



Pipe Inspection Robot

Model: S150A

User Manual

Before using this product, please read the user manual carefully and keep it properly for future reference.

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Please read the product, environmental, and safety symbols in this manual carefully before using this product. Misinterpretation or improper operation may result in electric shock, fire, or personal injury to others.

1. Product, environment, and safety signs and symbols

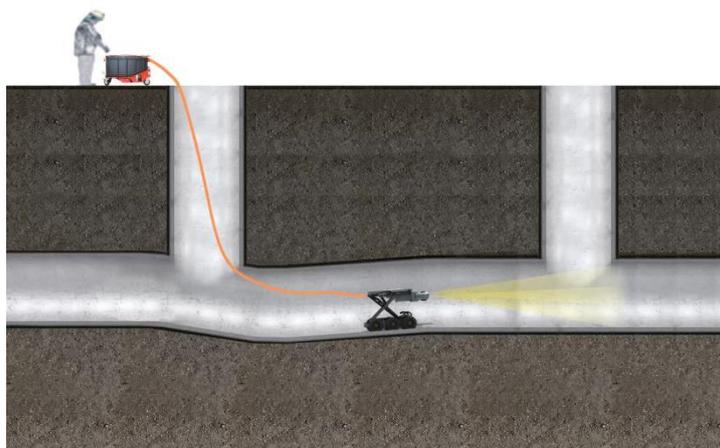
Product Symbols	
	<p>Caution: The charger should be protected from rain and is suitable for indoor use. Before use, keep it away from children's play areas as much as possible. Also, ensure that the charger is compatible with the product's battery. When the battery is fully charged, please promptly unplug the charger to avoid damaging it.</p>
	<p>Caution: Power adapter, danger of electric shock, waterproof attention required! The power adapter must only be connected when the generator's output voltage stabilizes at 220V. Keep it away from children's play areas and sources of flammable or explosive heat.</p>
	<p>Caution: When charging with low battery, be careful not to overcharge or over-discharge, as both can damage the reversibility of the chemical substances inside the battery, leading to a potential short circuit and severely affecting the battery's lifespan. To prevent leakage or short-circuiting, place the device in a dry and ventilated area while charging or during idle periods.</p>
	<p>Caution: When using the generator for power supply, please strictly follow the operation procedures of the generator and ensure the use of the voltage stabilizing adapter provided by our company.</p>
	<p>Caution: Helium gas cylinders should be stored in a cool, dry place, away from heat sources, flammable or explosive products, and out of reach of children. Before use, please refer to the safety operation procedures manual and pay attention to the safety symbols on the helium gas cylinder. Non-laboratory personnel or users are strictly prohibited from handling the gas cylinder and related valves.</p>
Environmental Symbols	
	<p>Note that the charging cable, power adapter, battery, as well as individual tools, equipment, or components such as the camera and main body, specifically mentioned as part of the complete set of products, should be waterproofed to prevent damage caused by moisture or water ingress.</p>
	<p>The transportation packaging is susceptible to pressure, and the correct position is vertically upright. Inside, there are items or equipment that should not be placed upside down.</p>

	The packaging is fragile. Please handle with care during the process of moving and unpacking, avoiding excessive pressure that may cause crushing, deformation, or other damages to LCD screens, metal casings, and other accessories or materials.
	The transportation packaging is vulnerable to rain. Please take precautions to prevent rainwater from causing short circuits and damaging the internal electronic components of the machine or equipment, which may result in the malfunctioning of the core mechanism.
	There are limitations and restrictions on the stacking and placement of items.
	The transportation packaging should not be rolled or tossed.
Safety Symbol	
	When assembling or connecting the machine equipment, be cautious of tools, accessories, or heavy objects falling and causing foot injuries.
	When operating machinery and equipment to open manhole covers of sewer pipes in residential areas, industrial areas, or under highways, pay attention to safety and be cautious of falling into the sewer pipes to prevent accidents.
	Safety warning symbols: They indicate warnings when there is a potential threat to personal injury. It is necessary to follow the guidance of safety information during work to avoid potential accidents and even signals that may pose a risk of death.
	Electric shock warning symbol: It indicates that before connecting the product to the power supply, you must check for damaged or deformed wiring and sockets, and verify that the wiring methods are correct. When the product is powered on, it is also important to pay attention to waterproofing and prevent electric leakage to avoid the risk of electric shock to individuals.
	Danger warning symbol: It indicates environments where there are hazardous conditions that, if not avoided, can result in death or serious injury accidents.
	Warning symbol: It indicates hazardous conditions that, if not avoided, may also result in death or serious injury accidents.
	Caution symbol: It indicates hazardous conditions that, if not avoided, may result in minor or moderate injury accidents.
	Notice symbol: It indicates safety information related to protecting property. This symbol signifies that users must carefully read the operating manual before using the tool, as the manual provides important safety precautions and proper usage instructions.
	This symbol indicates the requirement of always wearing safety guards, safety goggles, and focusing attention when using operating tools.
	This symbol indicates the need to stay away from high-voltage electricity, cables, and utility poles as much as possible when working in rainy conditions. It serves as a warning for the risk of electric shock.

2. Product Description

2.1 Applications

CCTV Pipe robot crawler system is mainly used for rapid inspection and diagnosis inside municipal drainage pipes. Equipped with a powerful light source and a portable control system, it is suitable for field and mobile workplaces. The transmission cable can be equipped according to the user's needs, and currently supports a maximum length of 500 meters (fiber optic communication cable). The components of the robot are waterproof, but the actual operation depends on the situation.



2.2 Key Specifications

Model		S150A
Crawler SD9150A1	Sewer Main Range	DN150mm-600mm
	Operating Voltage	48V
	Max Power Output	180W
	Pulling Force	25kg
	Travel Speed	0-33m/min
	Drive	Six Wheel Drive
	Motor	2*60W
	Slope	35°
	Dimensions	680mm(L)*130mm(W)*125mm(H) (Includes 70mm wheel set and minimum height of lifting platform)
	Weight	12.08kg(including 70mm wheel set and lifting platform)

	Operating Temperature	-20°C-55°C
	Protection Level	IP68
Front View Camera SD1090F2	Image Sensor	1/2.8" Progressive Scan CMOS
	Resolution	1920*1080
	Optical Zoom	10x
	Focus Distance	4.7-47mm
	Focus	Autofocus
	Min. Illumination	Color: 0.005Lux @ (F1.6, AGC ON) Black & White: 0.001Lux @ (F1.6, AGC ON)
	Wide Dynamic Range	120dB
	Illumination	High Brightness LED, 8 * 2W
	Night Vision	Smart 2D/3D Noise Reduction Algorithm for Clear Night Vision
	Rotation	360°axial, 270°vertical
	Dimensions	φ 99mm, 162.5mm (L)
	Weight	1.6kg
	Operating Temperature	-10°C-60°C; less than 90% RH
	Protection Level	IP68
	Rear Camera	Image Sensor
Resolution		1920*1080
Min. Illumination		0.1LUX
Illumination		Highlight the LED, 2 * 2W
Wide Dynamic		Support for digital-width dynamics
Operating Temperature		-20°C-55°C
Protection Level		IP68
(Optional) Wireless Operating Box SD8402A1	Battery	Lithium Battery 600 mAh
	Dimensions	240mm(L)*125mm(W)*84mm(H)
	Weight	1.3kg
	Operating Temperature	-20°C-55°C
	Protection Level	IP65
Cable Reel SD6150A1	Cable	φ 8.3mm, 120m(L)
	Drive	Automatic/Manual Winding and Unwinding
	Dimensions	564mm(L)*310mm(W)*538mm(H) (with wheels)
	Weight	45kg
	Operating Temperature	-20°C-55°C
	Protection Level	IP54

(Optional) Cable Reel SD6300A1	Cable Length	φ 8.3mm, 150m-300m(L)
	Drive	Automatic/Manual Winding and Unwinding
	Dimensions	564mm(L)*564(W)*538mm(H) (with wheels)
	Weight	55kg
	Operating Temperature	-20°C-55°C
	Protection Level	IP54
Control Unit SD7110A1	Screen Size	11" Touchscreen
	OS	HarmonyOS 2.0
	System Storage	6G
	Storage	128G Optional (Support for extension 512G)
	Processor	The Qualcomm Snapdragon 865
	Resolution	2560x1600
	Software	PipeClimber
	Battery	Lithium battery: 7250 mAh
	Weight	498g
(Optional) 133 Control Unit SD7133B1	Screen Size	13.3" Touchscreen Controller
	Resolution	1920*1080
	Video Format	H.264
	Storage	250G SSD
	OS	Win10, 64bit
	Software	SingaController
	Dimensions	468mm(L)*288mm(W)*79.4mm(H)
	Weight (with box)	9.5kg
	Operating Temperature	0°C-50°C
	Protection Level	IP54

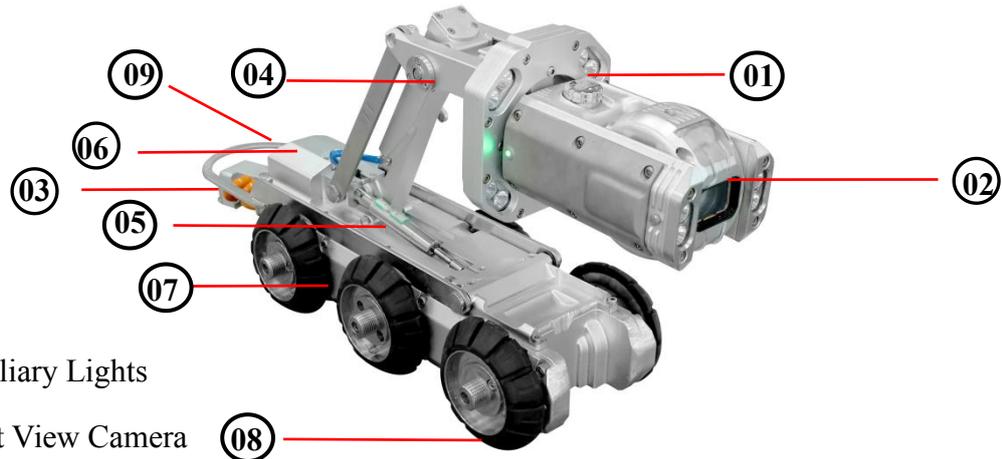
3. Key Components and Functions

S150A mainly consists of a controller, a cable reel, a crawler, a remote control box, a camera head, and a power supply (adapter, lithium ion battery).

