User Manual

PUSH CAMERA

TechWorm S

Use of the manual

This system manual has been prepared as both an operating guide and a reference. Please read this manual carefully before using the camera for the first time. Its purpose is to provide clear answers to your questions and to help you solve problems quickly and easily. Whenever an issue occurs, please consult this manual first. Use the table of contents to locate the relevant section.

If your question remains unanswered, or if you require assistance from an authorized service center, please contact:

Zikmund electronics, s.r.o.

Na Radouči 1221

29301 Mladá Boleslav

Czechia

Michal Neumann

+420 607 234 402

michal.neumann@e-zikmund.cz

https://www.e-zikmund.cz

Terms of warranty

Subject of warranty

The subject of this warranty is the purchased TechWorm S push camera system (as specified in the handover protocol).

Acceptance of goods

Upon receipt, the operator is obliged to thoroughly check the system and all its components. The delivery protocol serves as proof of fulfilment of the system delivery.

Warranty period

Zikmund electronics, s.r.o. provides a 12-month warranty for its camera inspection systems, starting from the handover date confirmed in the handover protocol. Exceptions are parts not manufactured by Zikmund electronics, s.r.o., for which the warranty is provided by the respective component manufacturer. Zikmund electronics, s.r.o. issues a confirmed warranty card.

Place of claim

Warranty claims can be made at the business premises of Zikmund electronics, s.r.o. or at an authorized service center of the manufacturer.

System handling

The buyer is properly trained and tested in the operation of the system, for which a certificate is issued. The equipment must not be operated by untrained personnel.

Claim procedure and settlement period

In the event of a defect covered by this warranty, the operator must notify the manufacturer as soon as possible and arrange for service. Repairs will be carried out as quickly as possible, and no later than 30 calendar days from the date the defect is reported at the business premises or authorized service center.

The warranty does not cover:

• Surface treatment of components moving in pipes

• Mechanical damage to the camera’s main cable

• Defects caused by improper handling of the system, including failure to follow the instructions in the user manual.

• The PC operating system

• Water penetration into the interior of cameras. The manufacturer guarantees system tightness only if the equipment is operated correctly.

• Normal wear and tear of parts due to operation (e.g., wear of seals, wear of the cable, wear of the main camera connector, etc.)

• Subsequent innovations or equipment upgrades

Prohibited operations

No additional applications may be installed on the PC system without prior consent from Zikmund electronics, s.r.o.

Loss of warranty

The warranty becomes void if the defect is caused by mechanical damage to the system, operation in unsuitable conditions (chemically aggressive environment, absence of internal air pressure, etc.), or unauthorized tampering with the product (including by non-authorized service technicians). Use in explosive environments is strictly prohibited. Defects caused by natural disasters or force majeure are also excluded from the warranty.

Table of contents

1. Purpose

The TechWorm S push camera is designed for convenient video inspection and diagnostics of engineering networks such as sewers, water pipes, and ventilation ducts. The video source is a camera with bright LED lighting, mounted in the head at the end of a durable cable. The cable is wound on a drum and manually pushed into the inspection area. To make insertion easier, special skids are used.

2. Technical specifications of TechWorm S

Basic frame and cable drum	
Parameter	**Value**
Basic frame material	Powder-coated steel
Drum exchange	Fast interchangeable drums with various cable types and lengths
Camera working position	Horizontal and vertical
Cable brake	Adjustable one-way brake - braking forward, free movement backward
Distance measuring system	Built-in electronic system
Data transmission (camera ↔ control tablet/PC)	Wi-Fi, USB-C, LAN
Cable type	Push cable 7T6, Ø 7 mm
Cable length	60 m (standard), up to 100 on demand
Flexible extension piece	Optional, for easier pushing through bends (up to 90°) and difficult pipe sections
Camera heads	
Supported heads	VH 33 HD, VH 39 HD, RTH 34 HD
Head exchange	Fast interchangeable, tool-free
Video resolution (all heads)	Full HD (1080 p), 1920x1080 px, 30 frames per second
Photo resolution (all heads)	Full HD (1080 p), 1920x1080 px
Expandability	VH 39 HD and RTH 34 HD can be used in Zikmund electronics robotic crawler systems
VH 39 HD camera head	• For diameters DN40 -DN300 (and up to DN2000 with optional additional lighting) • Motorised focus with remote focus control from the tablet for a clear view of objects selected by the operator • Self-levelling camera lens (relative to the horizon) • Built-in temperature and humidity sensors to monitor and control the condition of the head and its electronic components • Integrated LED lighting 1080 lm • 5x digital zoom • field of visibility 100° • IP 68
RTH 34 HD camera head	• For diameters DN70 -DN400 (and up to DN2000 with optional additional lighting) • Pan and tilt camera head: pan +/- 130°, tilt 360°(continuous rotation around its axis) • Motorised focus with remote focus control from the tablet for a clear view of objects selected by the operator • Integrated LED lighting 1440 lm • 5x digital zoom • field of visibility +141°/-136° • Integrated transmitter 33 kHz (standard) or 512 Hz (on demand) • Continuous speed control • Indicator of the direction of the view in the pipe • Automatic return to basic position

