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.

【 GENERAL SAFETY RULES 】

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 100mm-400mm.

KNOW YOUR TOOL

The pipe inspection camera system includes the following four main parts: camera head, push cable, meter counter device and LCD monitor.

The camera includes 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
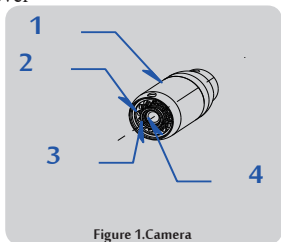3. Isolation ring
4. Sapphire lens cover

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
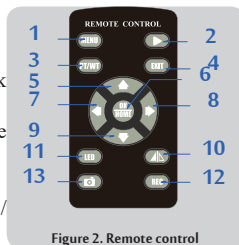12. REC: Start/Stop Recording
13. Photo: Take Photo

Figure 2. Remote control

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. USB 2.0 To PC
15. SD card slot
16. Mirror: mirror and flip image
17. UP: select up/previous item
18. PT/WT: reserve function
19. Color TFT LCD
20. Sun visor
21. Aviation cable video head
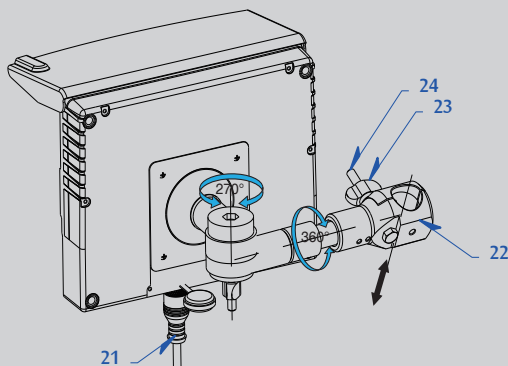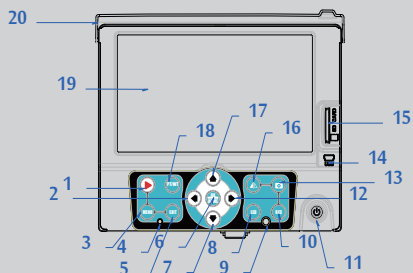22. Wheel clip
23. Wing nuts
24. Heavy hex bolts

Figure 3.DVR

[DESCRIPTION SPECIFICATIONS AND STANDARD EQUIPMENT]

SPECIFICATIONS

	ITEM	PARAMETER
General	Operating Temperature	-10°~50°/+14°~+122°
	Operating Humidity	30%RH~90%RH
	Storage Temperature	-20°~60°/+4°~+140°
	Power adapter	Input:110VAC~240V AC, Output:12V DC 1500mA
	MEAS.	78.5×34.0×89.5cm (LxWxH)
	Weight	27Kg(Approx)
Camera	Sensor	1/3" Sony CCD
	TV-Line	480 TV-Line
	View Angle	120°
	transmitter	512Hz Built-in (Selectable)
	Self leveling	Built-in
	Focus Distance	20cm (approx)
	Depth of field	100cm(approx)
	Camera Size	↻ 38mm×81mm（Main body）
	Camera Length	318mm
	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 , NTSC 720×488 30FPS 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 Output	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 12V input
	Current Consume	700mA Max
	Battery Capacity	7.4V 4400mAh Li-ion Battery
	Life Time	6 Hour
	Charge Time	8 Hour
Cable Wheel	Cable Diameter	↻ 9mm
	Cable Length	60/80/100/120meter (Selectable)
	Meter Counter	Built-in

Standard configuration

Tools kit

P1. Screwdriver
P2. Operation manual
P3. Bolts and nuts (4x)
P4. Inner hexagon spanner
P5. 72 Roller Skid (for pipe diameter 4″-5″)
P6. Car charger
P7. Text writer
P8. Power adapter
P9. 120 universal Skid (for pipe diameter 5 ″- 12″)
P10. Hexagon spanner
P11. Remote control

Machine

M1. Wheel
M2. Frame
M3. Coil and push rod
M4. DVR and bracket
M5. Meter counter device
M6. Guide spring
M7. Camera
M8. Handle