By operating the main controller, the robot can walk inside the pipeline, and the collected images inside the pipeline can be transmitted in real-time to the main controller for real-time monitoring through cables. The main controller is equipped with a 128G (expandable capacity) SSD for images/videos storage.

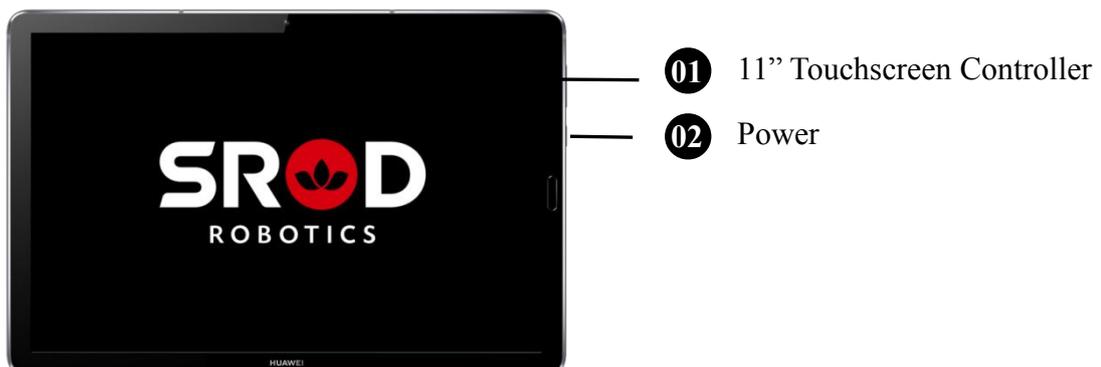
When monitoring pipeline images, if any damage or blockage is detected in the pipeline, it can be recorded through video or photographs to facilitate maintenance and repair.

3.1 Crawler SD9150A1



- 01 Auxiliary Lights
- 02 Front View Camera
- 03 Cable Port
- 04 Lifting Platform
- 05 Gas Spring
- 06 Rear View Camera
- 07 70mm Wheel Set
- 08 100mm Wheel Set
- 09 Bumper

3.2 Control Unit SD7110A1



3.3(Optional) 133 Control Unit SD7133B1



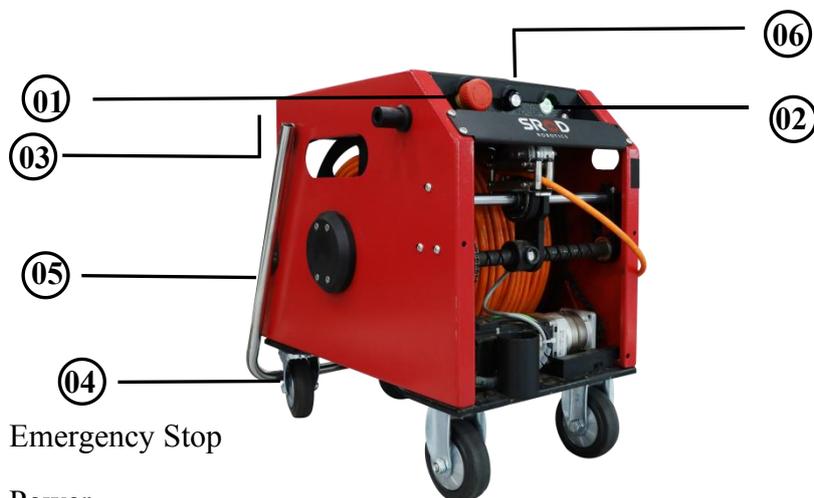
- 01 Switch
- 02 Video
- 03 Microphone
- 04 LAN
- 05 USB
- 06 Antenna
- 07 Cable Port

3.4 Front View Camera SD1090F2



- ① Hemispherical Housing
- ② Integral Zoom Movement
- ③ Main Lights
- ④ Main Body
- ⑤ Valve
- ⑥ Cable Port

3.5 Cable Reel SD6150A1



- ① Emergency Stop
- ② Power
- ③ LAN
- ④ Universal Wheel sets
- ⑤ Handle
- ⑥ Auto Winding

3.6 Power Adapter, Battery and Charger



Power Adapter (Optional)
Input: AC110-240V 50/60Hz
Output: DC48V 7.5A

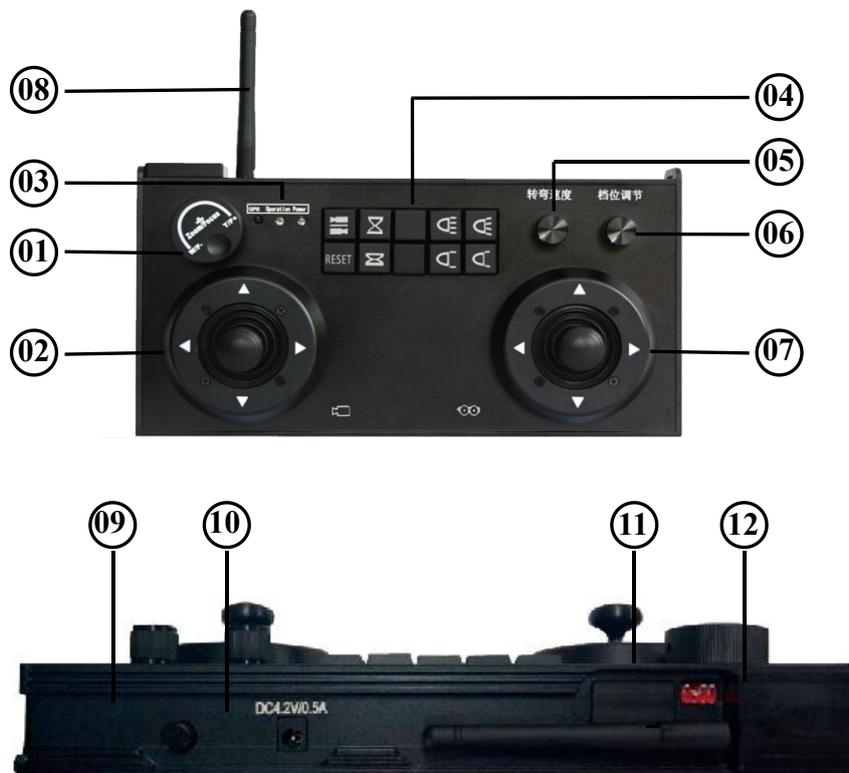


Cable Reel Li-ion Battery
Voltage Output: DC 48V
Capacity: 20Ah



Li-ion Battery Charger
Input: AC220V 50/60HZ
Output: 54.6V 4A

3.7 Remote Control Box



- | | |
|----------------------------------|----------------------------|
| 01 Pushbutton Encoder | 07 Y2 Joystick |
| 02 Y1 Joystick | 08 Antenna |
| 03 Status Indicator Lights | 09 Switch |
| 04 Function Keys | 10 Charging Port 4.2V/0.5A |
| 05 Turning Speed Adjustment Knob | 11 Red DIP Switch |
| 06 Gear Adjustment Knob | 12 GPS |

Pushbutton Encoders

Press to switch: Zoom/ Focus Function
(Default: Zoon Function)

Zoon Function:

Turn Left: Zoom In; Turn Right: Zoom Out

Focus Function:

Turn Left: Focus +; Turn Right: Focus –

Note: Be gentle and adjust the button slowly to avoid it getting stuck.



Y1 Joystick

Up: Camera rotate anticlockwise

Down: Camera rotate clockwise

Left: The hemisphere rotate left

Right: The hemisphere rotate right

Note: Push the Joystick for each direction for at least 1 second to avoid misconduct.



Y2 Joystick

Up: Crawler go forward

Down: Crawler go backward

Left: Crawler turn left

Right: Crawler turn right

Note: Push the Joystick for each direction for at least 1 second to avoid misconduct.



Turning Speed Adjustment Knob

Turn Left: Decrease speed by 130-0

Turn Right: Increase speed by 0-130



Gear Adjustment Knob

Turn Left: Decrease gear by 9-0

Turn Right: Increase gear by 0-9



Status Indicator Lights

GPS: Green Light only
 Green light on: GPS connected
 Green light off: GPS disconnected

OPERATION: Red/Yellow Lights

Yellow light on: When pressing the function button
 Yellow light off: Switch to different function button
 Red light on: Error

Power: Blue/Red

Voltage > 4.5V Blue and Red light on

Voltage \cong 4.1V Blue lights on

Voltage > 3.7V Blue light flashes

Voltage < 3.5V Red light flashes



Function Keys



 Front View/Rear View

 Camera Reset

 Lift Up

 Lower Down

 Retract The Cable

 Main Lights +

 Main Lights -

 Auxiliary Light+

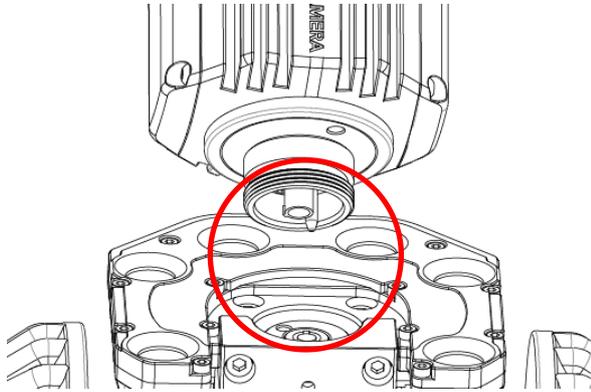
 Auxiliary Light -

4. Product Installation and Operation

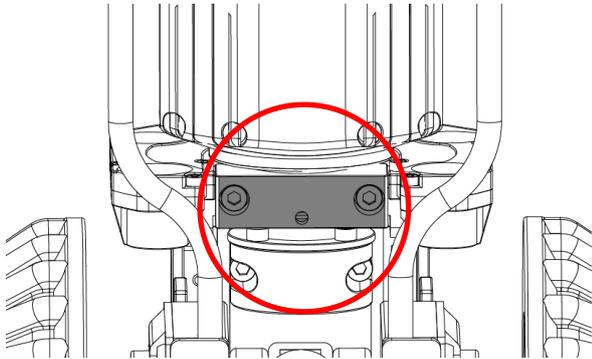
Note: If using the equipment in extremely harsh conditions (such as low temperatures), please preheat the device indoors (by turning it on) for 10-20 minutes before deployment.