Power	
Power source	Autonomous – powered by rechargeable DeWalt hand tool batteries, easily replaceable without tools
Charging	External charger
Minimum operating time	6 hours
Software and control	
Inspection control	Portable tablet with Windows 11 IoT LTSC operating system, 10″ high-brightness display (1000 nits)
Dual video transmission	Simultaneous video streaming to a second operator's smartphone/tablet
Software IKAM Basic	Camera head control, recording video, saving photo, title in the screen
Software IKAM Professional	Camera head control, full version, working in ATV or EN13508 norm
Menu and software languages	Czech, English, German, Swedish, Ukrainian, Serbian, Croatian
Expandability	Can be used in Zikmund electronics robotic crawler systems
Weight and dimensions	
Weight	16 kg with 60 m cable (standard configuration)
Dimensions	538 mm (L) × 694 mm (H) × 320 mm (W)
Operating conditions	
Temperature range	+5 to +40 °C

3. System operation and Functionality

3.1. Switching on the TechWorm S reel

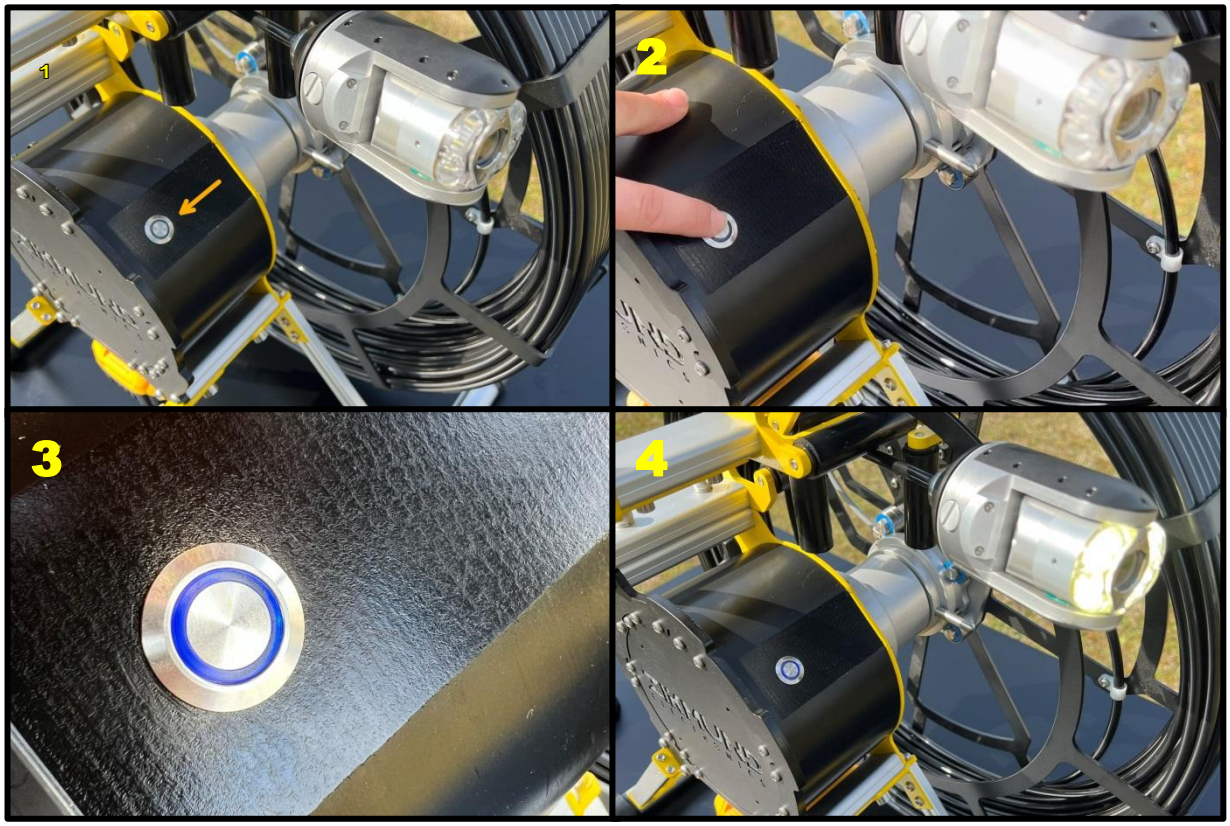
Position of the button for switching on the reel of TechWorm S.

