Pipe Inspection Camera System

Operation Manual

Read this Operation Manual carefully before using this tool

【INTRODUCTION】

The pipe inspection camera system is a powerful set of tools that helps you locate and diagnose problems in a pipeline system.
The system is widely used in inspections of Sewer, central air conditioning, chimney, plumbing, building, cable pipe and pipes ventilation systems and other places.

【PRECAUTIONS】

Read all safety warnings and instructions. Failure to follow warnings and instructions may result in electric shock, fire and/or serious injury.
Save this operation manual for future reference.
1. Do not operate this device in explosive atmospheres, such as in the presence of flammable liquids, gases, hazardous chemicals, superheated liquid or heavy dust. It may create sparks which may ignite the dust or fumes.
2. The camera head and the push cable are waterproof, however, the DVR and connecter cable are not. Do not expose them to water or rain. This increases the risk of electrical shock.
3. Avoid using the device in environments of extreme cold, heat or humidity as it may damage the device.
4. Do not drop or press hard on the device.
5. Always backup your data before connecting your SD memory card to this system. The manufacturer is not responsible for any data of damage on your SD memory card for any reason.
6. Do not disconnect the unit while recording or playing back. It may damage the unit and/or the SD memory card.
7. Only qualified person are allowed to repair this device. Service or maintenance performed by unqualified person could result in injury.
8. Do not use this device in places where there is high voltage equipment. The device doesn't contain high voltage protection and isolation.
9. Check or maintain this device regularly, repair it or replace new parts if there is any damage.

【APPLICATION AND KNOW YOUR TOOL】

APPLICATION

Suitable for pipes at diameter of 50mm-300mm.

KNOW YOUR TOOL

The pipe inspection camera system includes the following four main parts: camera head, push cable, keyboard text writer unit and DVR.
The camera features 512Hz transmitter (optional), self-leveling device, adjustable brightness LEDs, high quality anti-scratch sapphire glass lens cover; stainless steel housing; The sapphire glass cover and stainless steel housing can protect the camera from scratching, knocking, etc.
The flexible stainless steel spring and other related components provide a flexible transition; which makes the push cable be easier to pass through bended pipes.
Battery is built into LCD to provide power for camera and DVR monitor.

Camera

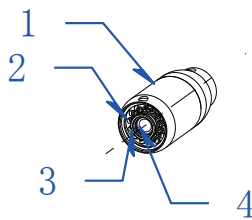1. Stainless steel shell
2. Leds
3. Isolation ring
4. Sapphire lens cover

Figure 1.Camera

Remote control

1. Menu: Select Menu
2. Playback: Playback Mode
3. Pt/Wt: Reserve Function
4. Exit: Exit Menu
5. Up: Select Up/Previous Item
6. OK & Home: Confirm/Select Menu
7. Left: Select Left Item
8. Right: Select Right Item
9. Down: Select Down/Next Item
10. Mirror: Mirror And Flip Image
11. LED: Adjust The Led Brightness
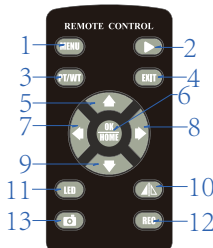12. REC: Start/Stop Recording
13. Photo: Take Photo

Figure 2. Remote control

Keyboard Text Writer

1. Meter-Zero
(Meter Counter Zero Set Button)
2. Cam (connect to DVR)
3. USB 2.0 female connect
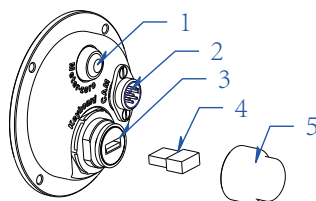4. Wireless Keyboard Receiver
5. Waterproof Cap

Figure 3.Keyboard text writer

LCD display has two options, single DVR or toolbox unit

DVR and Bracket

1. Playback: Playback mode
2. Left: Select left item
3. Menu: Select menu
4. Power Indicator LED
5. Exit: Exit menu
6. OK & home: Confirm/Select menu
7. Down: select Down/Next item
8. LED: Change the LED brightness
9. IR for remote control
10. REC: Start/Stop recording
11. Power switch
12. Right: Select right item
13. Photo: Take photo
14. SD card slot
15. Mirror: mirror and flip image
16 UP: select up/previous item
17. PT/WT: reserve function
18 Color TFT LCD
19. Sun visor
20 Aviation cable video head
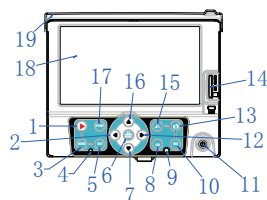21.Wheel clip
22.Wing nuts
23.Heavy hex bolts