4.1 Connect Camera with Crawler

1. Take out the camera and insert the camera's positioning post against the round hole in the body and fix it in place

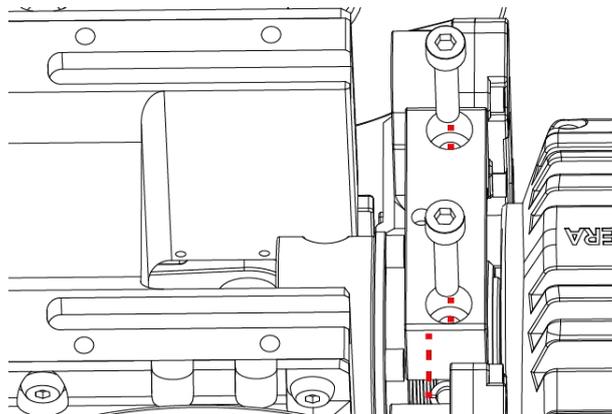


2. Put on two M5 spring pads M5 * 25 socket head cap screws, and then into the fixed clamp block ends, and then use the M5 hexagonal screwdriver to tighten the screws



3. If you want to dismantle the camera you need to dismantle the fixed block at both ends of the M5 * 25 socket head cap screws.

Note: All air must be removed before removing the camera



4.2 Connect Crawler with Cable Reel

1. Align the crawler tail connector with the cable reel connector.

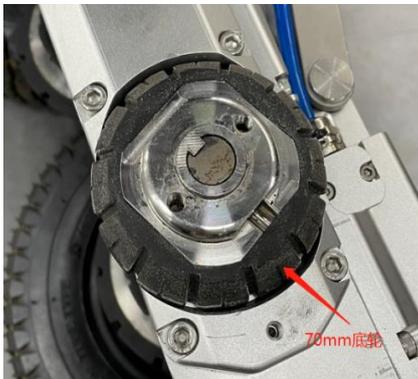


2. Rotate the latch clockwise to lock the cable, and use a special tool to insert it into the hole as shown in the picture to lock the latch.



4.3 Assemble 100mm Wheel Set

1. Insert the 100mm wheel by aligning the concave point on the 100mm wheel with the convex point on the 70mm wheel.



2. Prepare 2 M5 hexagon socket head cap screws and tighten them with a screwdriver.



4.4 Assemble 130mm Wheel Set

1. Insert the 130mm wheel by aligning the concave point on the 130mm wheel with the convex point on the 100mm wheel.



2. Put on the spacer and M20 nut, and tighten the nut with a wrench.



4.5 Assemble 200mm/230mm Wheel Set

1. Insert the 230mm wheel by aligning the concave point on the 230mm wheel with the convex point on the 100mm wheel.
2. Put on the spacer and M20 nut, and tighten the nut with a wrench.



4.6 Connect Cable Reel with Battery

1. Insert the battery connector aligned with the cable reel connector.



2. Turn the knob clockwise to lock the power cord and cable reel.



4.7 Auxiliary Light Assembly Removal and Dust Cover Installation

1. Remove the three screws shown in the figure below.



Use one M4*12 hex socket screw to secure the cover.



2. Cover the auxiliary light connector hole with the dust cover equipped with a sealing ring.



5. Operation for Software (for Control Unit SD7110A1)

1. After connecting the cable reel, crawler and power adapter (or lithium battery), turn on the Power and pull out the Emergency Stop on the cable reel.

2. Turn on the control unit, click Settings, turn on the WLAN, and select the Wi-Fi name of the Wi-Fi Repeater for connection

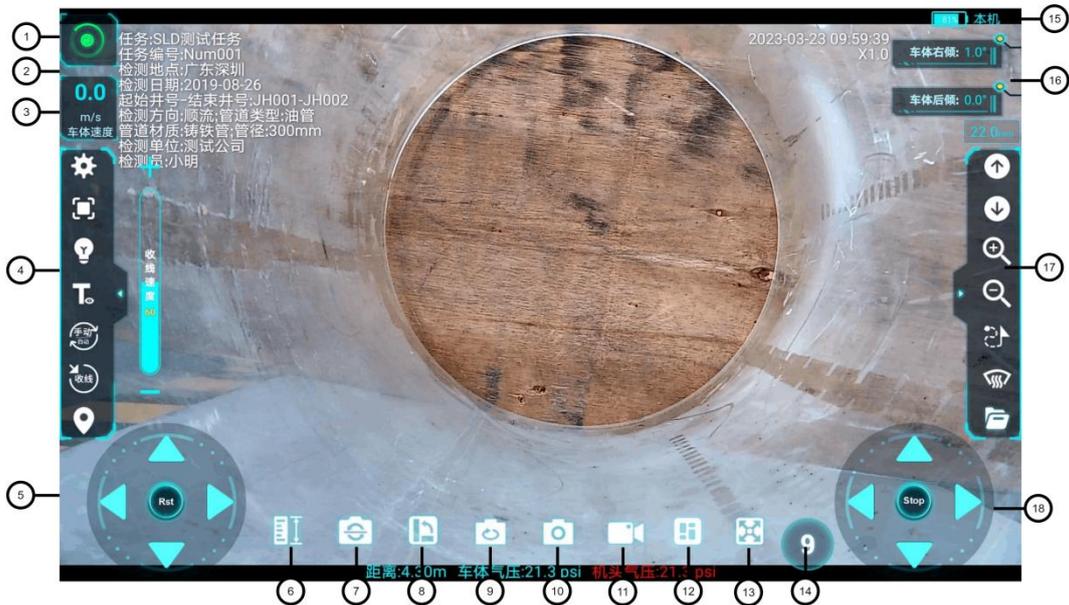
Wi-Fi name: XXXXX (please check the name on the cable reel label); initial password: 12345678

Click pipeclimber  to control the robot.

You can also set Wi-Fi inside the software: Click  and select the Wi-Fi name (please check the name on the cable reel label)



5.1 Introduction of Control Software Interface



- (1) Network Connection Status
- (2) Video Subtitles
- (3) Speed
- (4) Left Function Bar
- (5) Camera Control Keys
- (6) Laser Measurement
- (7) Camera 360° Pan Rotation
- (8) Camera 90° Tilt Rotation
- (9) Rear View

- (10) Snapshot
- (11) Record
- (12) More Functions
- (13) Full Screen
- (14) Speed Adjustment
- (15) Battery
- (16) Crawler info
- (17) Right Function Bar
- (18) Crawler Control Keys

5.2 Software Settings

Barometer

车体气压:21.3 psi 机头气压:21.3 psi

Blue color indicates safe pressure.

Red color indicates the air pressure insides the crawler is too high, with voice prompts.

Inflate

Notes: Need to make sure it is calibrated before inflating (Calibrated by default)
Due to the unstable fluidity of the newly filled gas, it is necessary to wait for stabilization before it can be counted as a normal value.

Meter Counter



Distance: Display the cable length during pipeline inspection.

Zeroing: Used to set the cable reel distance to zero. Click "Zeroing" to reset the cable reel distance (distance) to zero.

Distance Correction: Used to set the initial value distance for the cable reel. Click "Distance Correction" to set the initial value distance for the cable reel.

Crawler Info

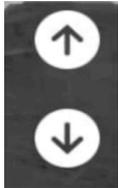
0.0 mm 车体高度 Platform Height: Display the platform height of the crawler.

车体前倾 Front & Rear Inclination: Display the front and rear inclination of the crawler.

车体左倾 Left & Right Inclination: Display the left and right inclination of the crawler.

Note: When the left/right/forward/backward tilt angle of the robot is greater than the alarm value, the font will turn red, and if it is greater than the alarm value when the robot is moving, it will stop moving immediately.

Lifting Platform Control



Long press to lift up the platform.



Long press to lower down the platform.

Auto/Manual Winding/Unwinding Control



Auto/Manual Rewind: short press to rewind the cable as the crawler goes backwards, press again to stop auto rewind.

Rewind: Long press to rewind the cable.

Front View Camera Control Keys

◀ Counterclockwise Rotation: angle range 0 to -360°

▶ Clockwise Rotation: angle range 0 to -360°

- ▲ Turn Left: angle range 0 to 270
- ▼ Turn Right: angle range 0 to -270°



RST: Reset the camera

Main & Auxiliary Rear Light Adjustment



Main Lights: + turn up brightness; - turn down brightness

Auxiliary Lights: + turn up brightness; - turn down brightness



Focus Adjustment

F+/F-: adjust the focus

AF: auto focus

Zoom Adjustment

🔍 Zoom in

🔍 Zoom out



Crawler Control Keys

Up: The crawler moves forward (the cable reel automatically enters the pay-out state). Press and hold for five seconds to enter automatic cruising mode.

Down: The crawler moves straight backward (the cable reel automatically enters the retraction state). Press and hold for five seconds to enter automatic cruising mode.

Left: the crawler intermittently moves backward on the left wheel and forward on the right wheel, thus turning to the left.

Right: the crawler intermittently moves backward on the right wheel and forward on the left wheel, thus turning to the right.

STOP: The crawler and cable reel stop moving.



GPS

Click to turn on GPS, geographic information will display on the screen.



Defogging

Click on the open, open the defogging function, the defogging function lasts for 1 minute, after 1 minute to complete the defogging work, you can also click on the close button to stop manually.

T. Text input



Click to show/hide the subtitles input.

5.3 Software Settings

 Click to calibrate the system.

System Options



System Configuration: Users can set the system configuration options accordingly.

File Save Path: the path where user's photo/video files are saved

Language: Chinese only for now

Meter Unit: Default: Metric Units; Optional: Imperial Units

Inspection Standard: default: "China Test Standard"

Locations

The user can edit the monitoring location, task number, well number, date/time, testing unit, etc., as well as edit the other information in the notes.

Click  to add monitoring locations, collect information, GPS data and other operations and save it in real time.



Parameter Calibration

All parameters of the robot can be calibrated; newly installed software or controllers need to be calibrated before initial calibration (e.g. air pressure, front/back, left/right tilt, meter counting, and platform height with electric lifting function).