1. Press the button on the body of the TechWorm S reel for 1 to 2 seconds to switch on.
2. After switching on, the button lights up.
3. The lights on the camera head always light up after switching on.

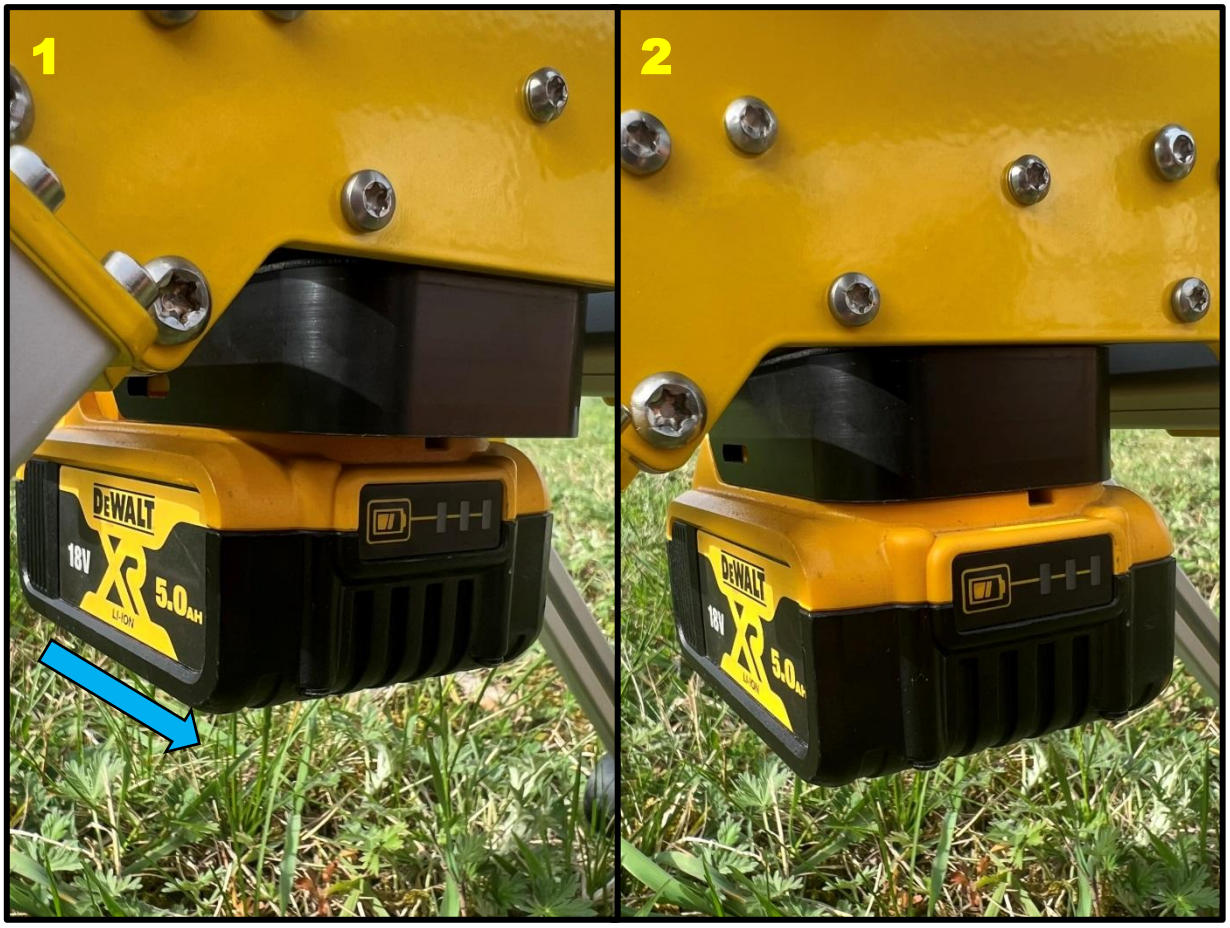
   The camera head switched on signals that everything is working and is well connected. Should there be a problem with the data or image, switch off the system and clean the printed connections with an alcohol cleaner (FLU cleaner).