Figure 4.DVR

Figure 5.DVR and bracket

Toolbox Unit

1. Playback: Playback mode
2. Left: Select left item
3. Menu: Select menu
4. Power Indicator LED
5. Exit: Exit menu
6. OK & home: Confirm/Select menu
7. Down: select Down/Next item
8. LED: Change the LED brightness
9. IR for remote control
10. REC: Start/Stop recording
11. Power switch
12. Right: Select right item
13. Photo: Take photo
14. SD card slot
15. Mirror: mirror and flip image
16 UP: select up/previous item
17. Aviation Socket
18. Meter-Zero(Meter Counter Zero Reset Button)
19. DC In
20. Sun Visor
21. Color TFT LCD

Figure 6.Toolbox unit

【DESCRIPTION SPECIFICATIONS AND STANDARD EQUIPMENT】

Product parameters

	ITEM	PARAMETER
General	Operating Temperature	-10~50°C/+14~+122°F
	Operating Humidity	30%RH~90%RH
	Storage Temperature	-20~60°C/+4~+140°F
	Power adapter	Input:100-240V AC, Output:12V DC 1500mA
	MEAS.	58.5×33.5×75.0cm (LxWxH)
	Weight	13.5-21.2Kg(Approx)
Camera	Sensor	1/3" Sony CCD
	TV-Line	480 TV-Line
	View Angle	120°
	Self leveling	Built-in
	Focus Distance	20cm (approx)
	Depth of field	100cm(approx)
	Camera Size	Φ38mm×81mm(Main body)
	Front Lens	Sapphire
	Shell Material	304#Stainless Steel
	Lighting	Built-in 12×LED (White)
	Water-Proof	20m water (Camera fix on Cable)
	Power Supply	DC12V
	Current Consume	60mA (LED OFF);140mA (LED ON)
DVR	Screen	7-inch 16:9 super bright high-definition color LCD screen
	Resolution	800×480 RGB
	Mirror and Flip	Support image mirror, Flip, Mirror & Flip
	Video Resolution	PAL 720×576 25FPS Max.
	Video Encoding	H.264
	Photograph	720×480/720×576
	Audio Recording	Local Sound
	Out Put	TV and Audio output
	External Memory	Support SD Memory Card up to 32GB
	Data port	USB2.0 To PC
	LED Driver	Built-in Dimmer
	Play Back	Video, Photo and Audio
	Language	English, German, French, Spanish, Italian, Chinese, Japanese, Russian, Portuguese
	Power Supply	DC 6~12V input
	Current Consume	700mA Max
	Batter y Capacity	7.4V 5200mAh Li-ion Battery
	A Single Charge Work Time	6 Hour
	Charge Time	8 Hour
Keyboard Text Writer	Keyboard Compatibility	Suppor t Specific PC Wireless keyboard
	Typing Language	English
	Max Characters	384
	Hide Characters	Quick One Key hiding
	Precision of Meter	Counter ±1%
	Meter and Feet Switch	Support
	Set Zero	Support
	Power Consume	40mA @ 12V DC
	Waterproof	P66 (for connection por ts panel only)
Cable Wheel	Cable Diameter	Φ6.8 mm
	Cable Length	40/50/60meter (Selectable)

STANDARD CONFIGURATION
Frame Assembly

M1. Frame
M2. Coil and push rod
M3. Meter counter device
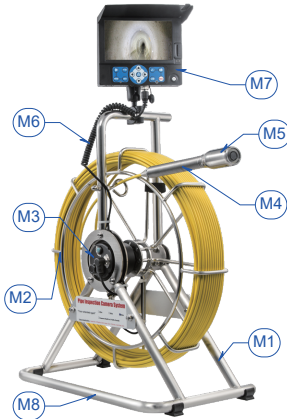M4. Guide spring
M5. Camera
M6. Handle
M7. DVR and bracket