Note: how to calibrate:

Measure low value:

1. Adjust the crawler to the lowest position.
2. Click **Low meas** to collect the value for 3-5 seconds.
3. Click **Stop meas**.
4. Click **Edit**.
5. Click **OK**.

Measure high value:

1. Adjust the crawler to the highest position.
2. Click **High meas** to collect the value for 3-5 seconds.
3. Click **Stop meas**.
4. Click **Edit**.

5. Click **OK**.

Note: If you click the value again, you can edit the low value, the input calibration high value, limit value and alarm value.

Image Settings

Users can turn on or off functions like TCP / UDP, screen rotation, FFMPEG video decoding, voice prompts.

The definition of the video, the color of the subtitles, and the font size can be set. If the Pipeline Intelligent Defect Identification is on, the pipeline defects in the shot video will be automatically captured during recording.

When recording the video, the microphone of the tablet will turn on.



User Account

Users can create new users and managed accounts.



Snapshot and Recording

 Snapshot: Click to take a picture.

 编辑图片 Click to edit a photo.

 6S 后跳过 Click to take a new snapshot.



 Click to record a video, and click again to finish; Default format: MP4

 Click to pause recording video.

 Click to stop the recording.

 During recording, click to take a snapshot, select the storage path, defect type, defect description and other functions for editing, and click to save the photo.

 Click to switch to rear view.



Open File

 Click to open the video file (currently .MP4/.AVI format only) and image files (.JPG format only).

The files can be edited, renaming, copy and paste, display photo info, delete, etc.



Video Replay

 Click to Pause / Play.

 Click to take Snapshot.

 Click to remove the video.

 Click to initiate AI Recognition.

1.0X Click to adjust video speed.

缺陷图片 Click to check the defect photo during recording.

简易报告 Generate a report.



Export Files to Other Device

1. Connect to the computer with the USB cable, the tablet page will pop up

"whether to allow access to device data", select yes to access the data.

2. Swipe down the status bar at the top of the screen → USB Connected → Select USB Usage "Device File Management (MTP)" in the pop-up "Allow USB debugging", select OK.

3. Click "this computer", click the internal storage, the need for the file of the export, in the export of video you need to export the corresponding files at the same time (one is a video file, a character file).

4. After the video file is copied into the computer, the MP4 video player is supported, and the video playback characters are displayed with the well number, inspection date, inspection time, ranging, zoom, pipe diameter, inspection location, and custom information.



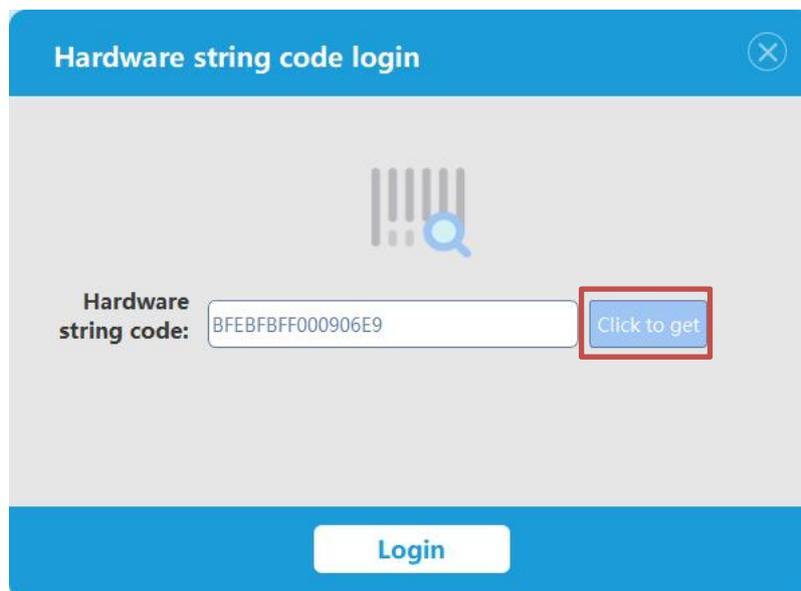
6. Operation for Software (for 133 Controller)

1. After connecting the controller, cable reel, crawler and power adapter/battery, press the power button and pull out the emergency stop on the cable reel.

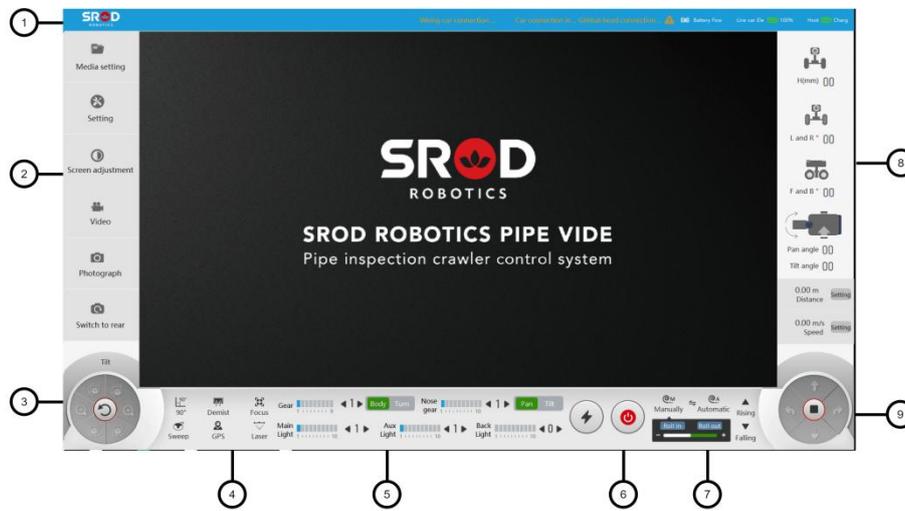
2. turn on the controller, click the pipe inspection software 



To log in with the hardware serial code, first click the [Click to get code] button in the pop-up window to get the hardware serial code of the software. After successfully obtaining the hardware serial code, click the [Login] button to complete the software login via the hardware serial code.



6.1 Interface



1. Notification
2. System Functions
3. Camera Control Keys
4. Camera Function Keys
5. Gear Control Keys
6. Power
7. Cable Reel Control Keys
8. Crawler Information
9. Crawler Control Keys

6.2 Functions

Notification

This area displays the connection status of the car body, alarm, car body power and cable reel power.

Cable Reel Connecting... Crawler Connecting... FV Cam. Connecting...  Battery

As shown in the figure, the connecting status of the cable reel, crawler and camera is displayed on the screen.

The new software and the old version of the software has a certain difference, after entering the main interface, the software automatically begins to connect with cable reel, crawler and camera, without having to manually click to connect.



This area displays the power level of the cable reel and the controller.



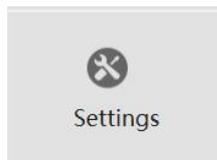
The battery level display will be shown in a numeric percentage style, and when the device has other external power sources it will be shown in a text-in-charging style.

System Functions



Click the [Media Setting] button to open the video recorded or pictures taken by the control software. You can view the video files and picture files in the saved directory of the control software.

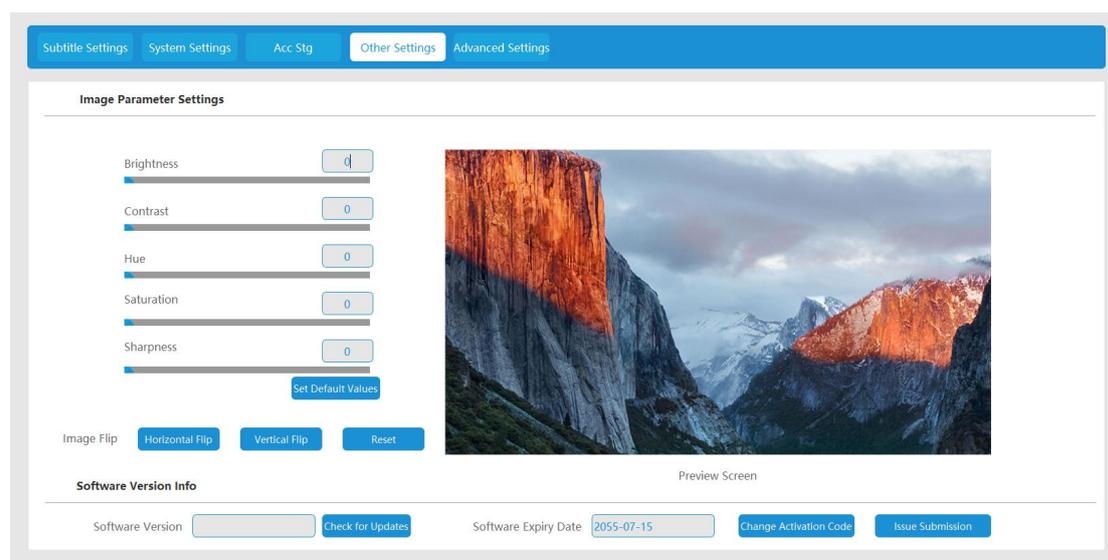
For the description of the media management function, you can check the detailed instruction of the media management function.



Click the [Settings] button to enter the setup interface of the control software, and you can complete the management related to the subtitle setting, system setting, user account setting, etc. of the interface.

For the description of the settings, you can check the detailed instruction of the settings.



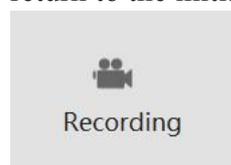


Click the [Screen Adjustment] button to enter the screen setting interface of the control software. In this page users can flexibly adjust the brightness, contrast, color, saturation and sharpness of the video of the PTZ. By adjusting a series of values, you can adjust the screen to your favorite effect.

You can see the preview screen effect after adjustment on the right side of the interface.

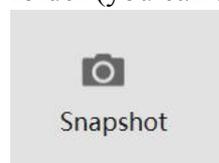


You can also adjust the effect of the video in the main interface through the image flip function, which can be flipped horizontally as well as vertically. If you need to return to the initial state, you can click the [Reset] button to restore the initial state.



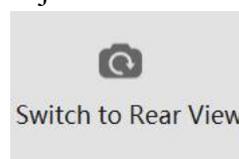
Click the [Recording] button to start recording the video.