   Caution: before switching on the TechWorm S system, check that all connectors are tightened, the battery is properly seated and the cable drum is locked inside the TechWorm S reel.

   To switch off the system, hold the button for 2 to 4 seconds. After switching off, the power button and the camera head will turn off.



3.2. Battery power supply



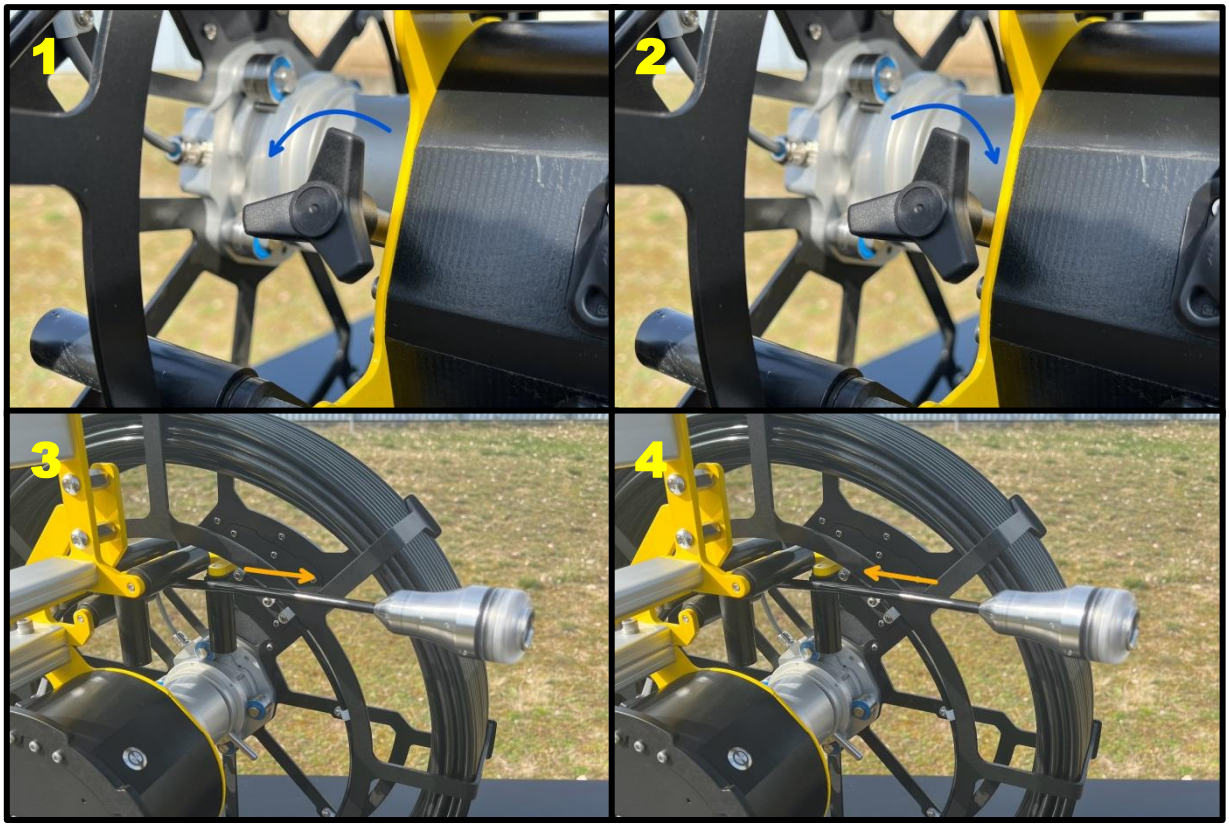
1. The battery connector is located on the TechWorm S reel between the lower legs. Slide the battery all the way into the battery connector. Once the battery is inserted to the maximum position, the battery will lock.

2. Correctly inserted battery.

   To remove the battery, press the button on the battery and slide the battery out.

   Always insert the battery correctly into the battery connector before switching on.

3.3. TechWorm S reel brake function



1. Turn the brake star counterclockwise to release the brake.
2. Turn the brake star clockwise to tighten the brake.
3. The brake is adjusted only in the outward direction. You can stop the cable movement completely by tightening the brake. The cable on brakes is more suitable for carrying the TechWorm S reel.
4. Winding up the cable back on the cable drum is not restricted by the brake.

