



MOWO-CAM

pushrod camera inspection system

USER MANUAL



⚠ CAUTION

These instructions are for the correct use of the inspection system. Always make sure you have read and understood these instructions before using the camera.

SAVE THESE INSTRUCTIONS FOR FUTURE USE.

TABLE OF CONTENTS

TOPIC	PAGE
General Safety Information	3
Environmental, Transport, Storage & Disposal	4
General Information	5
Technical Data	7
Voltage & Power Supply	7
Available Accessories	7
Starting & Using the System	8
Conduct an inspection	9
Starting up the Software	10
WiFi Selection	11
Menu	12
Start New Project	13
Photo Capture / Defect Capture	16
End Recording	18
Generate Report	19
OSD Edit / OSD Info	20
Files	22
Settings	23
Logo	24
Maintenance	25
Practical Tips for Proper Use	26
Copyright	27

GENERAL SAFETY INFORMATION

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

WARNING

This section contains important safety information. Failure to comply could result in serious injury.

Safety symbols

Safety symbols are used throughout this manual to draw attention to potential hazards.



DANGER risk of serious injury or death by electrocution, follow instructions.



CAUTION risk of damage, follow the instructions.

Personal Protective Equipment (PPE)

Always use Personal Protective Equipment including suitable protective clothing, footwear plus:



Suitable eye protection to protect against sewage, chemicals or dust from irritating eyes.



Suitable protective gloves to help prevent any hand injuries. Any open injuries or skin irritations should always be covered to avoid contact with sewage, chemicals or dust.

Always read all safety warnings and instructions. Failure to follow warnings and instructions may result in electric shock, fire and/or serious injury.



1. **Always wear eye protection as well as protective gloves.**

Other personal protective equipment, such as a dust mask, gloves and coveralls, should be worn if necessary.

2. Make sure the pipe is open and ventilated to prevent the accumulation of gases.
3. **Before each use**, carefully inspect the system for any breaks or damage. It is especially important to check the cable for signs of wear.
4. When in use, it is important that the inspection system is always stable and on a flat surface.
5. Do not use the inspection camera in explosive environments - such as in the presence of flammable liquids, gases and heavy dust.



6. Keep electrical connections dry and clear of the ground.

7. Always be aware of your surroundings. Block off open pits and follow traffic rules.

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE



This section contains important safety information. Failure to comply could result in serious injury.

ENVIRONMENT

Operational Ambient Temperature Range: -10°C to 50 °C (14°F to 122 °F) frost and condensation free

Storage Ambient Temperature Range: -20°C to 60 °C (-4°F to 140 °F) frost and condensation free

Maximum Altitude: 2000m (6500 ft). Derate above 1000m: 1% / 100m

Camera Maximum Humidity: 95% non-condensing

TRANSPORT

The inspection camera can be transported lying down or standing up in a car or other vehicle and should be secured with ratchet straps to prevent sudden movements or accidents due to hard braking or an accident.

It is best to transport the tablet separately from the inspection system.

If you are using a pick-up or trailer to transport the inspection system, cover the device to protect it from weather conditions.

STORAGE

It is recommended to store the inspection system indoors, protected from rain and sunlight and at a constant ambient temperature.

If the inspection system is stored in a colder environment than +10 oC (50 oF), battery performance may be reduced. It is better to allow the system to reach room temperature before use.

If the inspection system has been stored for an extended period (more than 2-3 months), it should be checked and tested before use according to the maintenance programme.

DISPOSAL



Camera, rechargeable Lithium Ion batteries and the glass fibre-reinforced video push cord can be returned to waste electrical and electronic equipment (WEEE) collection points in

Li-ion Europe. The base frame can be recycled at metal waste collection points.

Always follow the local waste handling rules and regulations.

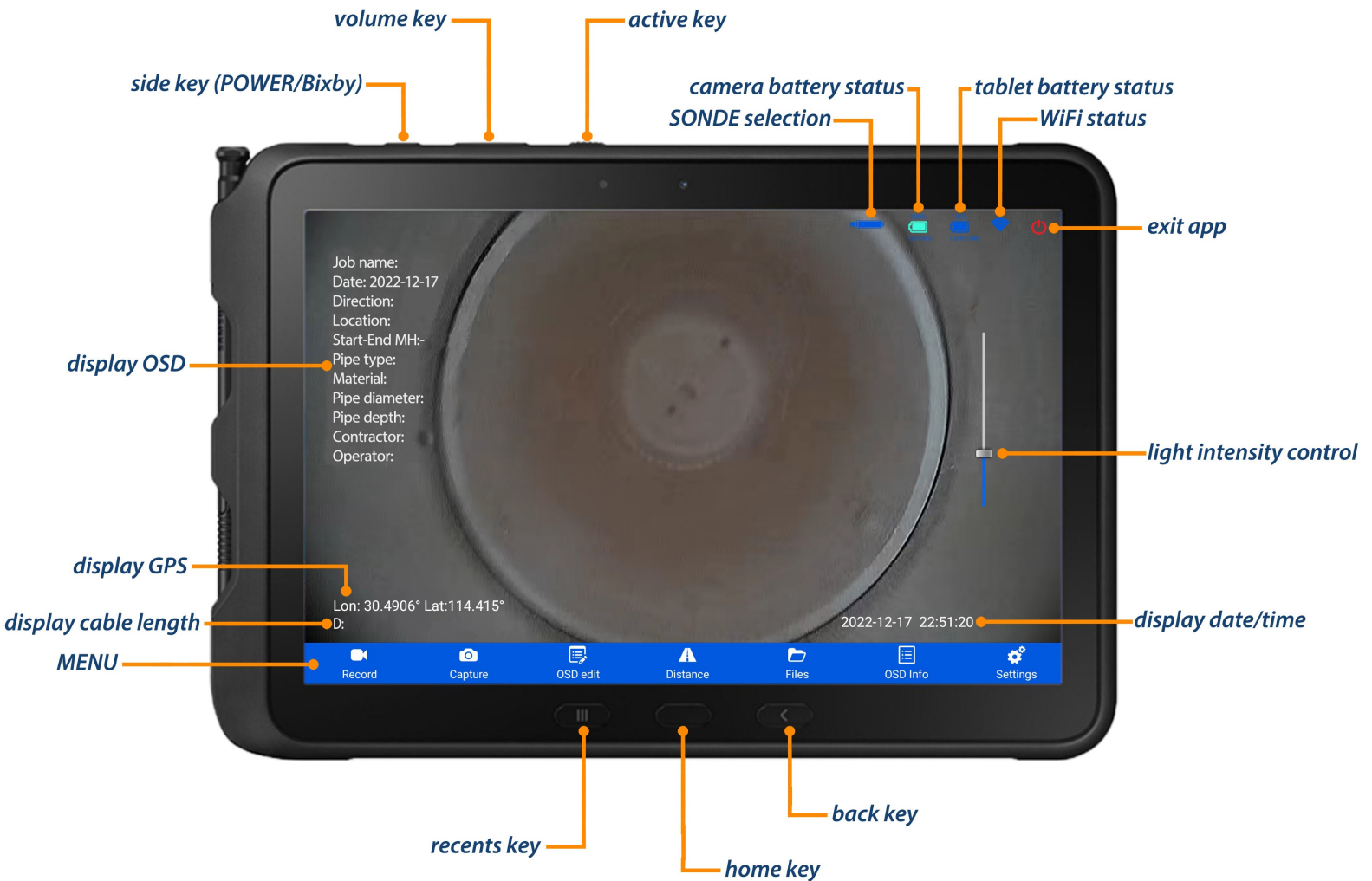
GENERAL INFORMATION

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE



GENERAL INFORMATION

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE



the image shown is with a SAMSUNG Galaxy Tab. If you are using another brand or type of tablet, the actual product image may differ from the image shown above as well as some control buttons may be different.

TECHNICAL DATA

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dimensions (mm/inches)	cable	camera diameter	range (mm/inches)	power (w)	battery	weight	IP Class
592x356x732 23"x14"x29"	8mm x 30m 8mm x 50m	25mm 32mm	DN50-200 2" - 8"	120V: 1.13kW 230V: 1.5kW	Li-Ion high capacity (9u)	21kg	68

VOLTAGE AND POWER SUPPLY

Ensure that the supply voltage is correct. The voltage of the power source must match the value given on the nameplate of the camera within the tolerances of $\pm 10\%$. Cameras with a 230V plate can be used in 220V mains and 110V camera's in the 120V grid. The camera should only be connected to a power source with the same voltage as indicated on the rating plate, and can only be used on single-phase alternating current. The camera is double-sealed according to European standards. The power source must be earthed.

POWER PLUGS



For safety reasons, this appliance may be fitted with a special plug. If the plug does not fit properly or does not fit into the socket, do not force it - contact an electrician to determine the required power plug. **Never change anything on the plug.** Only use the plug with an extension cord if it can be fully inserted into the socket. If a power generator is used, ensure that the power is sufficient.

220-230V: Europe Schuko 230V 16A. Power cable lead minimum thickness 2.5mm².

AVAILABLE ACCESSORIES

CENTRALIZERS	DIAMETER	Part #
45mm guidance 	DN50-70	D32-ZIQ-45
75mm guidance 	DN75-100	D32-ZIQ-75
100mm guidance 	DN100-125	D32-ZIQ-100
150mm roller guidance	DN150-200	D32-ZIQ-150
200mm roller guidance	DN200-300	D32-ZIQ-200

STARTING & USING THE SYSTEM

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

INTENDED USE

The pushrod inspection system is intended for the following uses;

1. The inspection system can be used to inspect pipes from DN50 to DN200. Various centralisers are included or optionally available for this purpose.
2. The built-in meter counter accurately measures the distance of the cable in the pipe, with an accuracy of 0,01m.
3. As standard, the system is equipped with a high-precision multi-frequency sonde for defect location.
4. Camera design and components used have been tested for quality and waterproofness (IP68). **Nevertheless, it is NOT to be used to remove blockages or clean dirty pipes. This will result in damage to the system and void the warranty.**

CONNECTING TO WiFi

The inspection system transmits its own WiFi signal. The tablet must be connected to the camera via WiFi.