Figure 7.Frame assembly

Tools kit

P1. 5mm Screwdriver
P2. Operation manual
P3. 13mm Inner hexagon spanner
P4. 2.5mm Hexagon spanner
P5. 72 Roller Skid
P6. Car charger
P7. Power adapter
P8. 5mm Hexagon spanner
P9. 120 universal Skid
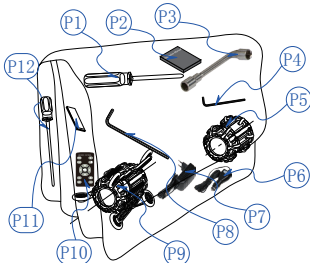P10. DVR Remote control
P11. Camera o-ring
P12. 3mm Screwdriver

Figure 8.Tools kit

STANDARD CONFIGURATION
Frame Assembly

M1. Frame
M2. Coil and push rod
M3. Meter counter device
M4. Guide spring
M5. Camera
M6. Cable
M7. Tool box bracket

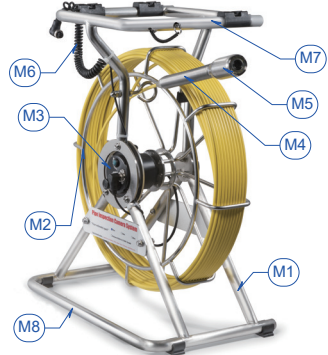**Figure 9.Frame assembly**

Toolbox unit

B1 DVR Remote control
B2 Car charger
B3 Power adapter
B4 5mm Screwdriver
B5 Camera o-ring

Figure 10.Toolbox unit

Tools kit

P1. 5mm Hexagon spanner
P2. 2.5mm Hexagon spanner
P3. 120 universal Skid
P4. 3mm Screwdriver
P5. Operation manual
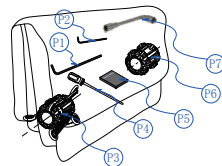P6. 72 Roller Skid
P7. 13mm Inner hexagon spanner

Figure 11.Tools kit

【INSTALLATION】

To reduce the risk of serious injury during use, follow these procedures for proper assembly.

1. Install Camera Head (See Figure 12)

Take out camera, grip the guide spring and screw the camera head tightly clockwise. Ensure the seal ring and the gold pins are in good status before installing camera head.
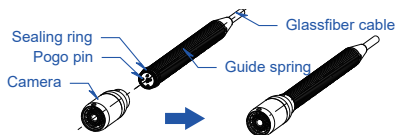

Figure 12.Install camera head

2. Install Roller Skid

Roller skids are used to keep the camera head in the center of different sized pipes and also to keep camera head away from mud at the bottom of pipes, in order to keep camera head clean and also view best quality images.

If you choose 72/120 skid, please install:

    1)Install 72 Roller Skid.(See Figure 13)

    2)Install 120 Roller Skid.(See Figure 14)

Please select the appropriate skids according to the size of the pipe, put the camera into the skids, rotate to find the right position, fixed the lock-ring.
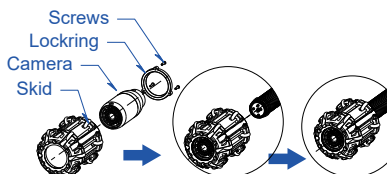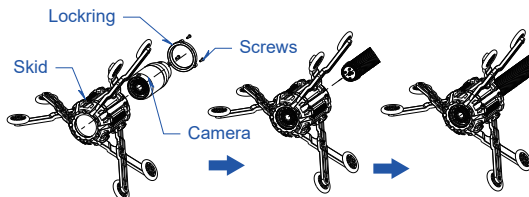

Figure 13. 72 Roller skid

Figure 14. 120 Roller skid

If you choose 78/134 skid, 60 ball skid, please install

    1) Install 78 skid and 60 ball skid. (Figure 15)

    2) Install the 134 skid and 60 ball skid. (Figure 16)