3.4. Flexible extension piece

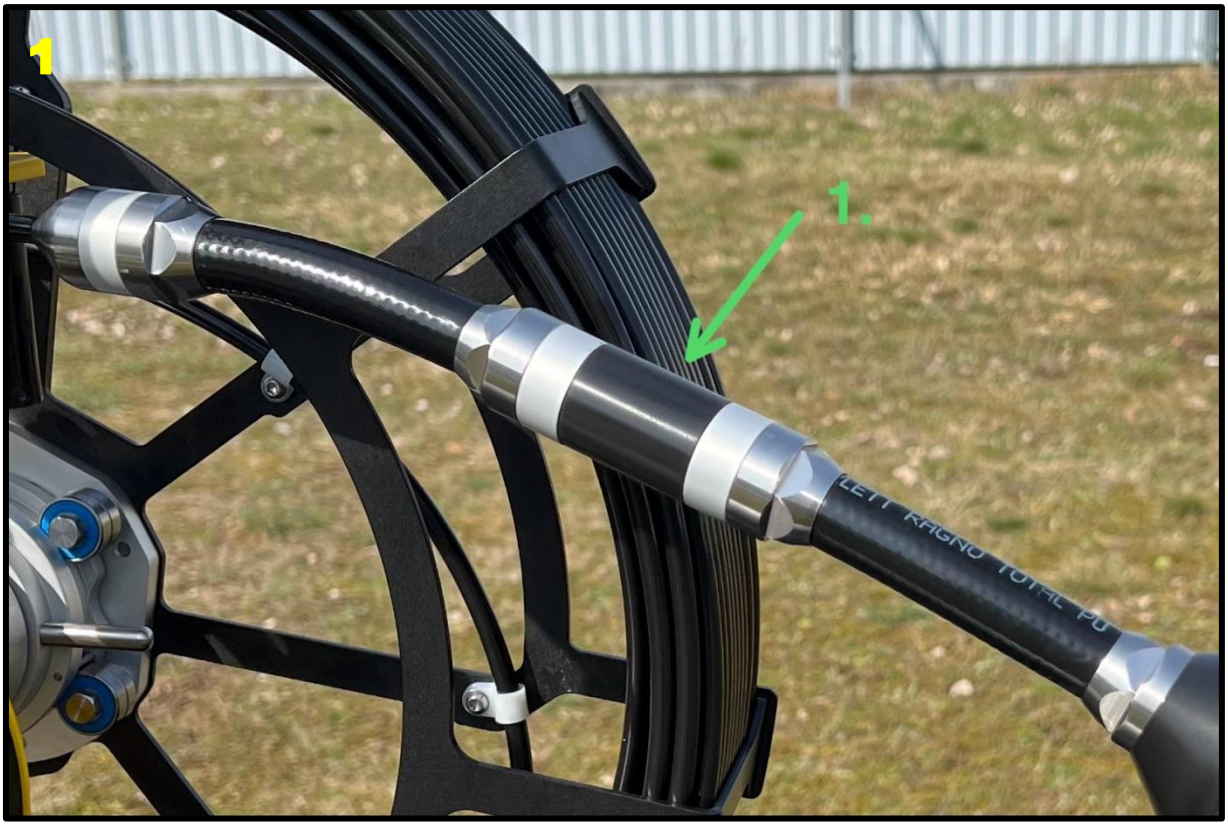
1. The flexible extension piece is used as a connection between the push cable and the RTH34/VH33 heads. It is required for routing the cable in the elbows of pipes. It can be equipped with a probe of 33kHz or 512Hz. The flexible extension piece can be of various lengths according to customer needs or intended use.

2. The connector with flexible contacts in Figure 1, number 1. Protect the connector from dirt. Do not touch the flexible contacts with fingers, there is a risk of damage and poor conductivity of the contacts. Keep the O-ring sealer on the connector clean, it ensures water-resistant connection between the connectors.

3. The connector with circular contacts in Figure 1, number 2. Protect the connector from dirt. Do not touch the circular contacts with fingers, there is a risk of poor conductivity of the contacts.

1. If the flexible extension piece is detached from the push cable, protect it with connector caps. Screw the connector cap on the connector, in the clockwise direction. Reverse the procedure to remove the connector cap.