1. Start up the system by pushing the push button on the cable reel. The push button lights up blue.
2. Use the tablet to search for the system's WiFi, the WiFi name should be the same as the Serial Number listed on the reel. Connect to the correct WiFi network (password is 12345678).
3. If you get a message on the tablet that the WiFi connection has no internet, choose the 'keep the connection' option.
4. Now launch the software (click on the icon).
5. The camera image will now appear on the tablet. Test the connection by adjusting the light intensity or moving the reel so that the meter counter rises.

The system is now ready for use.

ASSEMBLY OF THE CENTRALISER (CAMERA HEAD SUPPORT)

It is important to use the right centraliser for correct inspection of the tube. The centraliser ensures that the camera head is positioned in the centre of the tube so that the entire tube wall can be inspected and the light output of the LED lamps provide the best visibility.

Mount the centraliser and secure it with the supplied Allen key until it is tight.



CONDUCTING AN INSPECTION

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

CAUTION

The reel brake should always be used partially to slow down the uncoiling of the cable. To prevent injury, avoid uncoiling the cable uncontrollably.

Do not wear loose clothing that could get caught in a spinning reel. Keep your hands away from a spinning reel.

1. Place the reel on a flat surface about 1 to 1.5 metres from the entry point. This gives enough space to work with the push cable without much slack on the ground. If necessary, use the reel brake to slow down the movement of the cable reel. Using the reel in a horizontal position increases the width between the feet. This gives the reel more stability on uneven surfaces and reduces the height when space is limited.
2. Pull the camera head and sufficient push cable out of the reel. The reel is now ready to be inserted into the tube.



TIP

- a) remove any standing water from the tube; the images will be much better if the camera head is not under water.
- b) remove debris and objects from the pipe; the camera is made to inspect the inside of pipes, not to clean or unclog them.

3. Whenever possible, use a cable guide or protector such as a TigerTail to prevent the push cable from scraping over sharp surfaces. Use rubber gloves with sufficient "grip" to protect your hands from sludge during retrieval.
4. Push cable as close as possible to the entry point. Too much push cable between the entry point and pushing may cause the push cable to kink. Never put your weight on the push cable. This can cause the cable to kink.
5. Use finesse and no force when necessary. The camera and push cable are made to go through multiple bends. If you have trouble navigating through the tube, try pulling the camera back four to eight centimetres and pushing through it quickly. Sometimes the quick push will push the camera through a narrow space. Never pull the camera head back or ram it repeatedly into the tube in an attempt to get through.
6. Run water into the pipe during inspection. Inspect downstream with flowing water to reduce pipe friction and wash away debris that may collect on the camera lens. If you have trouble pushing, it may be better to do the recording on the way back so that the video recording does not lose time navigating difficult areas. Record while pulling back and even during slow strokes to pull back the push rod.
7. With a "T" entry, use a string to bend the camera head and point it in the desired direction into the "T". Take extra care with T-entries not to fold the camera back on itself; this can cause the camera to get stuck in the tube.
8. Make sure you use the right model of camera in the right diameter tube. Too large a camera may get stuck; too small a camera will lead to poor lighting and video quality.
9. Use a centraliser for the camera head. A centraliser protects the camera head from hitting debris and protrusions directly, but also keeps the camera head from lying on the bottom of the pipe and being better centred. Keeping the camera head away from the bottom of the pipe also improves image quality, as light from the camera is more evenly distributed in the pipe. Different types of skids are available for different applications. See the accessories section of this manual or visit our website for more information on skids. When pulling back the push cable, be careful and try to push the cable evenly back into the reel while clearing the cable of water and debris.

STARTING UP THE SOFTWARE

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STARTING THE SOFTWARE

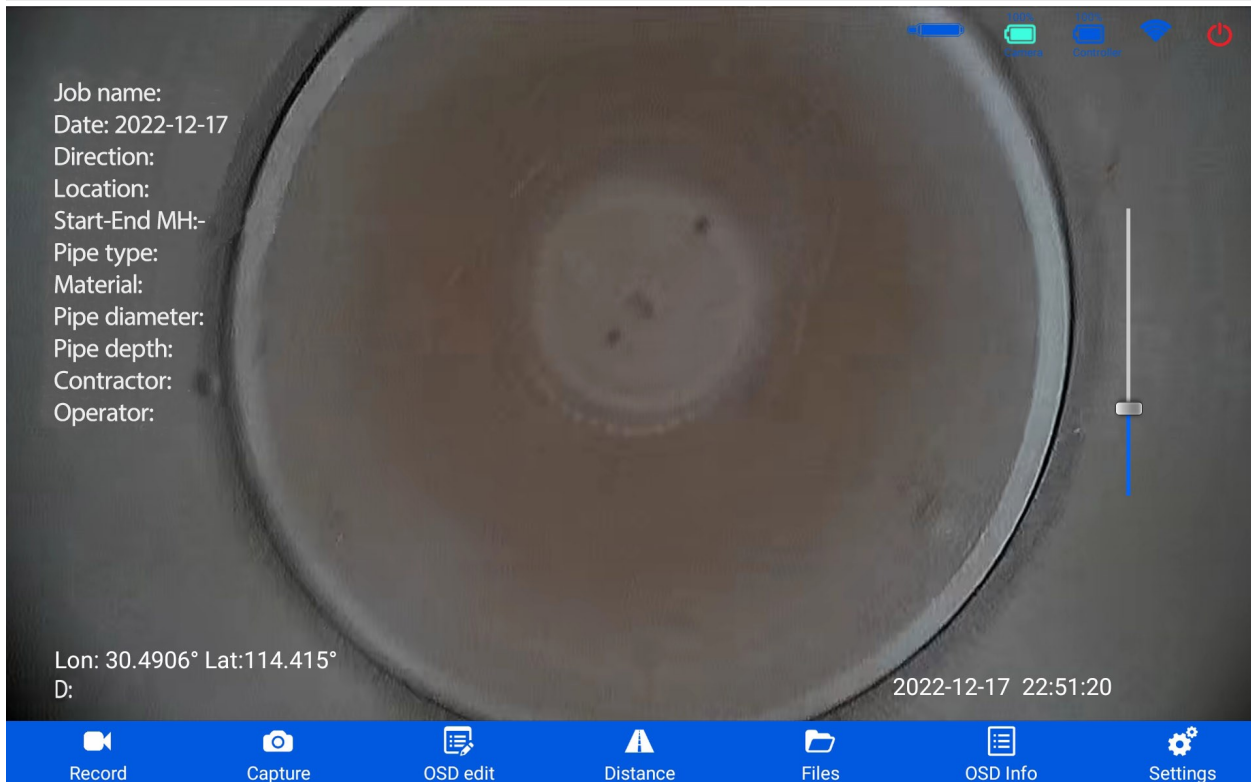


Click on the reporting app icon.
The start-up screen appears while the software connects to the camera system and loads the image.

The start-up screen appears while the software connects to the camera system and loads the image.