Click again to close the recording. The recorded video is saved in the selected folder (you can adjust the storage path of the video file in the settings).



Click the [Snapshot] button to start capturing the image.

The captured image is saved in the selected folder (the storage path can be adjusted in the settings).



Click the [Switch to Rear View] button to switch the video viewpoint from the front view PTZ head to the rear view.

Click again to switch back to the front view.

Camera Control Keys



Counterclockwise Rotation: angle range 0 to -360°

Clockwise Rotation: angle range 0 to -360°

Turn up: angle range 0 to 135°

Turn down: angle range 0 to -135°

Zoom: Zoom in/out

RST: Reset the camera

Camera Function Keys



One-touch 90 degrees: Controls the head to perform a 90-degree movement in elevation. In any position, the head executes a vertical 90-degree action in a horizontal position.

One-touch 360 degrees: Controls the head to execute a clockwise roll 360 degree action. In any position, the head executes a clockwise roll 360 degree action.

Focus:F+/F-: adjust the focus;FA: auto focus

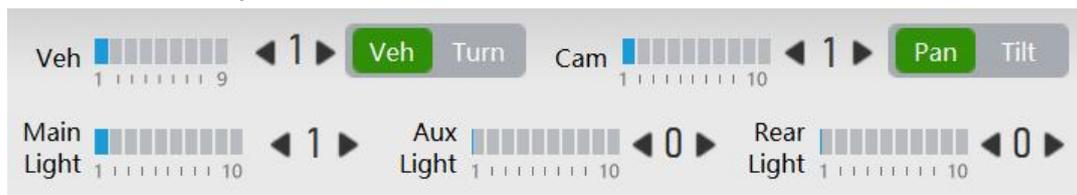
Defogging:Click on the open, open the defogging function, the defogging function lasts for 1 minute, after 1 minute to complete the defogging work, you can also click on the close button to stop manually.

Laser Measurement: Turn on/off the laser width measurement function. (Some models of head may not support this function.)

Positioning: The controller can complete the calibration of the positioning function if there is a GPS module.

Note:133B controller uses its own module, and the 133C controller needs to be connected to the external digital code box, and the positioning can be completed when using the digital code box.

Gear Control Keys



Camera Gear: you can adjust the speed gear of the camera tilt and roll, tilt and roll gear combined control. 1-10 gears, the larger the gear value, the faster the speed.

Default: 1

Veh Gear: you can adjust the speed gear of the crawler. 1-9 gears. the larger the gear value, the faster the speed.

Main light Gear: adjust the main light gear, 0-10 gears, the larger the gear, the higher the brightness.

Auxiliary Light Gear: adjust the auxiliary light gear, 0-10 gears, the larger the gear, the higher the brightness.

Rear Light Gear: adjust the rear view light gear, 0-10 gears, the larger the gear, the higher the brightness.

Power



Power-off/Power-on: by default, the cable reel, crawler and camera is automatically powered on, and clicking again puts them into a power-off state.

Close: Exit the operation control software.

Cable Reel Control Keys



Manual winding and unwinding

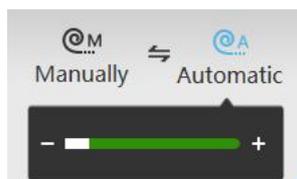


In this mode, clicking the [Winding] button starts the reel winding.

Clicking the [Unwind] button will start the reel to unwind.

The speed of winding can be adjusted by the bar below.

Auto winding and unwinding



In this mode, the cable reel will automatically release the line when the car is moving forward, and the reel will automatically unwind the line when the car is moving backward.

The winding speed can be adjusted by the bar below.

(Some models may not support the auto take-up function)

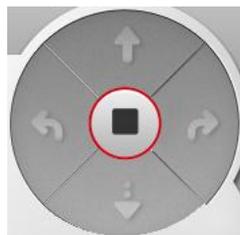
Lifting Platform Control

Lift up: Long press to lift up the platform.

Lower down: Long press to lower down the platform.

(Some models may not support the body lift function)

Crawler Control Keys



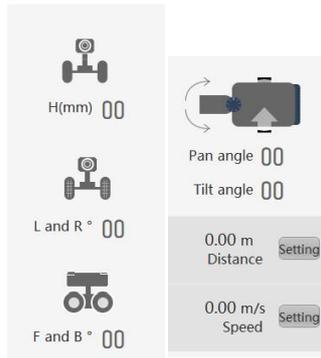
Forward & Backward: Before operation, you can adjust the traveling gear. By default, you need to press and hold the forward/reverse button to start the crawler's movement, and release the button to stop the crawler's movement. During the crawler's traveling process, the crawler's traveling speed and gear can be displayed in real time.

Turning: Before operation, you can adjust the steering gear. To maneuver the crawler to turn left or right, you need to press the steering button for a long time, and release the steering button to stop the steering movement, and the crawler steers in the same place.

Stop: stop the crawler.

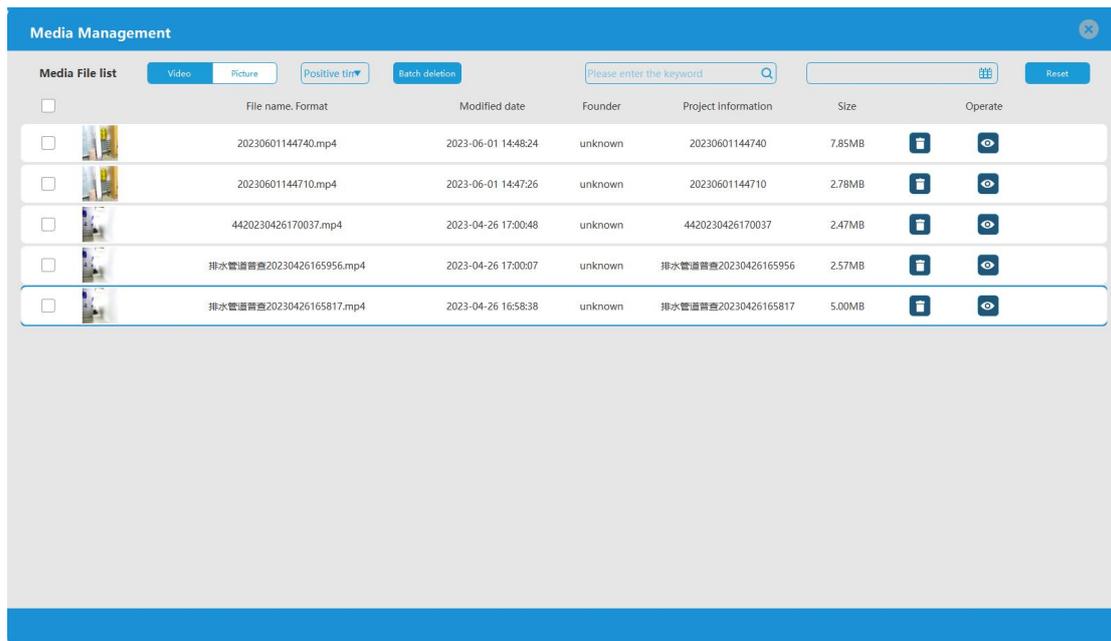
Auto-cruise: when hold down the forward/reverse button for more than 5s to open the auto-cruise function. After turning on the auto-cruise function, the crawler starts to move at a preset fixed speed, and you can manually change the speed gears during the process, and in the auto-cruise state the user can operate the turn, realizing the turn while traveling. If you need to stop the movement, click the stop button.

Crawler Information



- Platform Height: Display the platform height of the crawler.
- Front & Rear Inclination: Display the front and rear inclination of the crawler.
- Left & Right Inclination: Display the left and right inclination of the crawler.
- Camera Angle: Display the pan and tilt angle of the camera.
- Speed: Display the cable speed during pipeline inspection.
- Distance: Display the cable length during pipeline inspection.

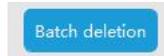
Media Management File Management



Click to check video/photo files.



Click to modify the sorting order of the files in chronological order, reverse chronological order, first alphabetical order of the file name, and reverse alphabetical order of the file name.



Click to select all the files on the page with one key. After selecting the files, you can delete the files. If you delete the files in batches, a check prompt will be displayed to prevent misconducts.



Enter a text box to search for files by file keyword. The search mode adopts fuzzy search, supporting uppercase and lowercase letters, Chinese characters, numbers, and punctuation.

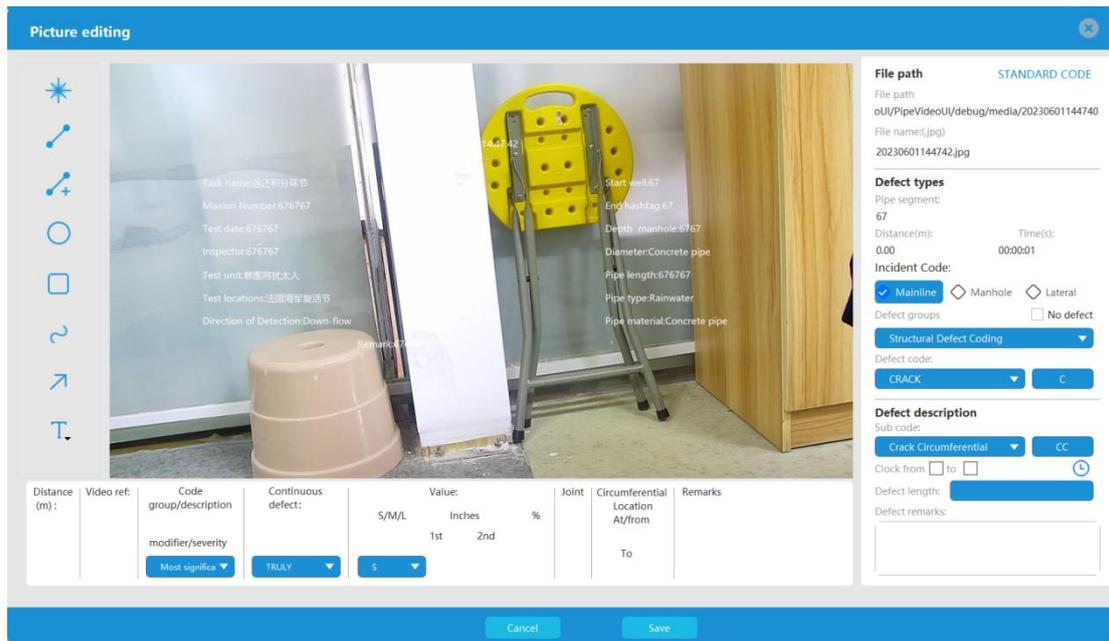


Click to delete videos or photos



View details: Click to view the corresponding picture/video.