2. Example of the connector covered in a safe way.



1. Example of a flexible extension piece equipped with a probe 1.

3.5. Push cable connector

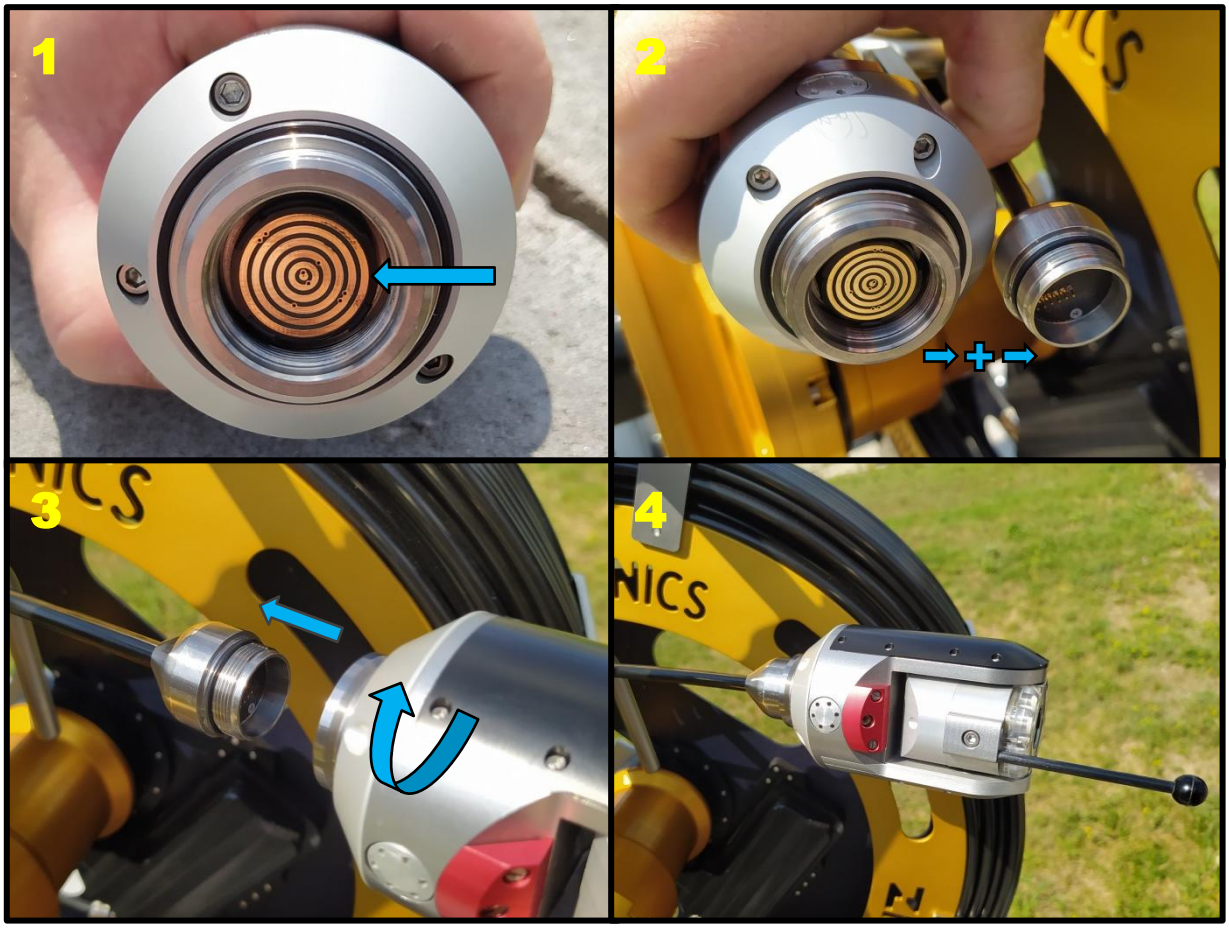
1. The connector with flexible contacts. Protect the connector from dirt. Do not touch the flexible contacts with fingers, there is a risk of damage and poor conductivity of the contacts. Keep the O-ring sealer on the connector clean, it ensures water-resistant connection between the connectors.

   If there is poor conductivity or you have touched the connector, clean the connector with an alcohol cleaner (FLU cleaner).

2. If there is nothing connected to the push cable connector, protect it with the connector cap. Screw the connector cap on the connector, in the clockwise direction. Reverse the procedure to remove the connector cap.

3. Example of the connector covered in a safe way.

3.6. Connecting camera heads to the push cable



1. The connector with circular contacts on the RTH34HD camera head. The VH33HD camera head has the identical connector. Protect the connector from dirt. Do not touch the circular contacts with fingers, there is a risk of poor conductivity of the contacts.

   If there is poor conductivity or you have touched the connector, clean the connector with an alcohol cleaner (FLU cleaner).

2. A view of the camera head and the push cable connectors. Always unplug the cable drum or switch off the TechWorm S reel before connecting or replacing the camera head. Failure to do so may result in damage to the system when connecting or disconnecting!

3. Screw the camera head on the push cable connector in the clockwise direction. Reverse the procedure to remove the camera head. For the RTH34HD camera head, each disconnection from the connector will release pressurized air. After losing its air it is always necessary to re-pressurize the RTH34HD camera head.