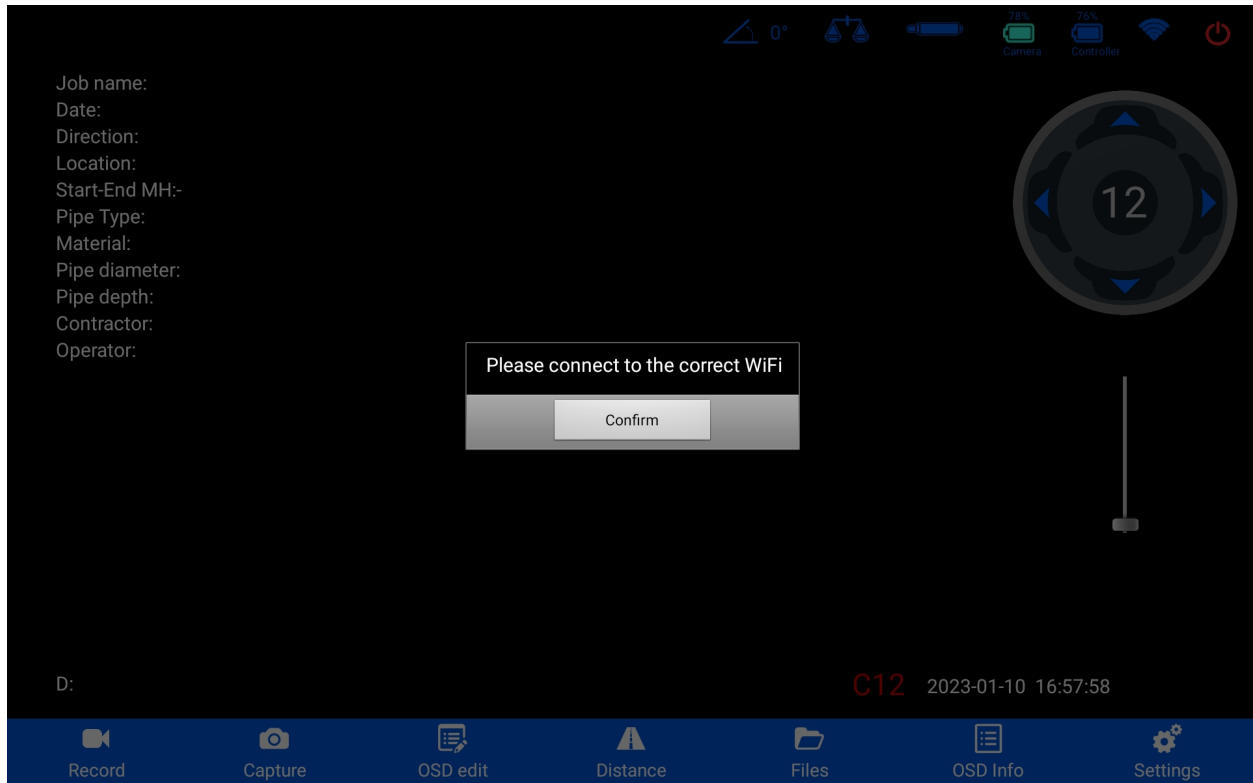
www.trio-vision.com



WIFI SELECTION

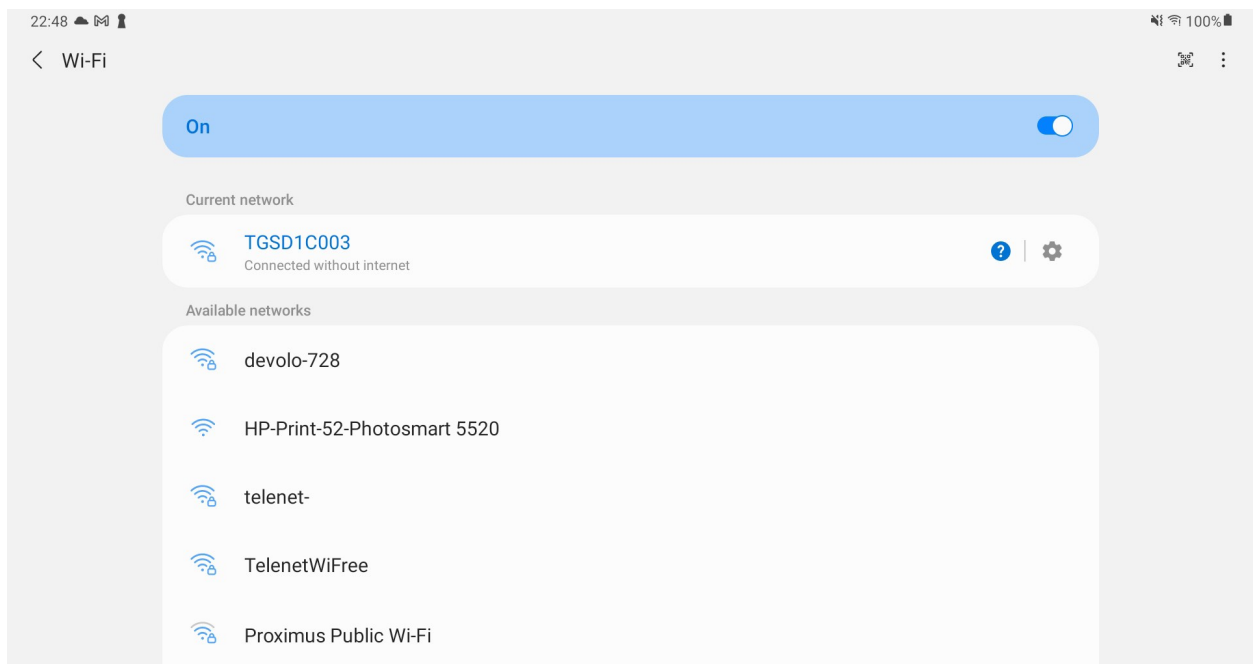
SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

If there is no connection to the correct WiFi network, the following message will appear



Close the app and connect to the correct WiFi network first. (see also 'CONNECTING TO WiFi' p8)

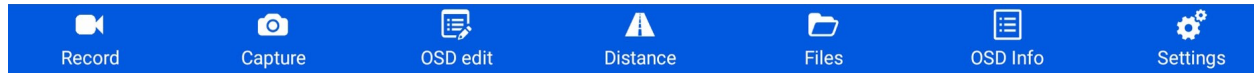
Enter password if necessary (**12345678**)










MENU

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

At the bottom of the screen is the MENU bar. Here, among other things, settings can be adjusted, recorded files can be played back, etc.



-  start a recording
-  capture an image
-  edit OSD live
-  manually adjust the value of the meter counter
-  playback previously saved recordings, view saved images and reports
-  list previously saved OSD info records
-  adjust settings, light intensity, language etc.

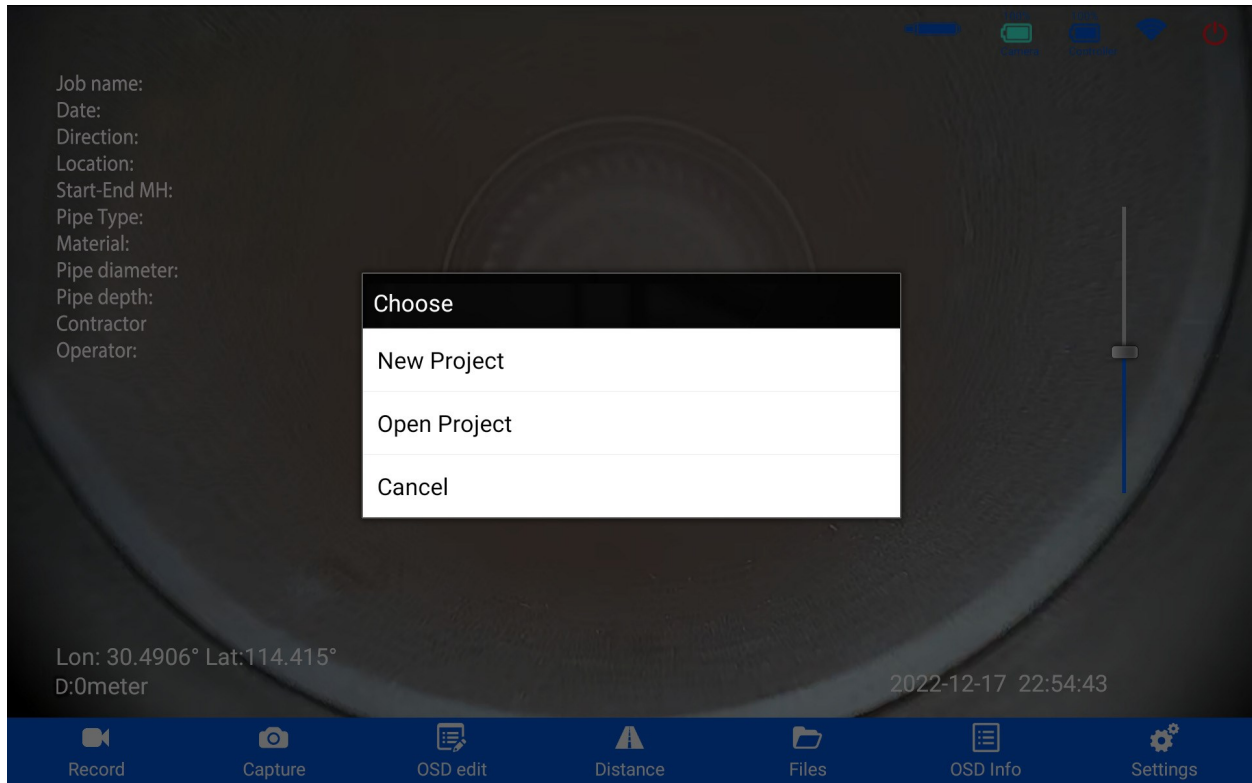
START NEW PROJECT

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

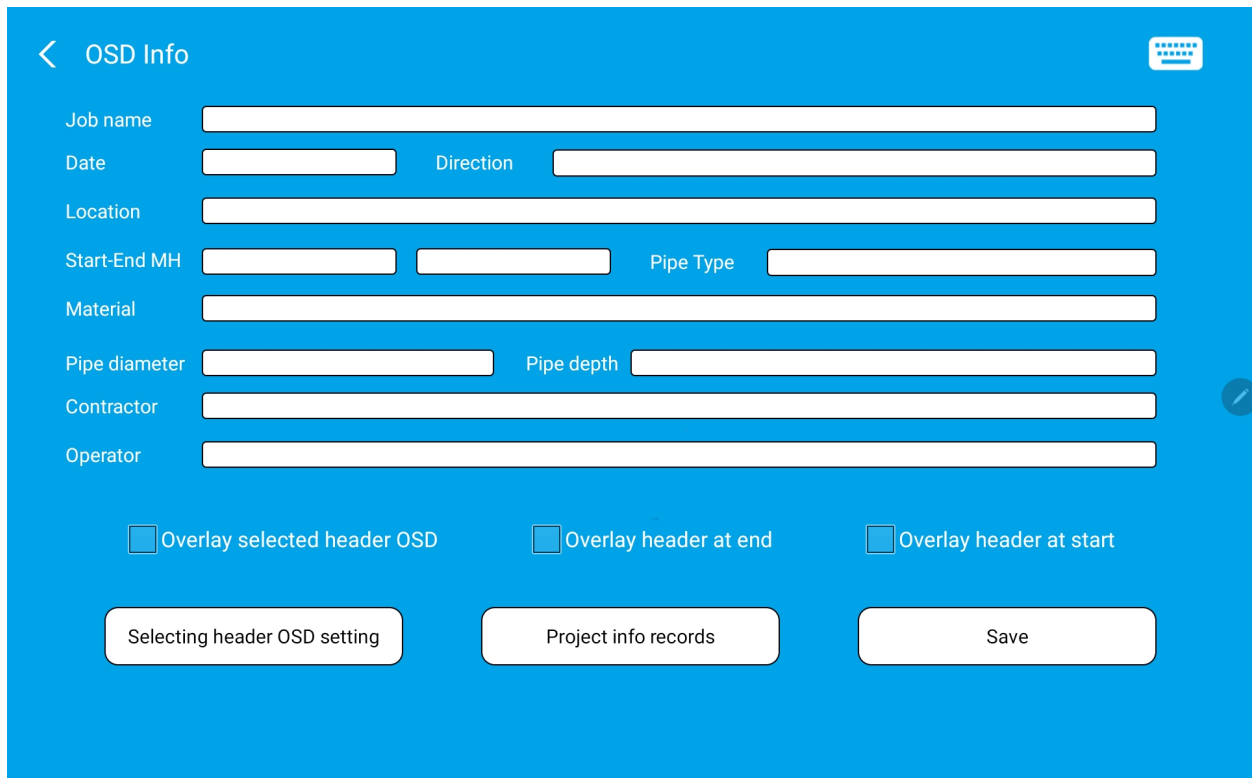
Click



to start a new project. The following pop-up screen will appear. Click 'New Project'



A new pop-up screen appears. Start filling in the details, click 'Save' to continue.