Photo Management



File storage path: Click to view the file storage path.

File name: Click to view the file name.

Section number: Click to view/change the section number.

Distance: Click to view or changed the distance within the pipe.

Time: Click to view or changed the inspection time.

Defect type: Click to view/change the defect type.

Defect level: Click to view/change the defect level.

Defect length: Click to view/change the defect length, text annotation includes upper and lower case letters, Chinese characters, numbers, punctuation(Max. 20 characters).

Clock description: Click to view and change the clock description.

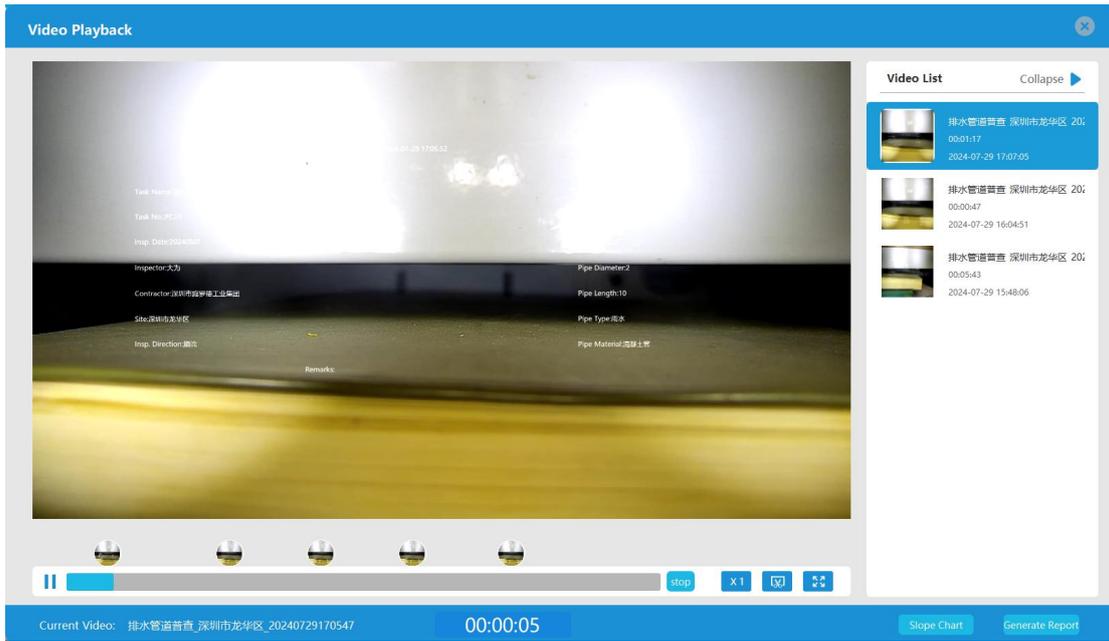
Clock defect indication: The clock orientation indication of the defect point in the pipeline inner section is displayed graphically.

Defect description: Click to view/change the defect description (adaptive according to the defect class level and defect level). text annotation includes upper and lower case letters, Chinese characters, numbers, punctuation (Max. 20 characters).

Picture annotation: box selection (circle, triangle, square), straight line marking, arrow marking, text marking, laser measurement.

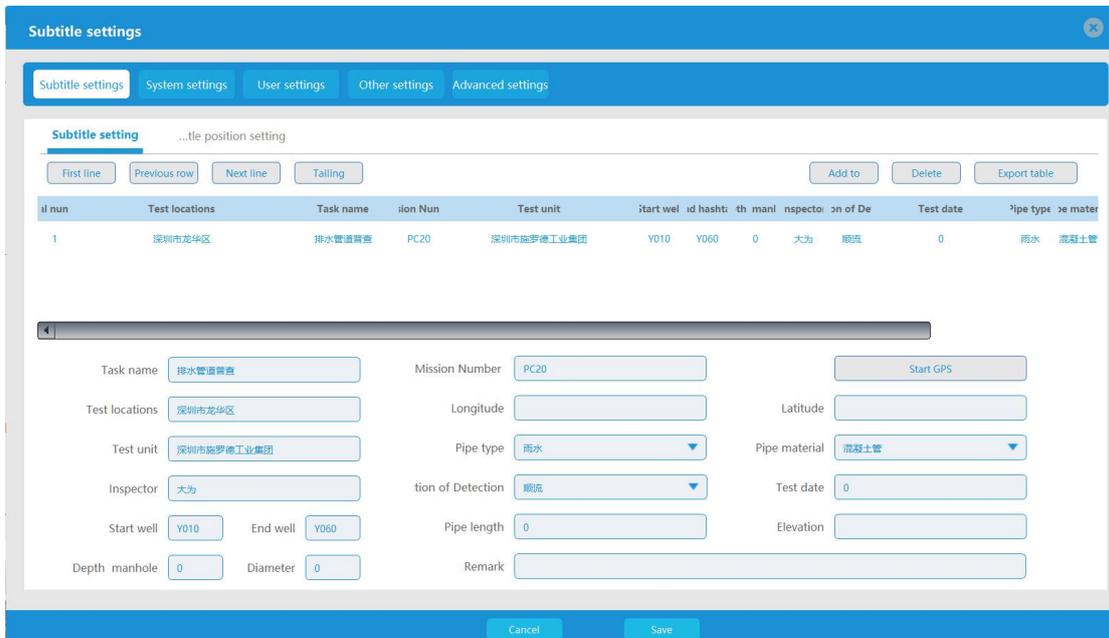
Note: Laser measurement for the captured defect picture, there will be two fixed laser points in the picture, in the defect measurement, the first measurement to measure the distance between the two laser points, as a reference value. After the subsequent measurement, manually pull the defect size, and the software will calculate the defect size according to the reference value of the first measurement.

Video Replay



- Play/Pause: Click to play/pause the video.
- Speed: Click to adjust the playback speed.
- Snapshot: Click to take a snapshot.
- Full-screen: Click to full-screen playback of the video.

Subtitle Settings Subtitle Contents



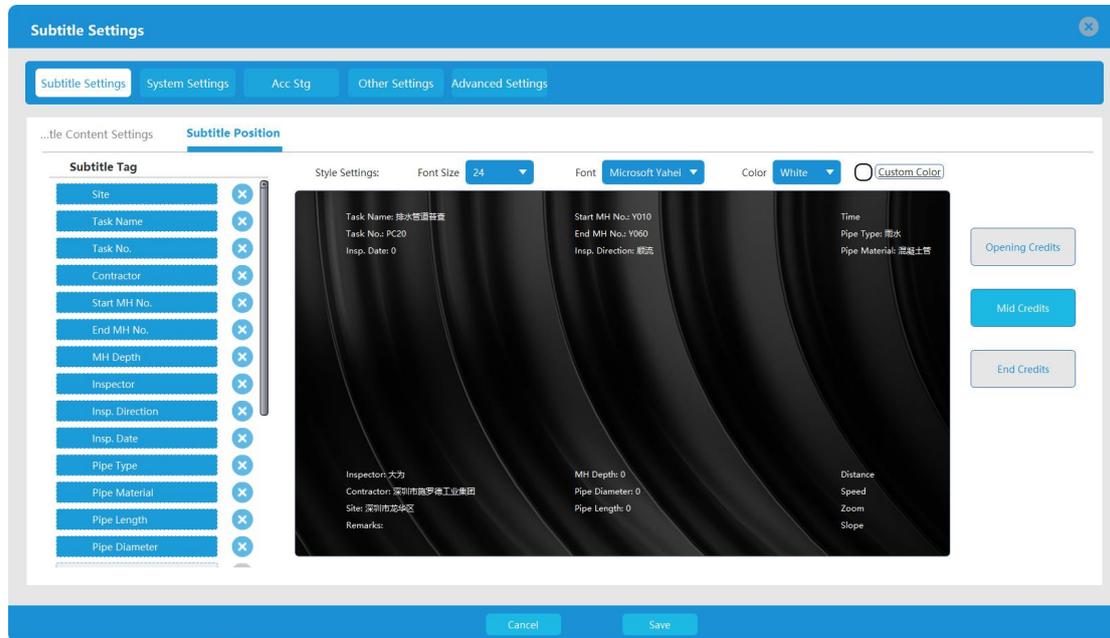
The user can set the subtitles in the video in this interface, and can edit the inspection location, task number, well number, date/time, inspection unit, etc., respectively, as well as edit other information in the notes.

Add: Add a new subtitle.

Delete: Delete the currently selected subtitle.

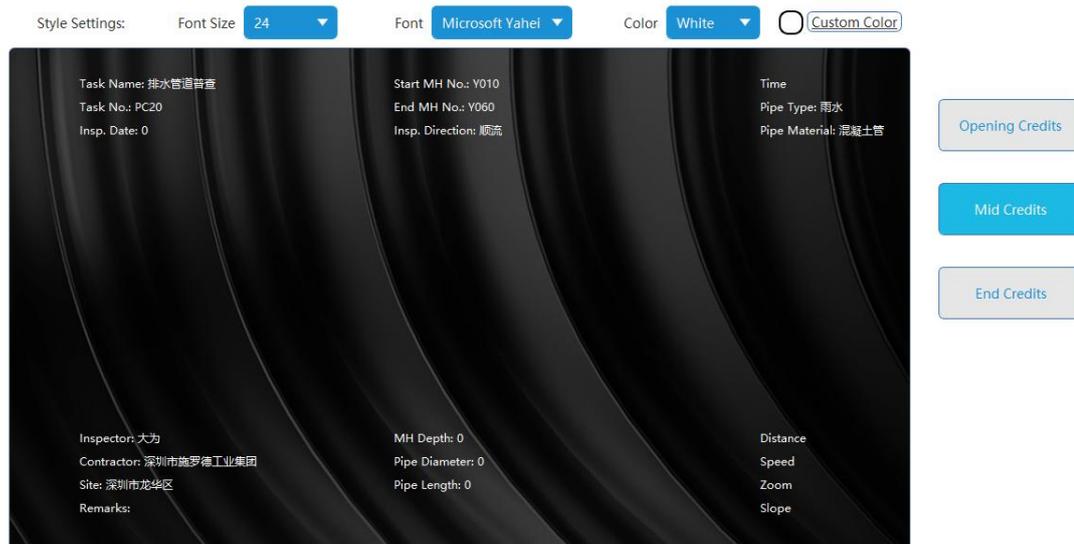
Export Form: After clicking Manage button, you can choose multiple tasks in the form, and click Export Form button to export the selected tasks to the form for storage.