4. Demonstration of the connected camera head. Use the camera head attached in this way only when inspecting pipes without elbows. There is a risk of breaking the push cable in elbows. For pipes with elbows use the flexible extension piece.

3.7. Connecting the flexible extension piece to the push cable

1. A view of the flexible extension piece and push cable connectors. Always unplug the cable drum or switch off the TechWorm S reel before connecting or replacing the flexible extension piece. Failure to do so may result in damage to the system when connecting or disconnecting!

2. Screw the flexible extension piece on the push cable connector, in the clockwise direction. Reverse the procedure to remove the flexible extension piece.

3. Example of the flexible extension piece connected to the push cable. Do not forget to attach the camera head after connecting the flexible extension piece.

3.8. Connecting camera heads to the flexible extension piece

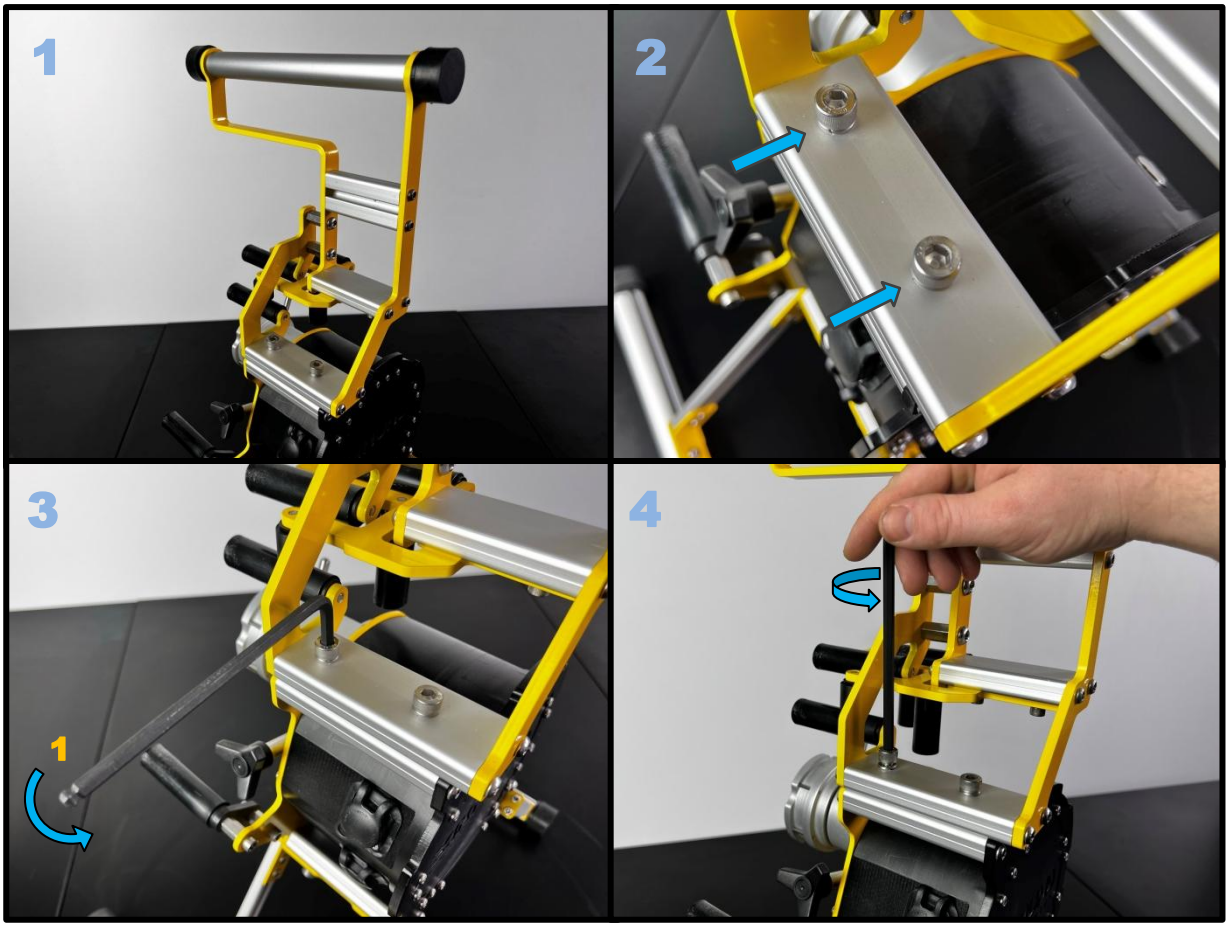
1. A view of the camera head and the flexible extension piece connectors. Always unplug the cable drum or switch off the TechWorm S reel before connecting or replacing the camera head. Failure to do so may result in damage to the system when connecting or disconnecting!