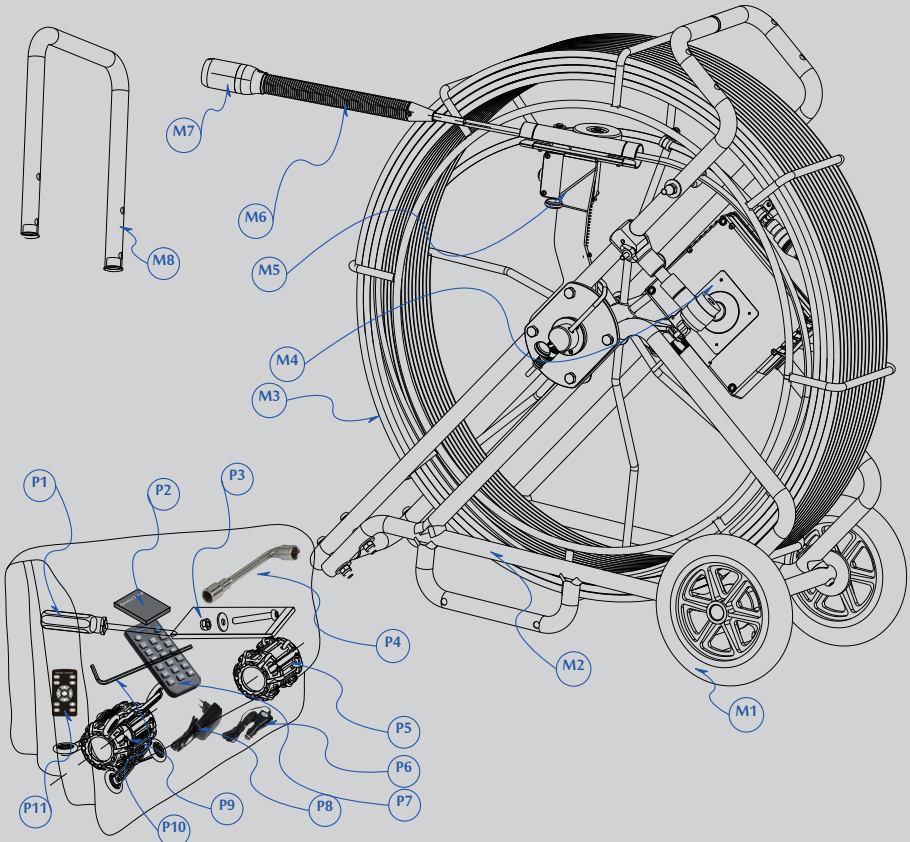**Figure 4. Standard configuration**

【 INSTALLATION 】

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

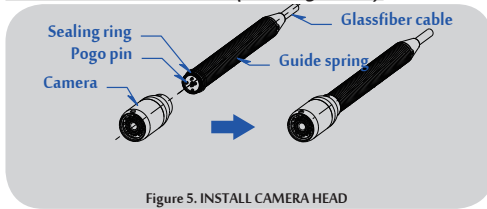## 1. Install Camera Head (See Figure 5)

Figure 5. INSTALL CAMERA HEAD

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.

2. Meter Counter Device (See Figure 6)

Unlock the adjustable screw. Turn the guide bushing clockwise rotation until the gap alignment of the open slot in guide shaft. Put the fiberglass cable in the guide shaft along the open slot. Then turn the guide bushing negative rotation to the Max position, locking the adjustable screw.

Figure 6. Meter counter device

Pull and push the fiberglass cable to confirm knurled wheel will not slip.
Press the reset button to reset meter counter, in order to recount.

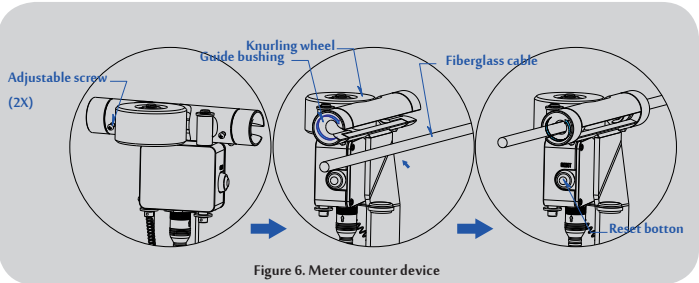## 3. Install Skid

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.
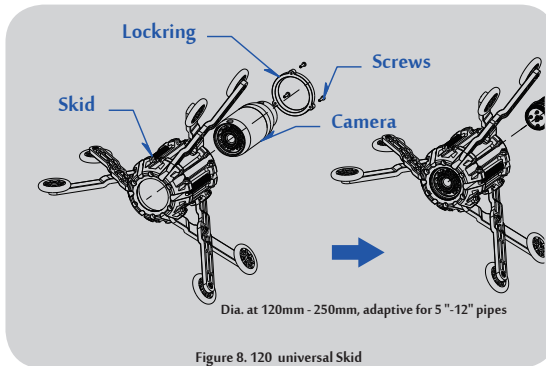There are two kinds of roller skids:

Dia. at 120mm - 250mm, adaptive for 5 "-12" pipes

Figure 8. 120 universal Skid
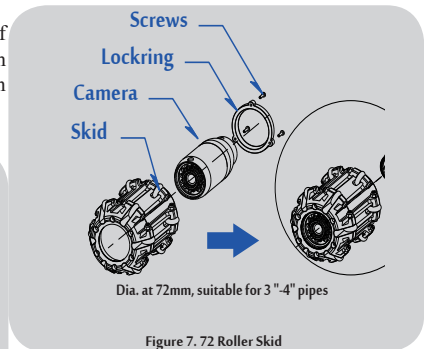

Dia. at 72mm, suitable for 3 "-4" pipes

Figure 7. 72 Roller Skid

1) 72 Roller Skid (dia. at 72mm, suitable for 4″-5″pipes) .(See Figure 7)
2) 120 universal Skid (dia. at 120mm - 250mm, adaptive for 5 "-12" pipes) . (See Figure 8)
Please choose an appropriate skid according to the size of the pipe. Put the camera into the skid, press and lock the lockring properly.

4. Install Handle (See Figure 9)

This product includes an extension handle for people with different height to operate it.
Take out the handle and bolt pack from tool bag, align the four holes in the handle frame, fit with bolts, washers, and finally tighten the whole hexagon lock-nuts.
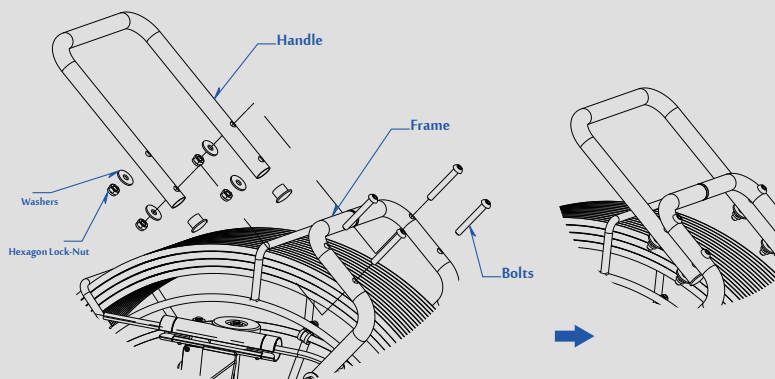
Handle
Frame
Washers
Hexagon Lock-Nut
Bolts

Figure 9. Install handle

5. Install The Wheel Assembly (See Figure 10)

Take out the wheel assembly from the package, unscrew the nuts and washers, fit the bolt into wheel hole and finally tighten the Hexagon Lock-Nuts.
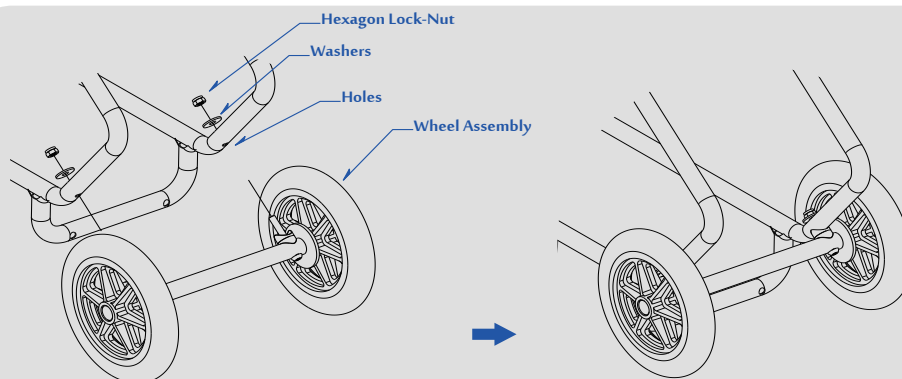

Hexagon Lock-Nut
Washers
Holes
Wheel Assembly

Figure 10.Install the wheel assembly

〔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
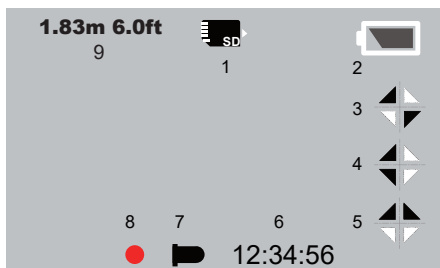8. Record
9. Meter Counter (optional function)

1.83m 6.0ft
9
1   SD
2
3
4
5
8 7   6
12:34:56

Figure 11. Screen icon Definition

[FUNCTION GUIDE]

1. Live video

Press ⏻ to turn on/off DVR to enter the live video mode, then press ▶ to enter playback mode.

Press (REC) to start/stop recording.

Press ◢ to mirror or/and reverse the image.