Subtitle Display Settings



The font size, font color, font of the subtitle, opening credits, middle credits, and closing credits can be changed here.

Click the Insert button after the subtitle label to insert the subtitle sticky note into the video interface. For the inserted subtitle label, you can click Cancel to remove this label from the video interface.



System Settings

The current version uses the drop-down box to select [Controller model][Crawler model][Cable reel model]

(Automatic model acquisition function is temporarily unavailable)

The meter unit: meter or foot

The time unit: seconds or minutes

Inspection standards: International Testing Standards, Shanghai Testing Standards, Guangzhou Testing Standards.

PTZ settings: To enable the lens auto-adapt to rotation speed. Default: auto-adaptation

Remote control Settings: Used to configure the joystick corresponding to the control of the crawler. Click the button [Handle Configuration] to connect. The current remote control can be selected according to the configuration, and the current support for 7133C controller joystick, wireless game joystick and remote control box.

Note: The current version of the upgrade detection function is unavailable

Controller ✕

Communication: 1 Setting

Baud rate: 115200

Search COM7 Connect

Cancel Save

Confirm passwo ✕

Left button				right button						
one-click scanning	Foresight	Fill+	Main light+	Crane lift	Reel up	Video	Laser			
▲ ● ▼	▲ ● ▼	▲ ● ▼	▲ ● ▼	▲ ● ▼	▲ ● ▼	▲ ● ▼	▲ ● ▼			
Lens reset	Rearview	Fill light-	Main light-	Crane down	Defog	Capture	Defog			
nose up	Joystick 1 up	nose left	Joystick 1 left	initializatio	quit	Joystick 2 up	car forward	Joystick 2 left	car turn left	
nose down	Joystick 1 click	ht-handed nose	Joystick 1 right	start	disconnec	Joystick 2 clicks	car back	Joystick 2 right	car turn right	
Zoom/Zoom-	Joystick 1 knob clockwise					Joystick 2 Knob Turn Right		car downshift		
Zoom/Zoom+	Joystick 1 knob left					Joystick 2 Knob Turn Right		car upshift		
Zoom/Zoom	Joystick 1 button					Joystick 2 buttons		cruise control		
				Search	COM7			Connect		

Cancel Save

File Settings

Subtitle Settings

Subtitle Settings System Settings Acc Stg Other Settings Advanced Settings

System Settings File Settings

Storage Path D:/Program Files (x86)/PipeClimber/media Change

Image Format JPG PNG

Video Format MP4 AVI

Naming Rules Example:

Task Name Task No. Start MH No. Pipe Diameter

Site Insp. Direction Pipe Type PipePipe Material

Cancel Save

Photo format: PNG/JPG

Video format: MP4/AVI

Naming rules: The file name can contain the following contents:

Task name, task number, start and stop well number, pipe diameter, test location, test direction, pipe type, and pipe material.

Each time you select one, a new one is added at the end of the file name. You can select a maximum of four combinations.

Special characters cannot be displayed in file names.

Advanced Settings

Parameter Calibration

All parameters of the robot can be calibrated; newly installed software or controllers need to be calibrated before initial calibration (e.g. air pressure, front/back, left/right tilt, meter counting, and platform height with electric lifting function).

Parameter Calibration

No.	Parameters	Meas Low	Cal Low	Meas High	Cal High	Parameter A	Parameter B	Low Stop	High Stop	Alarm Low	Alarm High
1	Dist. Ctr	0	0	0	0	0	0	0	0	0	0
2	Upper Cabin Pres.	0	0	0	0	0	0	0	0	0	0
3	Lower Cabin Pres.	0	0	0	0	0	0	0	0	0	0
4	Platform Pres.	0	0	0	0	0	0	0	0	0	0
5	F-B Tilt Angle	0	0	0	0	0	0	0	0	0	0
6	L-R Tilt Angle	0	0	0	0	0	0	0	0	0	0
7	Lift Height	0	0	0	0	0	0	0	0	0	0
8	FV Cam. Pres.	0	0	0	0	0	0	0	0	0	0

click the button again to stop capturing. Repeat the same steps for maximum values.

	Measurement Value	Calibration Value	Stop Value	Alarm Value	Parameter A/B
Low Value	<input type="text" value="0"/>				
High Value	<input type="text" value="0"/>				

Device Link/Unlink

Controller Model:

Cable Reel Model:

Crawler Model:

Note: how to calibrate:

Measure low value:

1. Adjust the crawler to the lowest position.
2. Click [Update] to collect the value for 3-5 seconds.
3. Click [Update] again to stop collect.
4. Fill in the marked value / stop value / alarm value of the calibrated low value.
5. Click [Save] to save value.

Measure high value:

1. Adjust the crawler to the highest position.
2. Click [Update] to collect the value for 3-5 seconds.
3. Click [Update] again to stop collect.
4. Fill in the marked value / stop value / alarm value of the calibrated high value.
5. Click [Save] to save value.

7. Maintenance of the crawler and Key Components

Due to the frequent use of the pipeline inspection robot in municipal sewer main inspections (such as inspecting, monitoring, and assisting in clearing blockages in sewage pipelines, purifying sludge, etc.), the robot and connecting cables are susceptible to contamination from foreign substances (such as acidic or alkaline materials). Therefore, after use, it is necessary to rinse, maintain, and clean the crawler and connecting cables accordingly.

7.1 Preparation Before Rinsing

Before cleaning the robot, please prepare a high-pressure washing device.

The robot can be disassembled for cleaning (but be cautious not to directly wash the connection parts to avoid water ingress, such as camera interfaces and cable reel interfaces). Alternatively, it can be cleaned without disassembling.

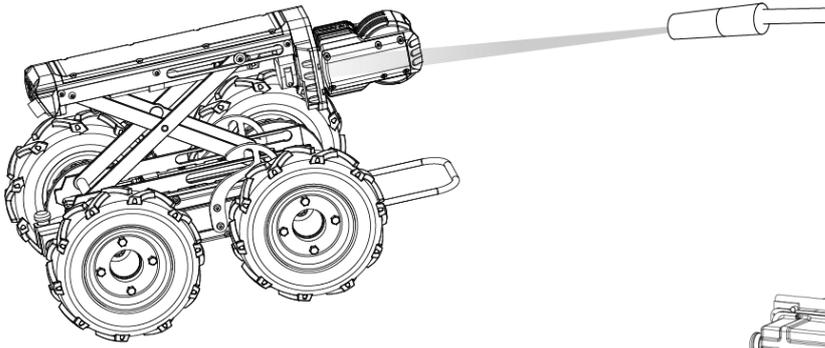
During the cleaning process, avoid directly spraying water onto the cable reel, cable reel body, or power part of the controller to prevent damage to the equipment (turn off all power sources).

7.2 Rinsing

Recommended Specifications for High Pressure Cleaning Machines	
Diameter Range	15-30mm
Speed	Controllable
Thrust	>30kg , Controlled by high-power DC geared motor or DC servo geared motor
Lock and Unlock	Equipped with a locking/unlocking function for convenient retrieval or insertion of high-pressure washing pipes
Dimensions	Width not exceeding 120mm, height 100mm, length 150-200mm
Weight	5-8kg

1. Find an open space and connect the high-pressure cleaning machine.
2. Keep your hands holding the handles of the pressure washer at a distance of 50cm or more from the robot (specific distance depends on the pressure washer and adjusted water pressure) to prevent wastewater from splashing onto your body. (Alternatively, you can also wear waterproof gear, such as water shoes and raincoats, and take necessary safety precautions before starting the cleaning process.)
3. Once all preparations are ready, turn on the switch of the pressure washer and aim the water nozzle at the robot and dirty areas for cleaning. Continue the cleaning

process until the robot is clean.

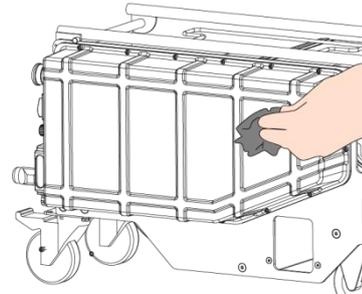


7.3 Cable Reel Cleaning

Prepare a water tray or bucket filled with water and have a clean cloth ready. Dip the cloth in water and use it to wipe the dirty areas of the cable reel body until they are clean.

Note:

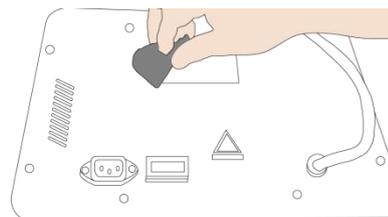
- Before cleaning the equipment, remove any devices related to the cable reel connections, unplug the charger, turn off the power, and keep the cable reel away from children and flammable materials.
- Water should not penetrate the battery, power ports, or video cables to avoid short circuits or damage to the circuit boards, or to prevent the cable reel from turning on or having no video output.
- If water accidentally gets on the battery, charger, or plugs, allow the equipment to dry thoroughly before powering it on to avoid any potential safety hazards.



7.4 48V Power Adapter Cleaning

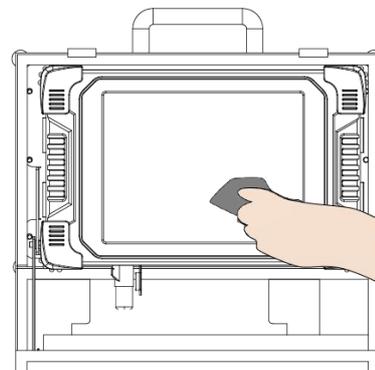
1. Unplug the power;
2. Clean the surface and interior of the 48V power adapter with a clean cloth.