Please choose a suitable skids according to the size of the pipe, put the camera into the skid, and tighten the locking sleeve;
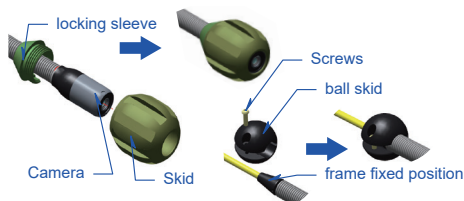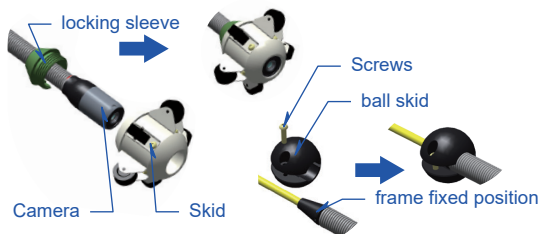

Figure 15. 78 Roller skid

Figure 16. 134 Roller skid

3. If you choosed the toolbox unit, please install the toolbox unit (Figure 17)

Take the toolbox unit out of the package, align the slot on the fixing seat, assemble the toolbox unit on the toolbox bracket, and fix the quick-release plug to the fixing hole on the toolbox unit.
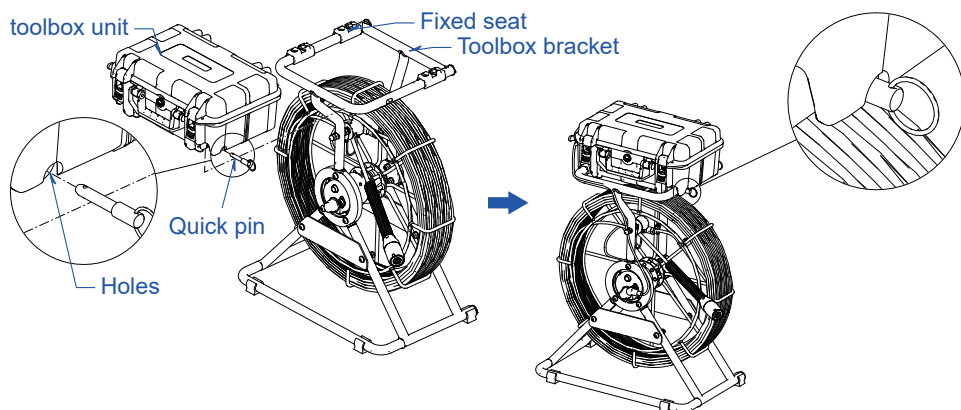

Figure 17.Install toolbox unit

【FUNCTION GUIDE AND OPERATING INSTRUCTIONS】

DVR ICON

1. SD Card
2. Battery Level
3. Image Reverse
4. Image Reverse & Mirror
5. Image Mirror
6. Timestamp
7. LED Brightness
8. Record
9. Meter Counter (optional function)

Figure 18. Screen icon definition

[DVR Operation]

1. Card insertion

Please insert SD card before using the device. (Note: In order to ensure the normal operation of the device, please use a good quailty branded SD card. It is best to format the SD card for the first time using this SD card.)

2. Power on/off

Press [(⏻)] to turn on/off DVR to enter the live video mode.

3. Function keys

Lamplight Adjust: In live video mode, Press [LED] to adjust the brightness of camera LEDs.

Mirror or/and Flip: In live video mode, Press [⬥] to mirror or/and Flip the image.

4. Take Photo and recording

Take Photo: In live video mode,Press [📷] to take Photo,The photo files will be saved in the DICM folder of the SD card.

Recording: In live video mode,Press [REC] to start/stop recording,The Video files will be saved in the DICM folder of the SD card.

5. Video Option

In live video mode,Press [MENU] to enter the video option menu; Press [▲] and [▼] to select items that you need, Press [OK/HOME] to confirm the selection, Press [▲] and [▼] to change the value. Press [OK/HOME] to save the setting; Press [EXIT] to exit video option and save.

• File size: D1 (720*576)/VGA(640*480)/QVGA(320*240)

• Video Seg: 10min/20min/30min/40min/OFF. Set 10-40min to restrict files length and open cycle-cover. Elder files will be covered by new files when SD card is full. Set OFF to close this function.

• Meter Counter: Reserve function.

• Sound: Turn on/off the local sound in Video Recording.

• Timestamp: Enable/Disable time stamp on screen.