START NEW PROJECT

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

You can also select previously saved OSD info by clicking 'Project info records'. Select the record and click 'Save' to continue (**Job name & Start-End MH must be altered**) see also page 21

OSD Info

Job name

Date Direction

Location

Start-End MH Pipe Type

Material

Pipe diameter Pipe depth

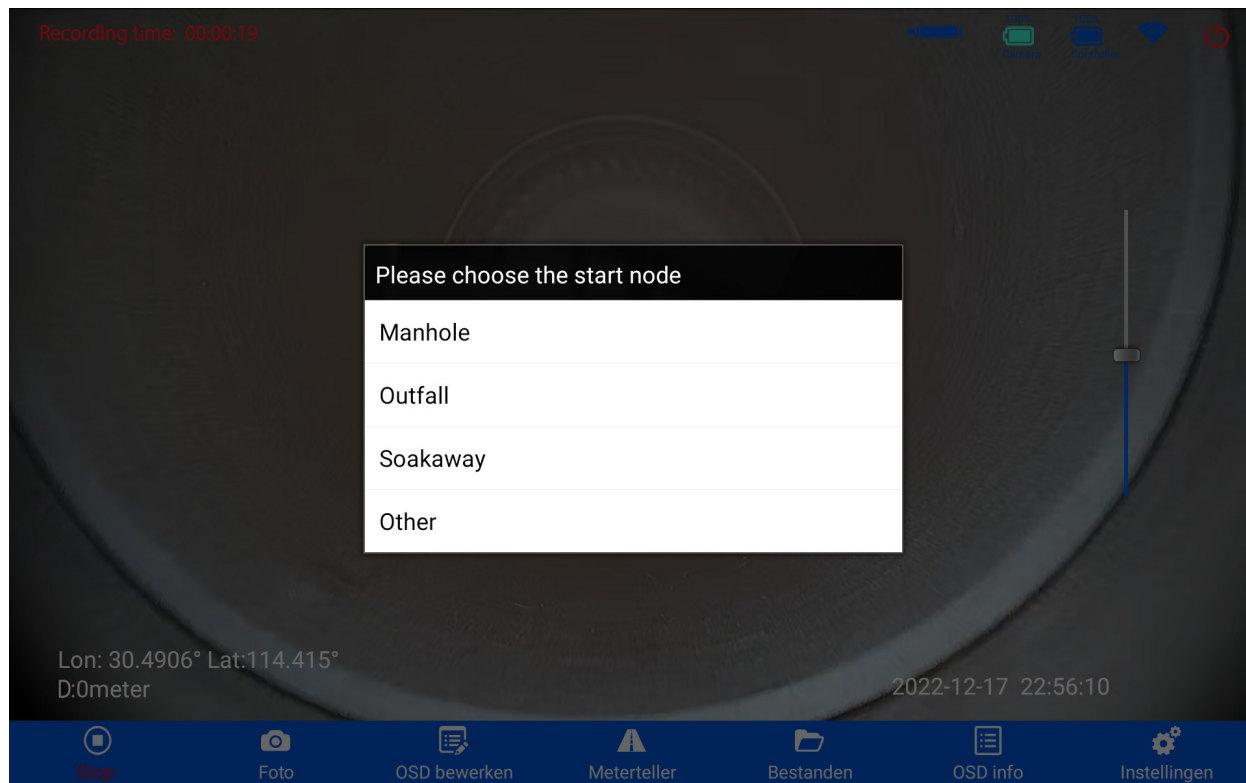
Contractor

Operator

Overlay selected header OSD Overlay header at end Overlay header at start

Selecting header OSD setting Project info records Save

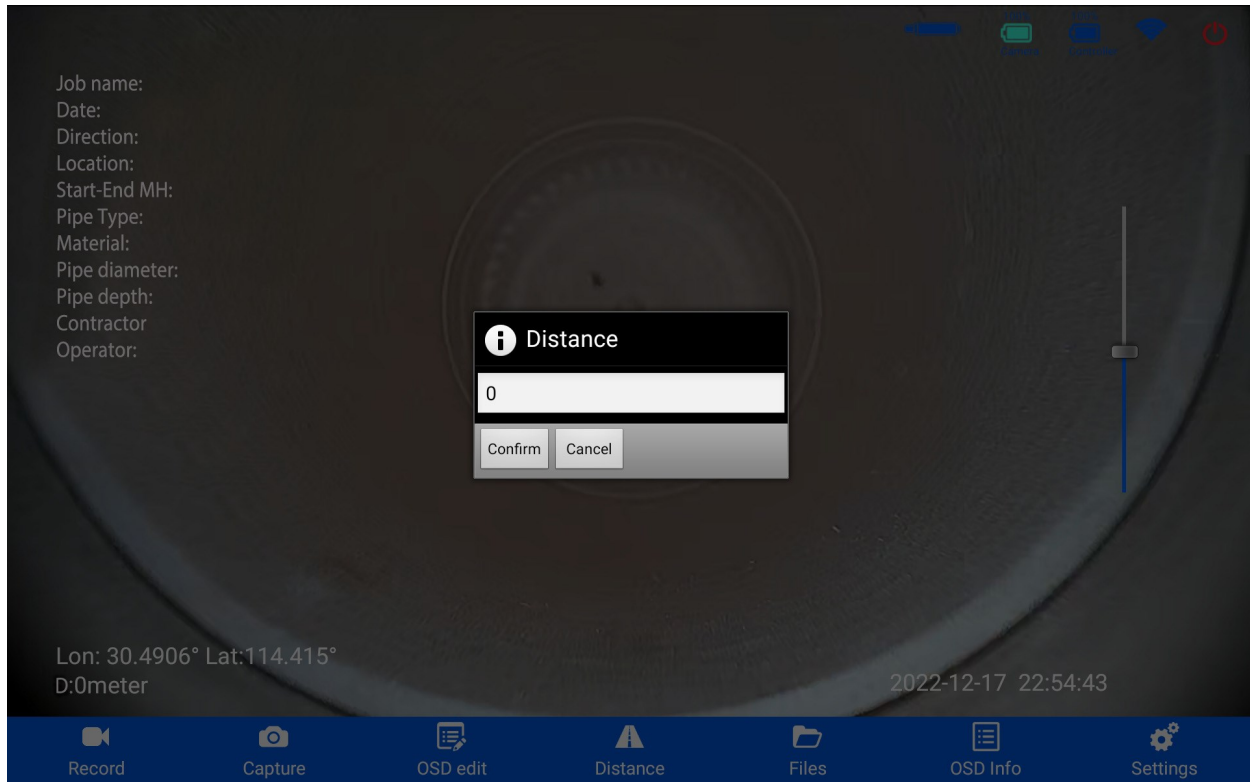
Select the start node of the recording (entry point). Recording will start, at the top left of the screen the timer starts running.



START NEW PROJECT

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

Click 'Confirm' to reset the meter counter ('0' position) or enter another value.



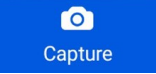
Start inspection, feed cable into the pipe.



PHOTO CAPTURE / DEFECT CAPTURE


SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

Click



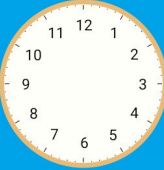
to take a picture, the picture will be displayed in a new window

< Remark



distance clock point

Observation

clock direction 

Defect notes


Lon: 30.4906° Lat:114.415° L:0 m 2022-12-17 22:56:36

Edit Image

Submit Cancel

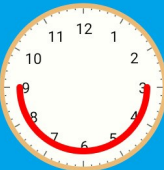
Additional info about the photo can be entered in the various fields

< Remark



distance clock point

Observation

clock direction 

Defect notes

Lon: 30.4906° Lat:114.415° L:0 m 2022-12-17 22:56:36

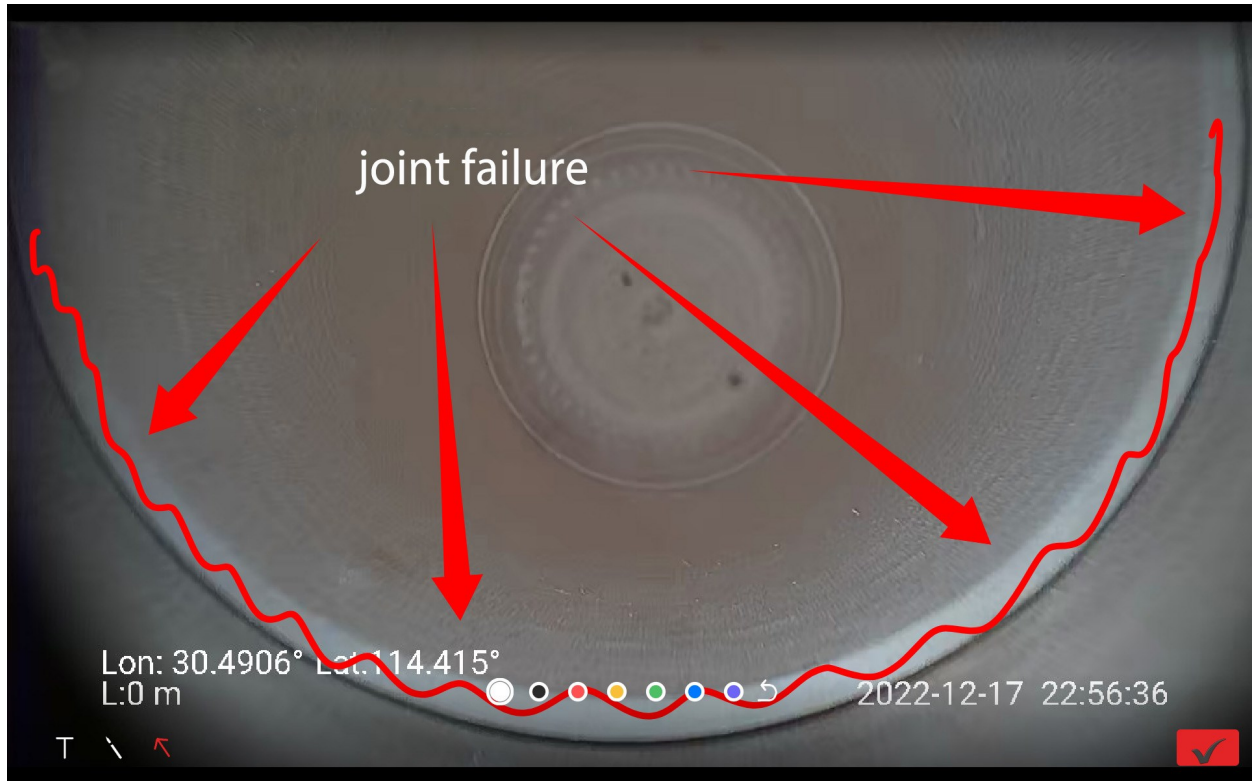
Edit Image

Submit Cancel

PHOTO CAPTURE / DEFECT CAPTURE

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

Click on 'Edit Image' and use the tools at the bottom of the page to make marks or write text directly on the photo. Save the changes by clicking the check mark. 

