment uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The equipment is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

B. 2 Electromagnetic Immunity

The equipment is intended for use in the electromagnetic environment specified below. The customer or the user of the equipment should assure that it is used in such an environment.

Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic Environment and Guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV Contact ±8 kV Air	±6 kV Contact ±8 kV Air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines; ±1 kV for input/ output lines	±2 kV for power supply lines; ±1 kV for input/ output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV line to line ±2 kV line to earth	±1 kV line to line ±2 kV line to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips and Short interruptions IEC 61000-4-11	<5 % U_T (>95 % dip in U_T) for 0.5 period 40 % U_T (60 % dip in U_T) for 5 periods 70 % U_T (30 % dip in U_T) for 25 periods <5 % U_T (>95 % dip in U_T) for 250 periods	<5 % U_T (>95 % dip in U_T) for 0.5 period 40 % U_T (60 % dip in U_T) for 5 periods 70 % U_T (30 % dip in U_T) for 25 periods <5 % U_T (>95 % dip in U_T) for 250 periods	Mains power quality should be that of a typical commercial or hospital environment. If the user of the equipment requires continued operation during power mains interruptions, it is recommended for the equipment to be powered from an uninterrupted power supply.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: U_T is the AC mains voltage prior to application of the test level.			

The equipment is intended for use in the electromagnetic environment specified below. The customer or the user of the equipment should assure that it is used in such an environment.

<table>
<tr><th>Immunity Test</th><th>IEC 60601
Test Level</th><th>Compliance
Level</th><th>Electromagnetic Environment and Guidance</th></tr>
<tr><td>Conducted RF
IEC 61000-4-6</td><td>3Vrms
150kHz-80 MHz</td><td>1 Vrms</td><td rowspan="2">Portable and mobile RF communications equipment should be used no closer to any part of the EQUIPMENT, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
Recommended separation distance:
$d=3.5\sqrt{P}$
$d=1.2\sqrt{P}$ 80MHz-800 MHz
$d=2.3\sqrt{P}$ 80 MHz-2.5GHz
Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).
Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol:
  </td></tr>
<tr><td>Radiated RF IEC 61000-4-3</td><td>3V/m
80 MHz-2.5GHz</td><td>3 Vrms</td></tr>
<tr><td colspan="4">NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.
NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</td></tr>
<tr><td colspan="4">[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the EQUIPMENT is used exceeds the applicable RF compliance level above, the EQUIPMENT should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the EQUIPMENT.
[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.</td></tr>
</table>

B. 3 Recommended Separation Distances between Portable and Mobile and RF Communications Equipment and the Equipment

The equipment is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the equipment can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the equipment as recommended below, according to the maximum output power of the communications equipment.

Rated Maximum Output Power of Transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz	80 MHz to 800 MHz	800 MHz to 2.5 GHz
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.