6. Setup Option

In live video mode, Press [MENU] and [▶] to enter the setup option menu; Press [▲] and [▼] to select items that you need, Press [OK/HOME] to confirm the selection, Press [▲] and [▼] to change the value, Press [OK/HOME] to save the setting; Press [EXIT] to exit video option and save.

• Format: format SD card.

• LCD: LCD brightness(1-9).

• Language: English, German, French, Spanish, Italian, Chinese, Japanese, Russian, Portuguese.

• Sys. Reset: Reset all setting.

• Light frequency: 50Hz/60Hz, specifying your ambient light frequency.

• TV output: PAL/NTSC.

• Date input: To set date and time.

7. File Management

In live video mode, Press [▶] to enter the playback mode,the user can browse, preview and playback media files.

Press [▲] and [▼] to browse and select media files.

Press [OK/HOME] to confirm the selection and preview media file. Press [▲] and [▼] to preview the previous file. Press [OK/HOME] to playback video. Press [MENU] to enter the play setting.

• Delete: Delete media files.

• Slide Show: 3sec/5sec/10sec. To set interval time of the slide shows.

• Protection: To protect important media files.

• Thumbnail: Browse 9 media files per page.

• File List: Browse 3 media files per page.

Press [OK/HOME] to Pause/Play movie, Press [▲] Stop play movie, Press [◀] Rewind, [▶]Forward, And you can press [▼] to set speed rate of rewind/forward.

【METER COUNTER OPERATION】

1. Press the meter-zero button to set the meter to zero on screen display.
2. Change the unit of length or the total length of push cable, please refer to 'F2 backstage operation' contents in the wireless keyboard operation.

Note1: The deviation of MC will increase if the total length is not correct. You need to select the correct total length to decrease the deviation. Use this function to change the displayed total length when the push cable is cut off for more than 3 meters.

Note 2: Turn on the system before pulling out the push cable from the cable reel. It can decrease the deviation of the MC.

【WIRELESS KEYBOARD OPERATION】

The keyboard text writer is used to type characters with the wireless keyboard and display on screen. The characters can be displayed in recorded video or captured photo. It supports max. 384 characters and quick one key hiding characters.

Text Input

1. Typing characters with wireless keyboard. Using arrow key to move cursor, backspace key to delete ,and enter key to change a new line.
2. Esc key to hide or appear all characters.Ctrl + Del to delete all characters.
3. You can type and edit characters while recording, the typing and editing will be recorded in the video files.
4. The typed characters will be stored in memory.

Backstage Operation

You can press "F1" or "F2" key within 5 seconds after DVR monitor starts to enter F1 or F2 backstage operation.

1. The first line is reserved for user to type company name, name of operator, phone number etc., and these contents won't be hid by pushing ESC button. You can edit the contents by using F1 key, and press Enter key to save and exit.
2. Please refer to meter counter operation prior to this operation. Using F2 background key to select the unit of length or the total length of push cable (this is designed in case the total length of push cable is changed). When the "L=" flashes, press up or down arrow key to select the unit of length, or select the correct total length. Press enter key to save and exit.

[PUSH CABLE AND CAMERA OPERATION]

At the job site

1. Always wear rubber gloves to operate the camera for health and safety reasons. Properly positioning the cable reel will save time and strength to push out and in the cable, and minimize the rate of equipment damage.
   • When pushing, the end of your stroke should be as close to the entry as possible. Standing too far back with an excess of cable between your hands and the entry may cause the cable to fold on itself outside the entry and damage the cable.
   • Try to keep the push cable away from sharp edge of a pipe entry because this may cause damage. If the camera does not seem to go any farther, DO NOT FORCE TO PUSH THE CAMERA! Try another entry if possible.

NOTE! Hands should be close to the line opening. DONOT catch the cable on the edge of an entry and continue to push.