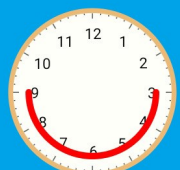


< Remark

distance clock point

Observation

clock direction



Defect notes

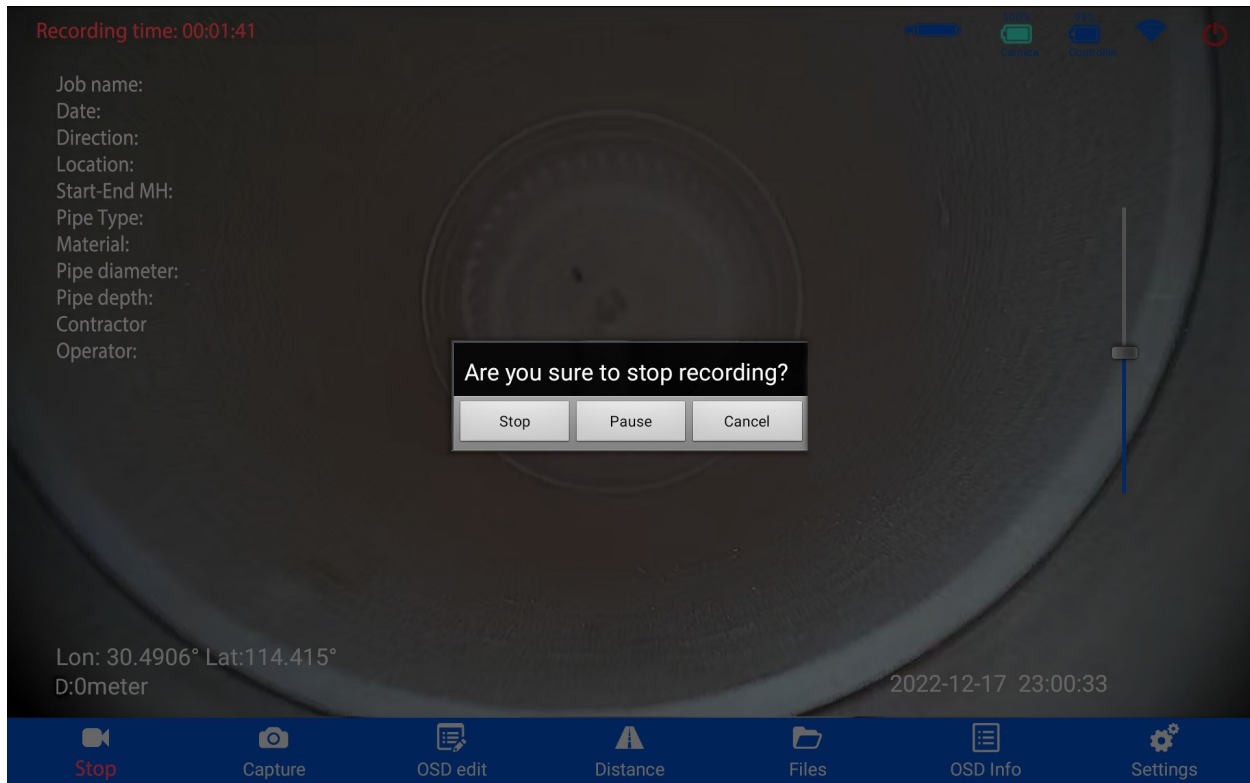
joint not fitted well causing a leakage in the pipe..

Click 'Submit' to save the image, the recording will continue.

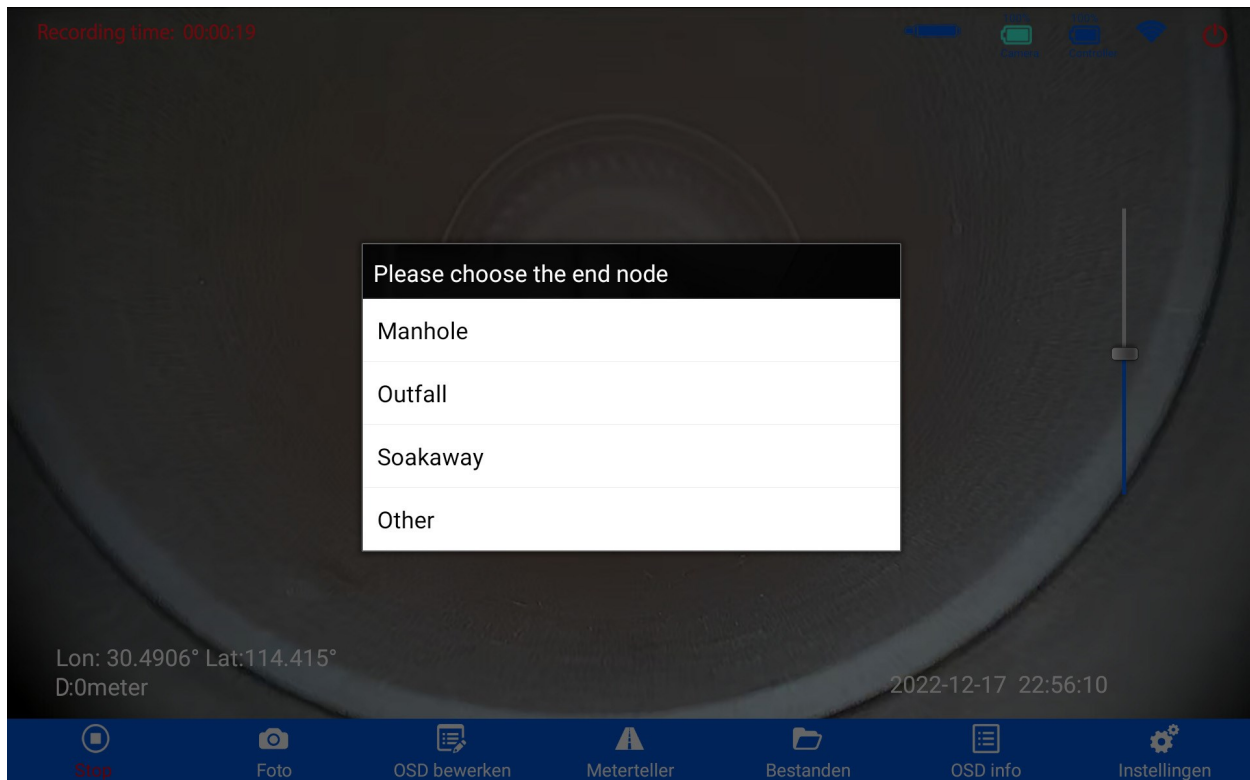
END RECORDING

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

When finished recording, click  to end recording



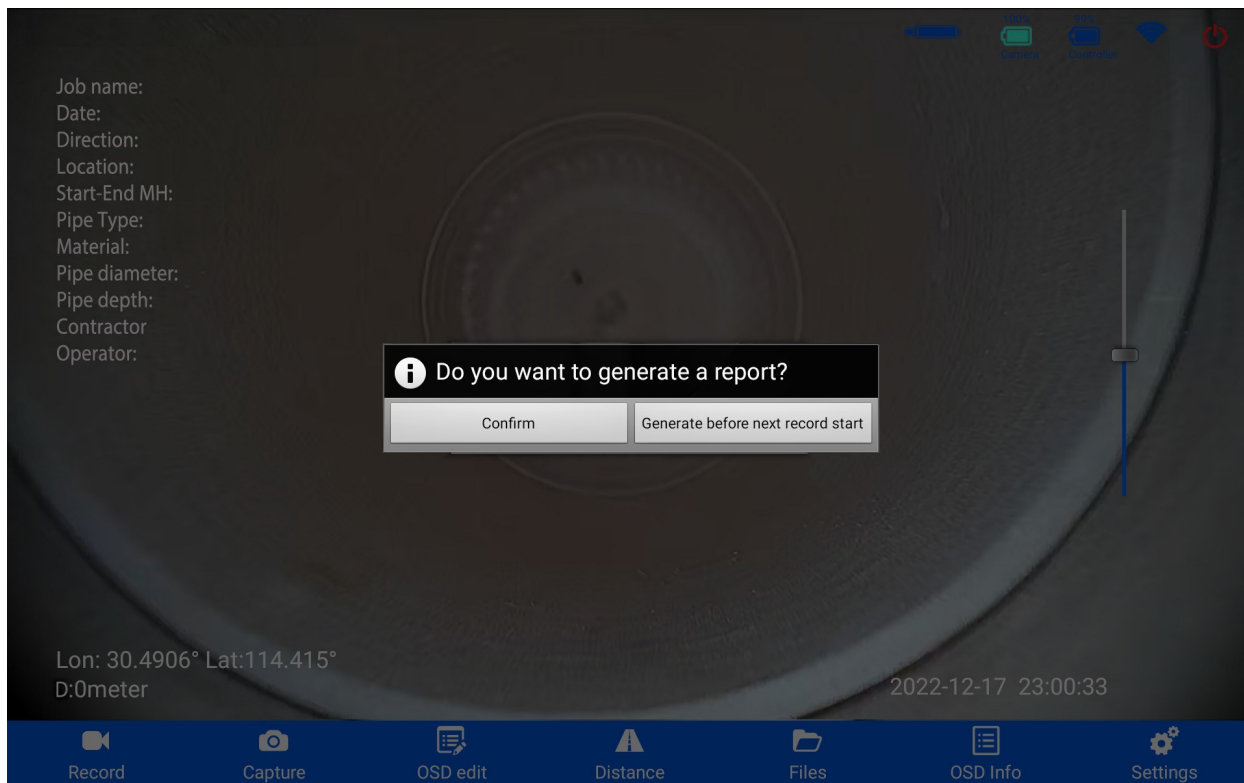
Select the end node of the recording. Recording will stop after 5 seconds.