Press (LED) adjust the brightness of camera LEDs.

Press 📷 to take a picture.

2. Video Option

Press (MENU) to enter the video option menu. Press ▲ and ▼ to select items that you need, press (OK HOME) to confirm the selection. Press ▲ or ▼ to change the value. Press (OK HOME) to save the setting. Press (EXIT) to exit video option and save.

- 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.

3. Playback

Press ▶ the button to enter the playback, 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 ▲ to preview the previous file. Press ▼ to preview the next 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.
- LCD: LCD brightness.

4. Playing Movie

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

5. SETUP

Press (MENU) to enter the preferences of Record/Playback. Press ▶ enters Setup menu.
The following items are in the setup menu.

- Format: format SD card.
- LCD: LCD brightness.
- 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.

【 USER MANUAL 】

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.**
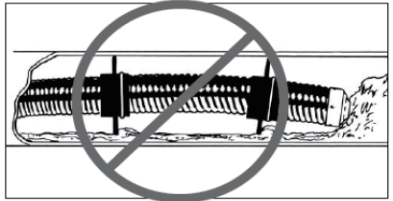

Figure 12. Improper operation

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. 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.

> **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 using the battery and charger, to reduce the risk of electrical shock.
1. Recharge batteries with accessory charging units.
2. Check the power units and battery 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.

Tips
User can use a power adaptor or car charger to charge the battery. Also can directly supply the system without battery.
The power indicator LED will be red during charging, will be turned to green when charged fully.
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
Meter is not accurate	Knurled wheel slip	Fit glassfiber cable into the guide solt and hook.
	not set to zero	Press reset button to set zero.
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.

FCC Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation. Any changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the device.

CE

This product complies with standards including Low Voltage Device Directive 73/23/EEC;

EMC

Directive 89/336/EEC. It passed the subject tests by the authority concerned and is authorized to bear CE mark.

KEY FEATURE

1. Character key
• 26 English letters.
• 10 Arabic numerals.
• 13 symbols.

Figure 17.   Text Writer

2. Function key
⏎ Enter key, confirm typing.
🔵 Del key, delete character.
➡ Key, move the cursor to left.
⬅ Key, move the cursor to right.
⬆ Shift key, switch English letters and Arabic numerals.
🔲 Caps Lock key, switch capital letters and small letters.

TYPE OPERATION
1. Turn on the screen.
2. Make the Text Writer point to screen then press character keys.
3. Press the same key again to select letters circularly. No operation or press other keys in 2 Seconds to confirm current characters.
4. Press REC key on DVR to record the Video with characters.
5. You can type and edit characters while recording, the typing and editing will be recorded in the video also.

Notes: Reboot the DVR will lose all characters on screen. The characters on screen cannot be recorded on photos.

Optional Part List

No.	Part Number	Part Name	Specifications	Picture
1	8-956	Castor Skid	POM ⌀ 134x83.9 30mm Wheel (Optional)	
2	8-967	POM Skid	POM ⌀ 78x83.9 (Optional)	
3	8-978	Ball Support	POM S⌀60x53.5 (Optional)	
4	8-989	Lock Sleeve	POM ⌀54.6x38(Optional)	
5	9-012	Maintenance	The parts for fiberglass Connector (15pcs)	
6	4-602	Cable	Cable with 6Pin aviation plug and 4Pin aviation plug. 2.1 meter long. Use to connect panel(7-823) and Simple version Equipment(6-801).	
7	1-323	Camera Head	Sony CCD 480TVL Φ38×81mm, 120° View Angle Self-Leveling With 512Hz Transmitter	

Part Number List

No.	Part Number	Part Name	Specifications	Picture
1	1-312	Camera Head	Sony CCD 480TVL, Φ38×81mm, 120° View Angle Self-Leveling	
2	2-312	Adaptor	DC 12V 1.5A Adaptor	
3	2-323	Car Charger	DC 12V 2A Car Charger	
4	3-412	Remote Control	13 Key Remote Control	
5	3-423	Text Writer	20Key Text Writer	
6	5-623	DVR	7-Inch Video Recorder, 14Key Built-In Battery With Aviation Socket	
7	8-934	72 Roller Skid	Suitable For 4″-5″ pipes	
8	8-945	120 Universal Skid	Suitable For 5″-12″Pipes	
9	9-412	Handle	¢ 22×281×242	
10	6-801	Simple version Equipment	A complete set of Equipment without DVR(5-623) and Bracket(9-423). Provide one Cable(4-602) to connect other panel.	
11	4-601	Cable	Spiral cable with 6Pin aviation plug. 71cm long. Use to connect DVR(5-623) and wheel.	
12	9-423	Bracket	Standard	