2. Always try to run water down the pipe under going inspection. This will keep the system much cleaner, and allow you to push noticeably farther with less friction. If the water is preventing you from seeing an area of importance, temporarily turn it off.
3. When push the push cable through the pipeline by steady and slowly, a short distance entry per time, keeps the hands at the entrance, so that can control the push cable and prevent it stuck, bent or scratch.
4. When inspecting a pipe, most of the time a slow steady push through the system works the best. At changes in direction such as P-traps, Tee's, Y's, Elbows, etc. It is usually necessary to give a little extra push in the bends. Back the camera head approximately 8" (20cm) from the bend, if necessary, and give it a quick push, "popping" the camera through a turn, using the least amount of force required. Try to be as gentle as possible, and do not hammer or snap the camera head through corners. After some practice, you may learn that the best way to inspect a section of pipe is to push the camera through quickly. Then draw the camera back home slowly and evenly.
5. Make sure the sapphire window is clean prior to entry. Some users claim that a slight film of detergent on the lens minimizes the possibility of grease sticking to the port. If necessary, take advantage of any standing water in the pipe to wash the front of the camera by jiggling it in the water.
6. When you place the camera head into the pipe remember, as the materials of pipe vary, it will be necessary to adjust the lighting settings to maximize picture quality.
7. The system can travel through multiple 45 and 90 degree bends and wyes. Do not, however, try to force it through a P-trap or tee if there is a large amount of resistance.

NOTE! Do not try to use the camera head to clear obstructions. This System is a diagnostic tool, not a drain cleaner. Using the camera head to clear obstructions could damage the camera head or cause it to be caught in the obstruction.
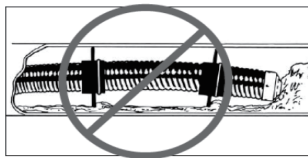

Figure 19.Improper operation

8. Do not attempt to remove or stores push cable on the reel solely by turning the reel itse if. You can manually push or pull cable from the reel and wind or unwind it.
9. If the camera sits in a pipe, or an enclosed environment, heat will build-up. This may lead to the camera head overheating which will cause fuzzy lines to appear on the monitor. In the event, this happens, turn off the system, remove the camera from the pipe (or enclosed environment) and let the camera head cool for 10 to 15 minutes. Running water into the line will also help cool the camera head. Always use the minimum illumination required to maximize picture quality and to avoid excessive heat build-up.

NOTE! The camera head can get HOT! When finished with your inspection, or if taking a prolonged break in the middle of the inspection, turn off the system.

Retrieving the push cable

1. Once the inspection has been completed, pull the push cable back with slow, steady force. Do not force the push cable or exert excessive force. This could damage the camera or push cable. The push cable may get hung up while being retrieved, and may need to be manipulated as did during insertion.
2. While take back the push cable, running water can be used to flush down the push cable. After recycling, you can wipe the push cable with a towel.

Note! NEVER USE SOLVENTS to clean any part of the system. Substances like acetone and other harsh chemicals can cause cracking of the camera ring, which could affect waterproofing.

3. Storing the push cable into the cable reel. One hand holds the push cable, the other hand close to the cable wheel. Slowly and gently push the push cable slide via the hook of the handle, cable reel will rotate and store the push cable inside.

Note! The hands should be close to the cable wheel when storing the push cable. Push the push cable a small piece every try. Push a long distance can cause the push cable bend or broken.

[BATTERY SAFETY AND USING GUIDE]

Using safety

Read the following battery precautions before charger, to reduce the risk of electrical shock.

1. Recharge batteries with accessory charging units.
2. Check the power units every time before using the equipment, be sure no problem, use of unauthorized parts may result in electrical shock, fire and/or serious personal injury or damage other instruments and system.
3. Never connects the car charger to any 24 volt cigarette lighter slot. It will harm the battery and DVR.
4. Do not short circuit, it may cause fire, electrical shock.
5. Do not charge the battery under rain or wet conditions. Water entering the charger will increase the risk of electrical shock.
6. If the charger and battery are damaged, do not use or stop to charge. It may cause electrical shock.
7. Don't disassemble the case, only qualified repair person can repair and maintenance.
8. Properly dispose of the battery. Exposure to high temperatures can cause the battery to explode. So do not dispose of in a fire. Some countries have regulations concerning battery disposal. Please follow all applicable regulations.
9. Do not touch anything which out from battery, which would burn or damage the skin, once touches please flush with water. If in eyes, immediately get medical help fast.

Using Guide

Follow the steps as below to reduce the injury of the electric shock.

1. Power indicator LED will be red during charging, will be turned to green when charged fully. If battery empty for a long term, it will pre-charge the battery automatically in 10 minutes, and LED will be blinking in red.
2. It needs about 8 hours to charge the battery fully. The battery can charge online, charging and supplying of work will not increase charging times.
3. User can use a power adaptor or car charger to charge the battery. If no use in a long term, take a recharge per 6 month, to ensure the battery in normal working status.