Note: Connecting part of the adapter can not enter the water, if water inside please leave it for a few days to dry before the operation



7.5 Controller Cleaning

Wipe the screen of the controller with a clean cloth.



7.6 Regular Maintenance

(1) After completing on-site detection work, do not immerse or flush the product. Use a slightly damp soft cloth to clean the monitor and robot, then dry them with a dry towel. Afterwards, place them in the designated packaging box, avoiding unnecessary damage from squeezing, impact, or collision to the camera and controller.

(2) When not using the product, please turn off the power and store it in the designated packaging box for safekeeping, thus extending the product's lifespan.

(3) It is prohibited to use the product outside the temperature range of -20°C to 50°C .

(4) When the display controller indicates low battery, promptly charge the battery. During the charging process, when the charger indicator light turns green, disconnect the charging power once the charging is complete. For long periods of non-use, it is recommended to charge the battery once a month as a precautionary measure.

(5) It is prohibited to use the product in hazardous environments that do not comply with the equipment's specifications.

(6) For long periods of non-use, it is recommended to store the product in a well-ventilated and dry place. If the product remains unused for more than six months, check the sealing of the camera components. If any abnormalities are found, return the product to the factory for maintenance.

8. Fault Analysis and Troubleshooting

Before seeking assistance, please refer to this table which may help you find solutions to your problems:

Description	Possible Causes
Unable to Power on	<ol style="list-style-type: none"> 1. Check if the controller battery is charged. 2. Verify if the power button is pressed to turn on.
Cannot Record Videos	<ol style="list-style-type: none"> 1. Check the available storage space and the memory card. 2. Verify if the recording button is functioning properly (the size of the recording file depends on the lighting conditions).
No Image on Startup	<ol style="list-style-type: none"> 1. Check if the camera lens is dirty. 2. Check if the zoom or focus buttons are pressed, causing the image to be magnified or focused
Unclear Image	<ol style="list-style-type: none"> 1. Check if the camera lens is dirty. 2. Ensure that the plug is inserted correctly and that the cables are not loose.
Unable to Control	<ol style="list-style-type: none"> 1. Check if all connectors are properly plugged in and inserted. 2. Check if the cables are securely connected.

Note:

- If the machine encounters any abnormalities during operation, immediately turn off the circuit breaker or disconnect the power cable to avoid electrical shock or fire hazards.

- Do not attempt to repair the equipment by yourself. Repairs should be carried out by professional technicians to avoid electrical shock or fire hazards.

9. Warranty and Technical Support

Effective Guarantee

1. The standard limited warranty period for this product and all accessories (excluding batteries) is twelve months from the date of purchase, with the option to purchase extended warranty coverage separately.

2. The limited warranty applies only to the original purchaser of the product.

3. During the limited warranty period, there will be no charges for parts or labor when repairing or replacing the product. All replaced parts, circuit boards, or equipment will not be returned.

4. For repaired products, the longer of the following two periods will be considered as the remaining warranty period:

(1) The remaining warranty time of the product, with an extension of thirty days for normal repairs.

(2) Thirty days from the date of repair for products that have been fully paid for the repair.

5. The purchaser is responsible for transportation and miscellaneous fees incurred during the shipment of the product to an authorized service center.

6. The purchaser will not be covered by the warranty provisions in the following circumstances:

(1) Damage caused by: improper use, improper storage, unauthorized repairs, accidents, unauthorized modifications, damage caused by incorrect installation, force majeure, etc.

(2) Accidental downtime or damage caused by improper use.

7. Please keep the packaging wooden box properly to facilitate the return shipment of the equipment for repair, to avoid delays in your work.

8. All warranty terms, product functions, and specifications are subject to change without prior notice.

9. Shenzhen SROD Industrial Group Co., Ltd. reserves all final decision-making rights.

10. List of Key Items

Users are advised to perform the following checklist before operating the equipment to ensure smooth operation:

Category	Description	Test Criteria	Result	
Function Check	C A M E R A	Able to perform axial rotation	360°	Yes
		Able to perform vertical rotation	270°	Yes
		Able to zoom in with variable zoom	1-10 times	Yes
		Able to zoom out with variable zoom	10-1 times	Yes
		Press RST for automatic reset and centering	≤5°	Yes
		Able to switch between front and rear view		Yes
		Able to adjust focus normally (+/-/AUTO)		Yes
		Able to adjust main light source	Level 0-10	Yes
		Able to adjust auxiliary light source	Level 0-10	Yes
		Able to adjust rear view light source	Level 0-10	Yes
	C R A W L E R	Able to lifting up the platform	0-150mm	Yes
		Able to lower down the platform	150-0mm	Yes
		Press D+/D- and go forward	Forwards	Yes
		Press R+/R- and go backward	Backwards	Yes
		Able to turn left properly		Yes
		Able to turn right properly		Yes
		Press STOP to stop movement		Yes
		Able to adjust gear properly	Level 0-9	Yes
		Able to adjust steering intensity properly	Level 0-9	Yes
		The crawler posture display interface displays the real-time corresponding platform height value	0-150mm	Yes
The crawler posture display shows real-time front and rear tilt angles	0-90°	Yes		

	C A B L E R E E L	The crawler posture display shows real-time left and right tilt angles	0-90°	Yes
		Able to measure distance properly	Within 0.3%	Yes
		The line winder can automatically collect the cable		Yes
		When cable reel is connected to the crawler, the cable can release automatically; when disconnected, can not		Yes
		Pressing the emergency stop button can shut down the device control system		Yes
		Interfaces can connect properly		Yes
		The reciprocating screw can move properly		Yes
		The battery has sufficient charge, ensuring it is above 25%		≧ 25%
	S O F T W A R E	System options	Selectable and Editable	Yes
		Edit title/headings	Selectable and Editable	Yes
		Parameter settings	Able to set	Yes
		Image settings	Able to set	Yes
		User accounts	Able to switch accounts	Yes
		Storage paths	Able to change save directory	Yes
Video recording, capturing photos		Able to record video and take pictures	Yes	
Note-taking function		Able to take notes	Yes	

Function check completed, initial system check completed.

Appendix

1. Deploy the Robot

Preparation

Before going down the shaft make sure that the power has been turned off, the lift frame has been lowered to the lowest level, the connectors on the crawler are connected and the camera fixing screws must be locked.

Note: Before each trip down the shaft, make sure that the head screws are locked, and that the joints at the end of the vehicle are securely fastened and clamped.

Helium Injection

1. Unscrew the nut on the reptile inflation port
2. Connect the helium cylinder inflation port to the device inflation port
3. Open the vent nuts, then fill the crawler body with helium cylinders to remove air from it
4. After the air is cleared, tighten the nozzle cap and fill with about 10 to 14PSI helium.

Note: If the conditions do not allow the filling of helium, you can also fill with dry or filtered gas to replace nitrogen

Deploy the Robot

First, open the control software on the controller to check whether the device is ready.



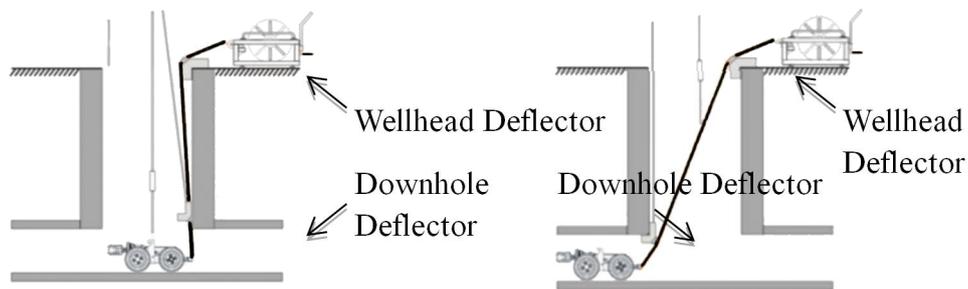
Connect the robot body with the cable, and hang the fixed device on the body.



Secure the slings with the fixtures and use the slings and tail cables to keep the vehicle level and moving down slowly, do not shake to avoid causing friction between the vehicle and the well wall. If conditions permit, it is best to use an electric boom.

If the vertical lifting method is used, it must be the front end upward and the tail end downward.

Note: In no case shall it be lifted in a head-down position.



Vertical Hoisting Method

Horizontal Hoisting Method

Note: Horizontal hoisting Method can be used when the wellhead diameter is bigger than 750MM.

When the car is approaching the bottom part of the well, slowly enter the tail end of the car into the pipe first, and then slowly release the cable, so that the car will slowly fall horizontally, otherwise, it will lead to serious damage to the equipment.



The cable is embedded in the downhole casing, which is pulled by a rope, and the casing is placed at the entrance of the downhole pipe.



Adjust the size of the uphole pulley, place the uphole pulley at the wellhead, the cable passes through the pulley, and the deployment is complete.



Inspection:

1. Confirm that the equipment is stable when it reaches the intended test position.
2. Turn on the controller.
3. Adjust the lifting platform.
4. Turning on the main lights and auxiliary lights
5. Move forward the crawler and adjust and fix the guide pulley to the right position
6. Acceleration and deceleration during operation should be carried out slowly, avoiding sudden deceleration and stopping to prevent the vehicle from tipping over.
7. User should open the rear-view camera when backing up, and use the take-up machine to collect the line drag crawler recovery, when the pipe has a certain degree of curvature within the pipe, with the reversing key to slow down the speed of the recovery, recovery speed close to equal to the speed of the reversing vehicle.

8. When the crawler turns in the pipeline, the turning speed should be adjusted to the range of 45 to 50; when the crawler backs up in the pipeline, hold the wireless operation box or adjust the gear to 2 gears on the controller, so as to prevent the crawler from backing up and turning too fast, resulting in damaging the car body by hitting the pipe wall.

Note: When the car body is running in the pipeline: crawler turning speed range requires to be adjusted to 45 ~ 50; reverse gear requires to be adjusted to 2 gears.

2. Reference For Pipe Diameter Range Of Different Wheel Diameter

Wheel Diameter	Minimum Pipe Diameter	Recommended Pipe Diameter Range	Remarks
70mm	150mm	DN150-DN200	Removal of the auxiliary light source module is required for detection of 150mm pipe diameter.
100mm	200mm	DN200-DN300	
130mm	250mm	DN250-DN400	
200mm	300mm	DN300-DN600	
230mm	300mm	DN300-DN600	

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