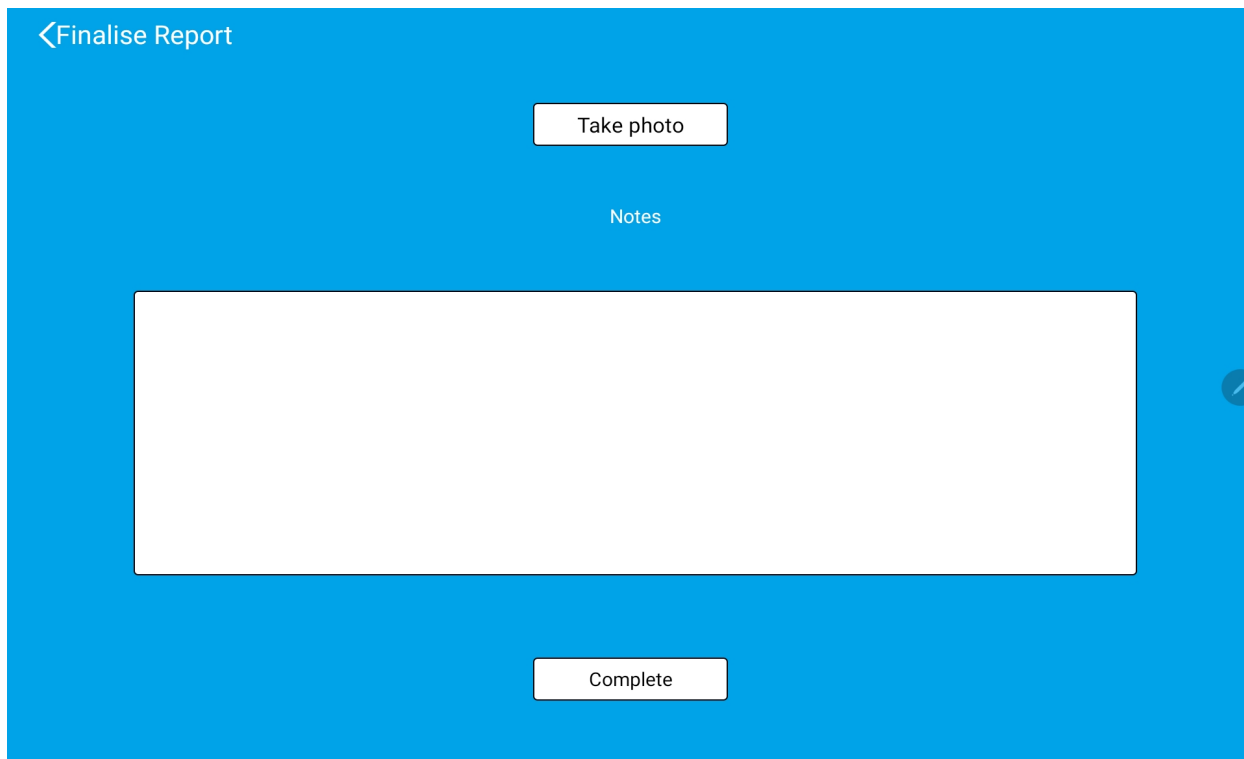
GENERATE REPORT

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

Automatically, the system asks if you want to generate a report, click 'Confirm' to generate a report of the inspection or select 'Generate before next record start' if you want to do this later.



Make a Surrounding photo, write another note in the appropriate entry field and click 'complete'. The pdf report is ready immediately and can be sent by email directly from the tablet.



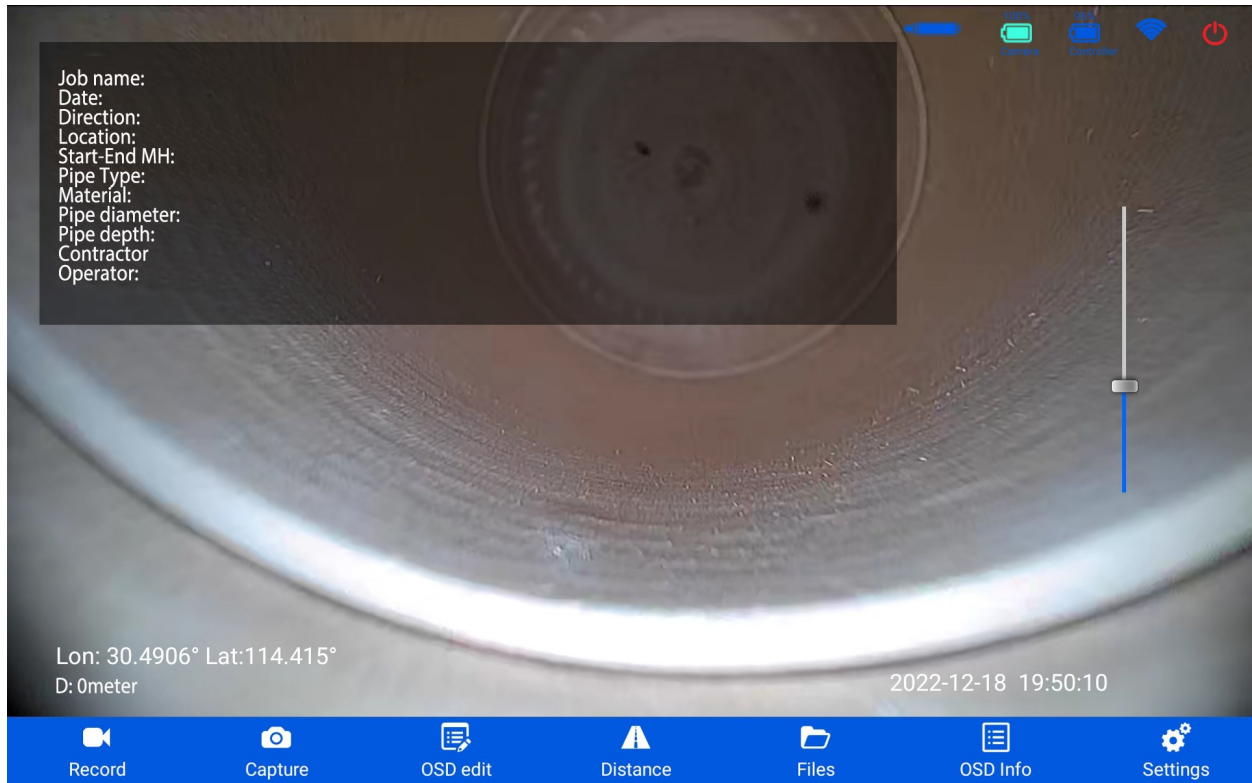
EDIT OSD / OSD INFO

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

Click



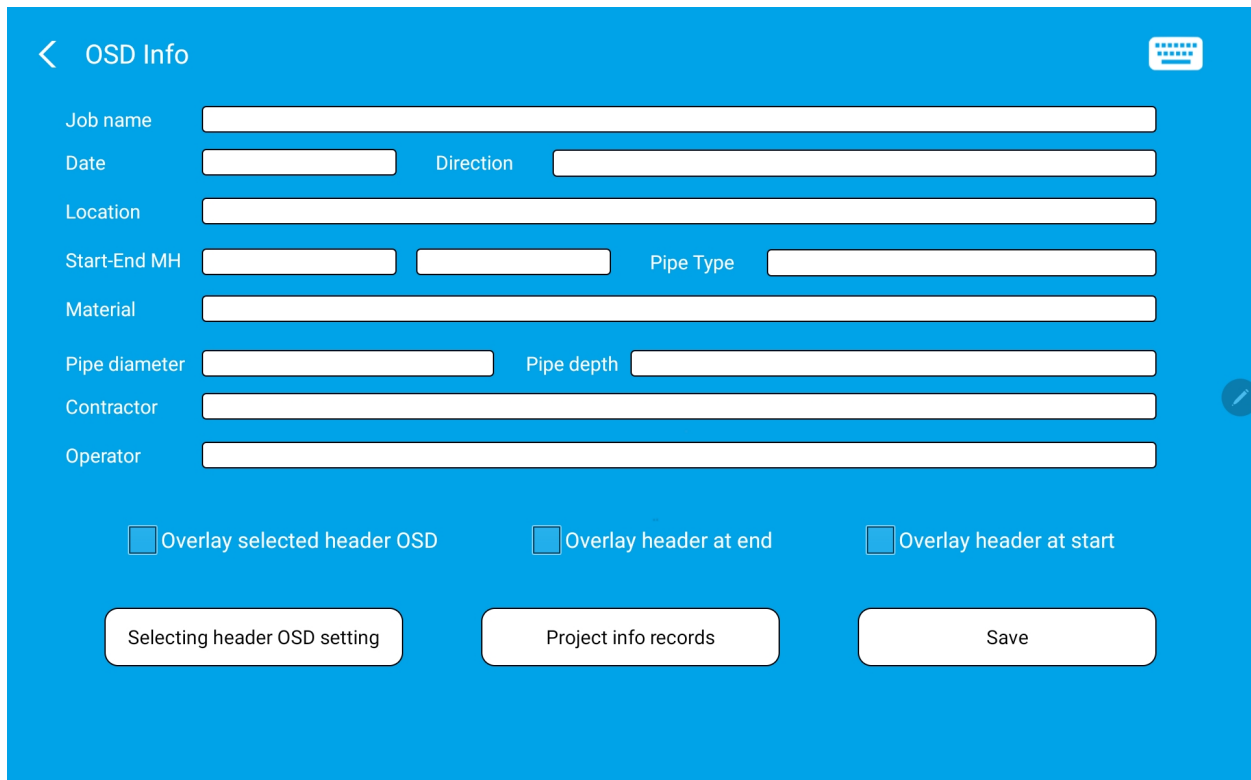
to edit the OSD info direct, even during a recording.