[OTHERS]

Troubleshooting

Problem	Probable fault location	Solution
No image	Cable connection faulty or loosely	Check cable connection, clean and reconnect if necessary
	Camera connector soiled	Clean the camera connector
	Wrong SD memory card	Turu off power and replace SD card
	Wrong setting	Enter the setup menu and select reset
DVR Can not boot	No power	Recharge
	Transient short circuit in the cable cause the battery short circuit protection	Recharge the DVR more than 2 seconds with adaptor or car-charger to activate the battery
The deviation of MC more than 1%	select the wrong total length	Re-select the correct total length. You can press F2 key when the machine boot within 5 sec to enter background to select it
	Pull out cable more than 3 meters before turning on the system	Turn on the system before pulling out the push cable from the cable reel
Can not input Characters	The wireless keyboard low battery	Chang battery
	Wireless Keyboard or Receiver fault	Check the Keyboard Receiver and the keyboard on a PC
DVR charging indicator lights up green and cannot be charged	The battery temperature exceeds the range of -5~+48℃	Put the product under normal temperature for 30 minutes to automatically resume charging
When charging, the yellow and green charging indicator lights are not on	Power adapter failure	Replace a power adapter

Camera 1-323 : 38mm camera head with builf-in 512Hz Sonde（Optional）

Type	Item	Parameter
Image	Sensor	1/3" SONY CCD
	TV-Line	480 TV-Line
	View Angle	120°
	Focus Distance	20cm (approx)
	Depth-of-Field	100cm(approx)
	Front Lens	Sapphire
Transmitter	Frequency	512Hz
	Transmit Mode	Constant
	Transmission Distance	6 meters open area (max)
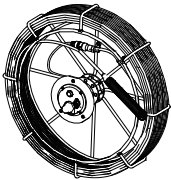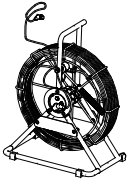
Figure 20.Camera 1-323

No.	Part Number	Part Name	Specifications	Picture
			Part Number List	
1	1-312	Camera Head	Sony CCD 480TVL, Φ38×81mm, 120° View Angle Self-Leveling	
2	1-323	Camera Head	Sony CCD 480TVL Φ38×81mm, 120° View Angle Self-Leveling With 512Hz Transmitter	
3	8-934	Roller Skid	72mm Roller Skid	
4	8-945	Roller Skid	120mm Roller Skid	
5	5-623	DVR	7-Inch Video Recorder, Built-In Battery	
6	2-312	Adaptor	DC 12V 1. 5A Adaptor	
7	2-323	Car Charger	DC 12V 2A Car Charger	
8	3-412	Remote Control	13 Key DVR Remote Control	
9	9-423	Bracket	DVR Bracket	
10	4-601	Cable	2 meters long Spring cable with 6Pin Aviation socket	
11	A38001	Repair accessories	Cable front end maintenance accessories	
12	A32001	Bracket	Tool box bracket	

No.	Part Number	Part Name	Specifications	Picture
		Part Number List		
13	R3840U	Cable Wheel	Φ6.8mm cable. push rod and keyboard text writer unit components Cable length: 40/50/60m(optional)	
14	R3850U			
15	R3860U			
16	M3840U	Cable wheel and frame	Include frame, coil, cable, push rod and keyboard text writer unit components Cable length: 40/50/60m(optional)	
17	M3850U			
18	M3860U			
19	M3240U	Cable wheel and frame	Include frame, coil, cable, push rod and keyboard text writer unit components Cable length: 40/50/60m(optional)	
20	M3250U			
21	M3260U			
22	A18001	Toolbox unit	Include DVR panel , control panel , wireless keyboard , remote control, adapter, car charger, 5mm screwdriver	
23	A18009	Cable	2 meters long Spring cable with 6Pin Aviation socket	
24	K7924K	Wireless keyboard	Wireless keyboard and receiver	
25	8-956	POM Skid	134mm POM Skid	
26	8-967	POM Skid	78mm POM Skid	
27	8-978	ball skid	60mm POM ball back support	
28	8-989	Lock Sleeve	POM Skid Lock Sleeve	