Or click

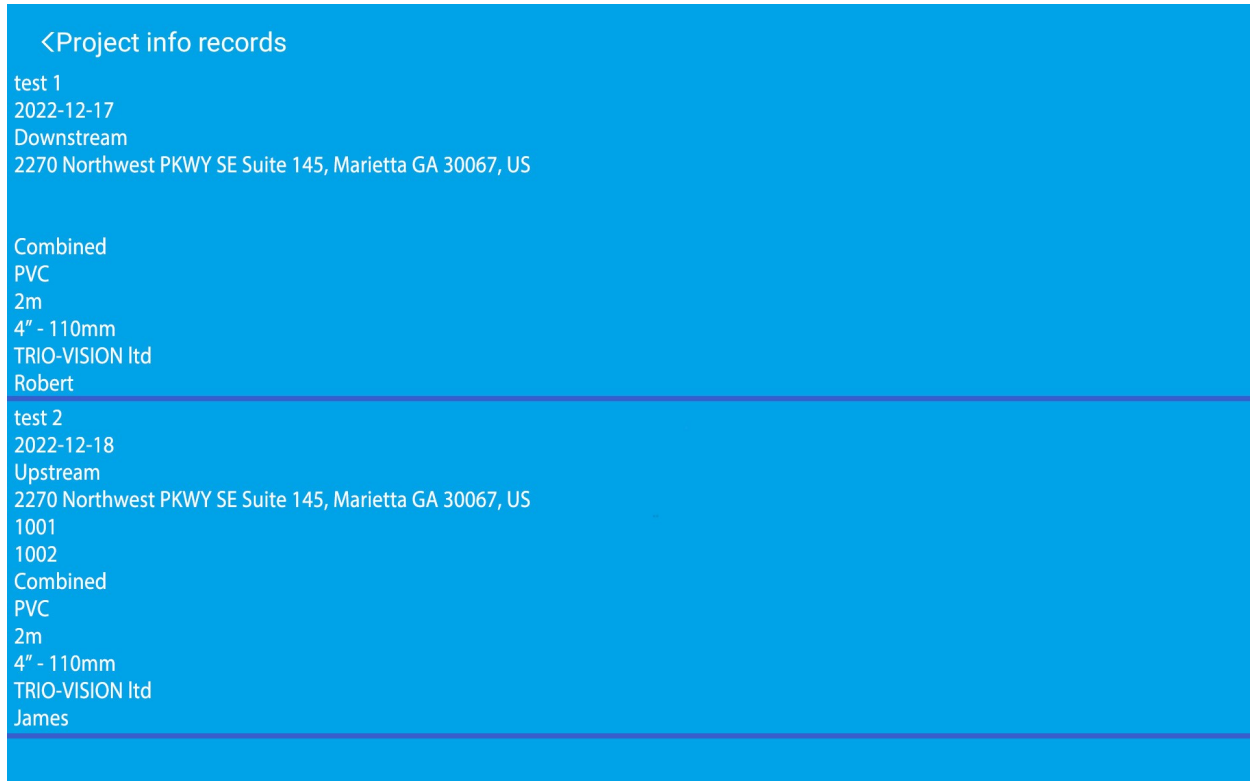


to view the OSD entry screen

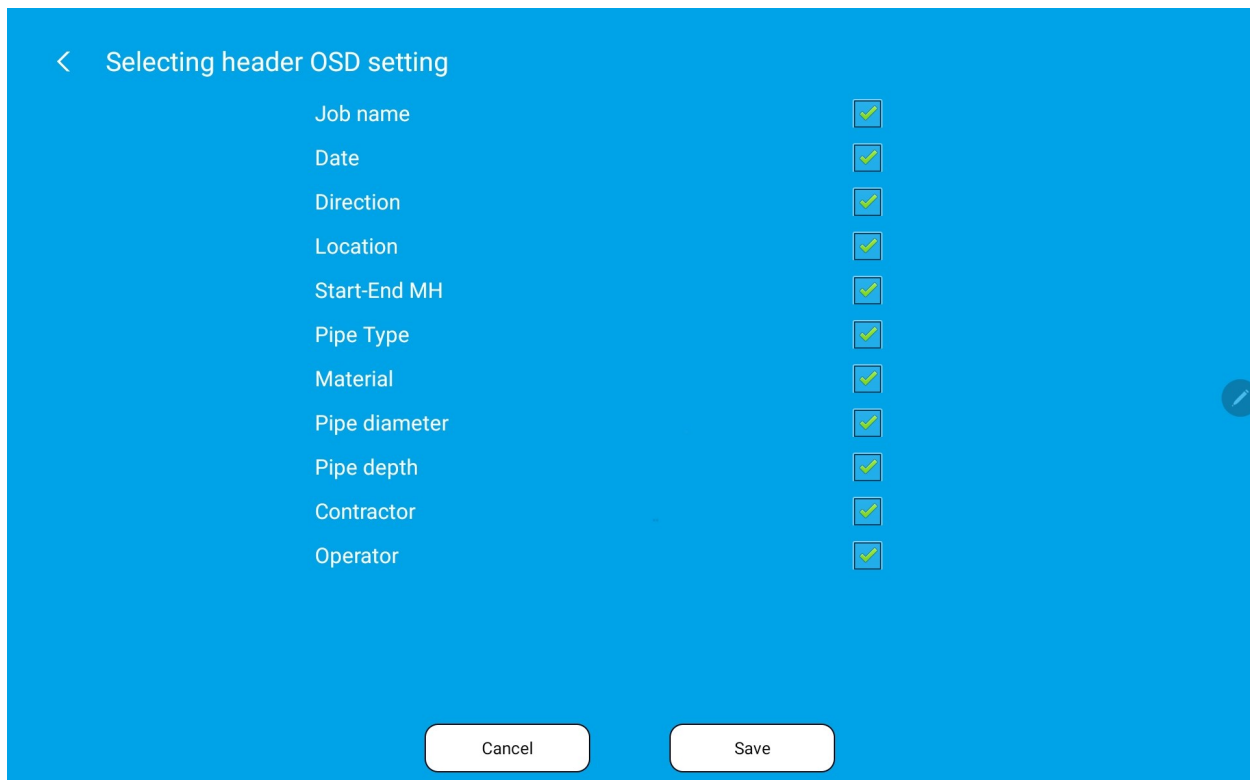
A screenshot of the "OSD Info" entry screen. The screen has a blue header with a back arrow and the text "OSD Info". Below the header are several input fields for: Job name, Date, Direction, Location, Start-End MH, Pipe Type, Material, Pipe diameter, Pipe depth, Contractor, and Operator. At the bottom, there are three checkboxes: "Overlay selected header OSD", "Overlay header at end", and "Overlay header at start". Below these are three buttons: "Selecting header OSD setting", "Project info records", and "Save".

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

Click 'Project info records' to call up the previously saved Project info records. (Job name & Start-End MH must be altered)



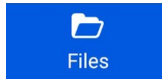
Click 'Selecting header OSD setting' to select the fields of the OSD info.



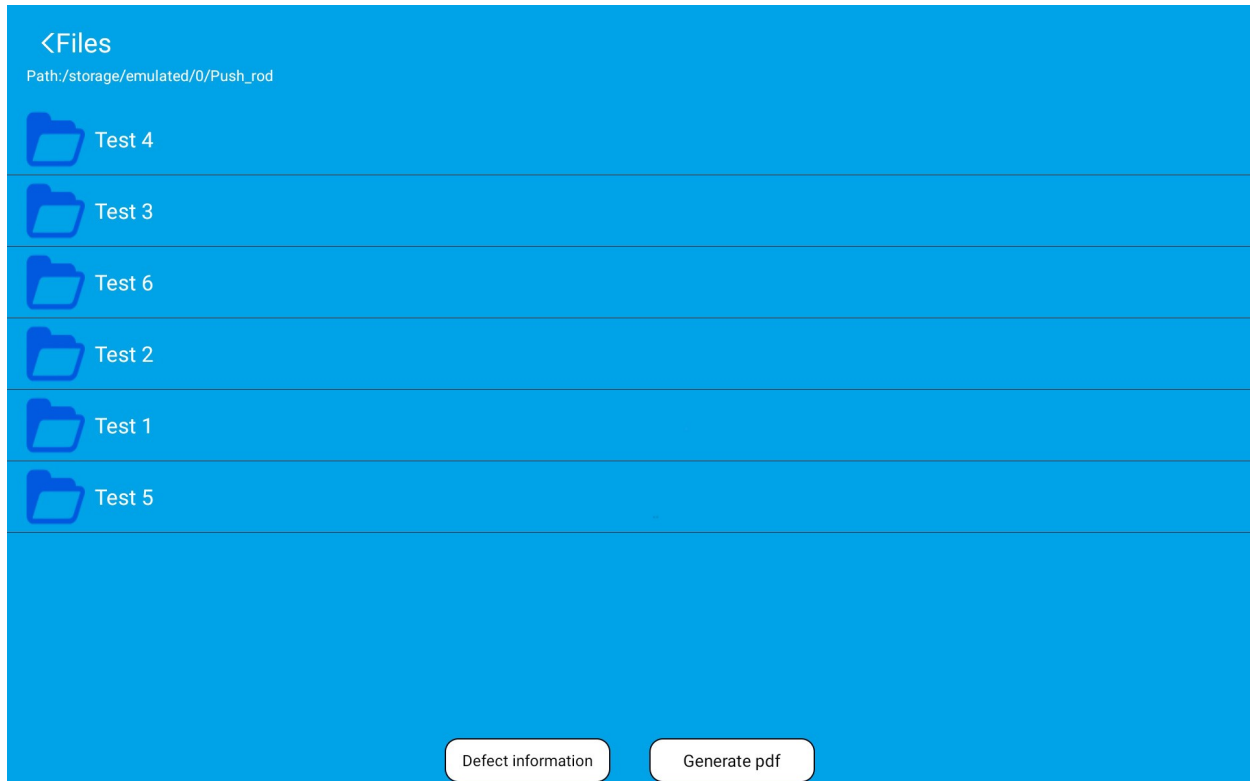
FILES

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

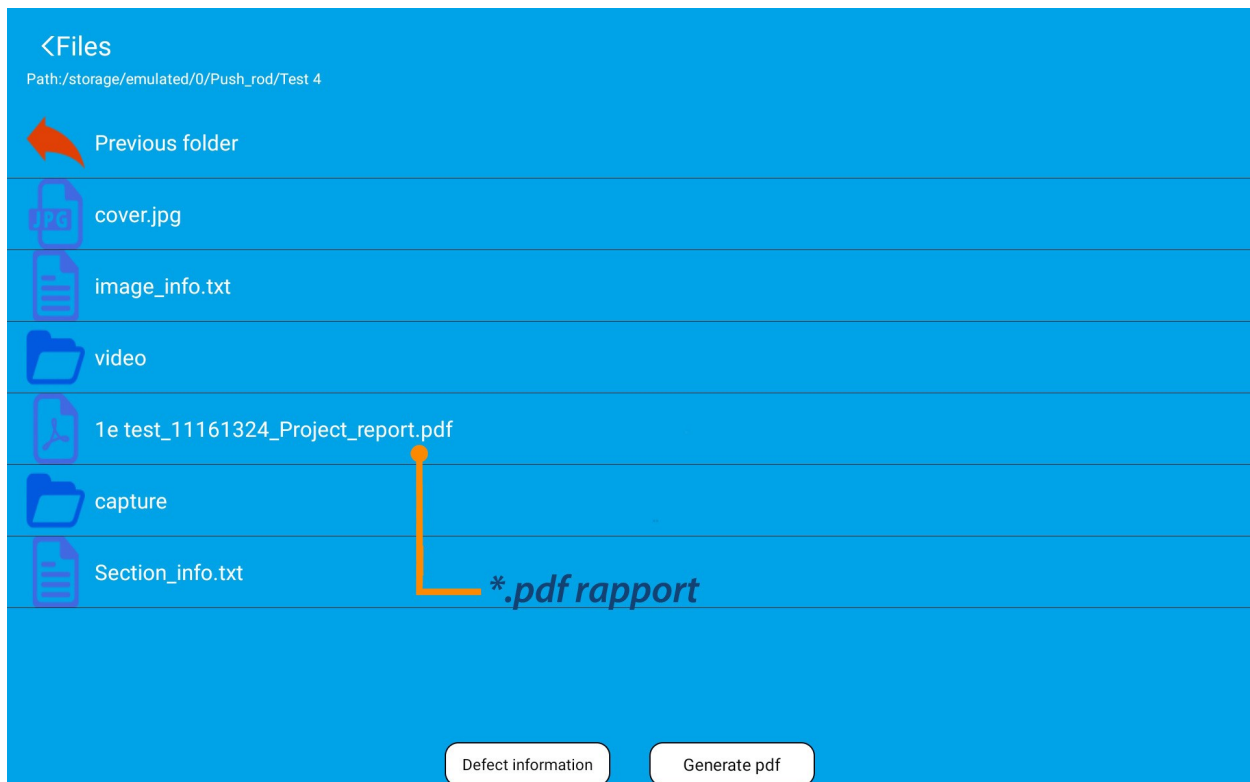
Click



to view saved projects. You can play videos and view photos here



Here you will also find the reports



The pdf report is ready instantly and can be sent by email directly from the tablet

SETTINGS

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

Click



to adjust settings such as language, font colour& size, brightness, GPS display etc.

A screenshot of the Settings menu. The background is blue. At the top left, there is a back arrow and the text "<Settings". Below this, there are several settings options, each with a corresponding dropdown menu:

- Date format: YYYY/MM/DD
- Font size: Large
- Language: English
- Time Point: Hide
- Font color: White
- Unit: meter
- Light power: Advanced

Below these settings, there is a checkbox labeled "GPS" which is checked. At the bottom of the screen, there are four buttons: "Version", "Report Logo", "Video name setting", and "Save".

The light power has 2 choices: Standard and Advanced. Choose Advanced if you are going to inspect pipes with a larger diameter or if the material of the pipe to be inspected strongly absorbs light (e.g. PE)

Version: here you will find the current version of the software.

If an upgrade is available you will be notified via your distributor. Upgrades of the software are free of charge and always recommended. Updates can be downloaded free of charge from this website:

<http://triviex.com/software.html>

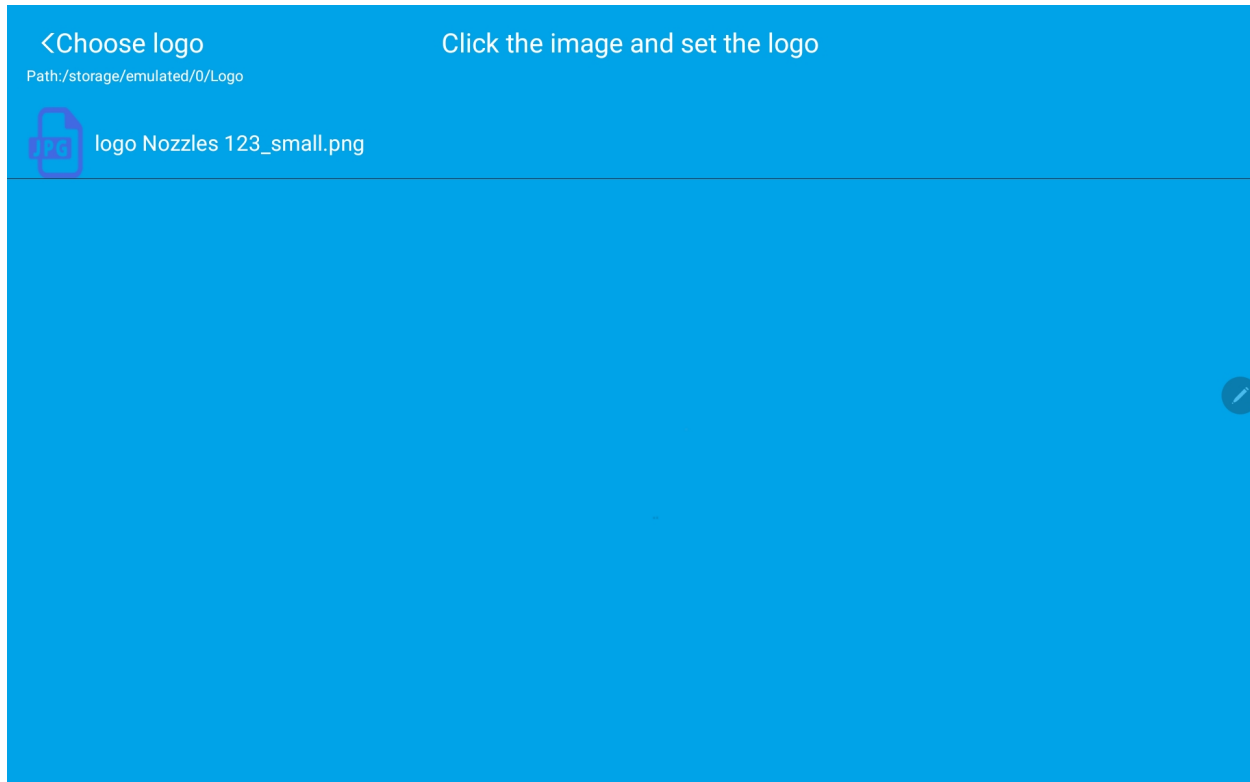
Click 'Video name setting' to select file name components.

LOGO

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

You can save a logo that will be automatically added to the reports. The logo should be saved in *.PNG format. Max. file size: 130 x 30 pixels.

Safe: Path:/Internal storage/Logo/



DAILY MAINTENANCE

As the inspection pushcable system is a precision electronic device, it must be handled with care to avoid damaging the lens.

Prolonged dirt adhesion can corrode the plug pins, resulting in air-tightness problems and difficult assembly. After each job, clean the surface of the push cable, wipe with a towel and dry. Use low-pressure water to rinse the camera head and wash away dirt and dust that may be in the spring. Shake dry or use low-pressure air to blow away excess water and dry the parts. The camera head, connecting rod and end pieces are exposed to highly aggressive chemicals during daily use. A clean system helps extend the life of these parts.

Interrupt the power supply throughout the cleaning process, but do not remove the camera head and cable connector to prevent water from entering the connector.

The electrical part of the cable reel cannot be cleaned directly with water to prevent circuit shorting.

After each inspection job, the operator should turn off the power and wipe the water off the equipment. Keep the camera system dry and clean.



Do not use pressure washers to clean the reel or other parts of the camera system.

WEAR OF THE PUSH CABLE

The push cable consists of a fiberglass rod surrounded by wire guides and a Kevlar braiding with a thick polypropylene sheath. Due to the harsh conditions in which the push cable is used, it must be kept in good condition.

Check the push cable for wear - Visually inspect the push cable for cuts, kinks and abrasions when it is reinserted into the cable reel. If the sheath is nicked or worn to the extent that the yellow or white Kevlar braiding is visible, it is time to replace the push cable. If the damaged push cable is used, water and moisture will enter the push cable, causing the camera's image to deteriorate or the image to fail completely.

The push cable below is an example of a badly worn sheath. This push cable should be replaced as soon as possible.



PROPER USE OF THE REEL BRAKE

Attempting to pull the push cable out of the reel while the reel is locked will result in the push cable in the reel becoming stressed. Pushing the push rod back into the reel while it is locked may cause the reel to tilt or the cable to kink.

STORAGE OF THE SYSTEM

Rinse / clean the system before storing it - the camera and push cable are exposed to a very harsh environment with potentially highly corrosive chemicals. If the parts are not cleaned and dirt dries up, these parts may wear out prematurely. Use low-pressure water to rinse the parts. Wipe the water dry or use air to blow it away before storing the unit overnight or for longer periods of time. It is a good idea to remove the centralizers to prevent water from drying up between the skid and camera head during storage.

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All features, functionality and other product specifications are subject to change without notice or obligation.