2. Screw the camera head on the flexible extension piece connector in the clockwise direction. Reverse the procedure to remove the camera head. For the RTH34HD camera head, each disconnection from the connector will release pressurized air. After losing its air it is always necessary to re-pressurize the RTH34HD camera head.

3. Demonstration of the camera head connected to the flexible extension piece in a correct way. This configuration is suitable for most inspections. The flexible extension piece facilitates passability through elbows in pipes and protects the push cable from breakage.

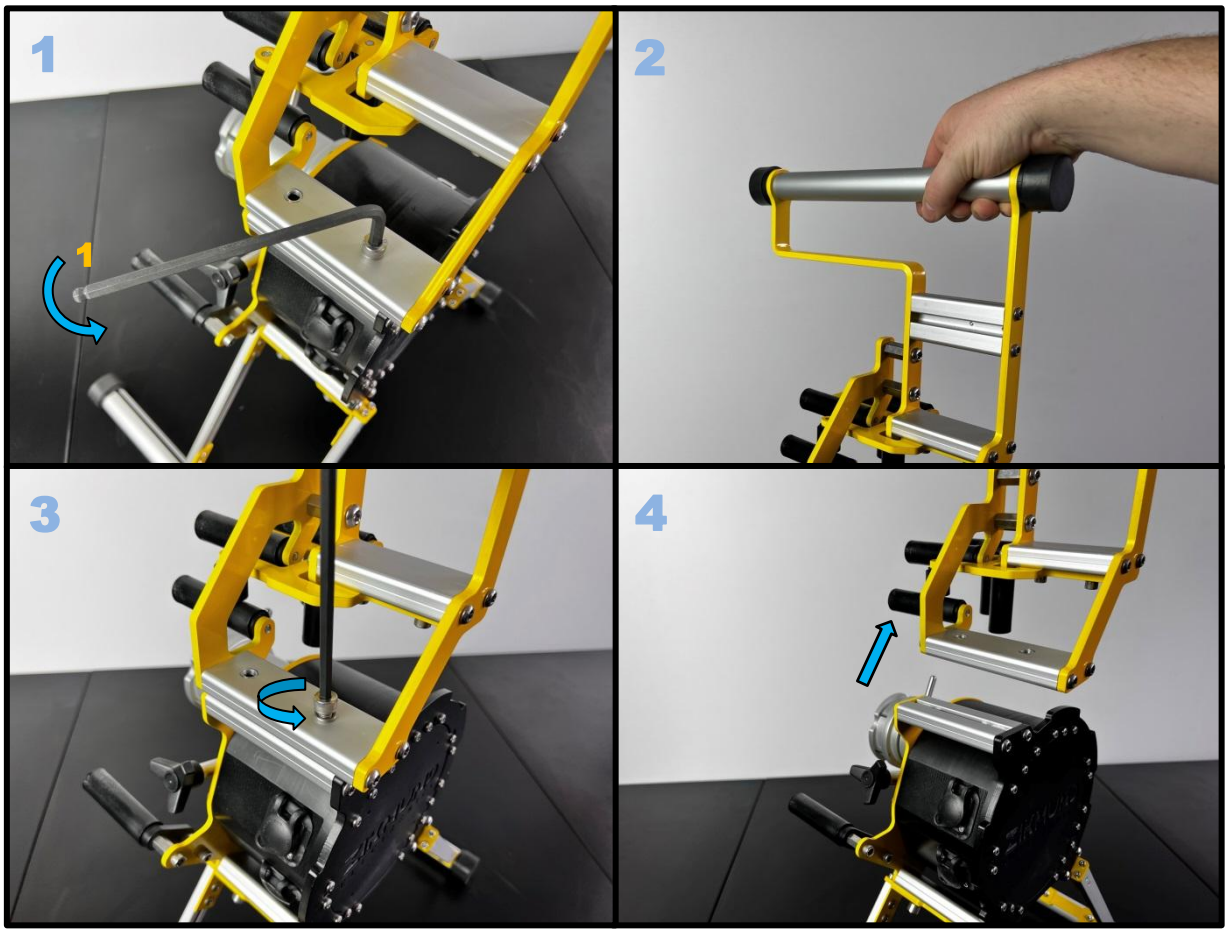
3.9. Mechanical adjustments to the reel

Removing the handle from the TechWorm S reel



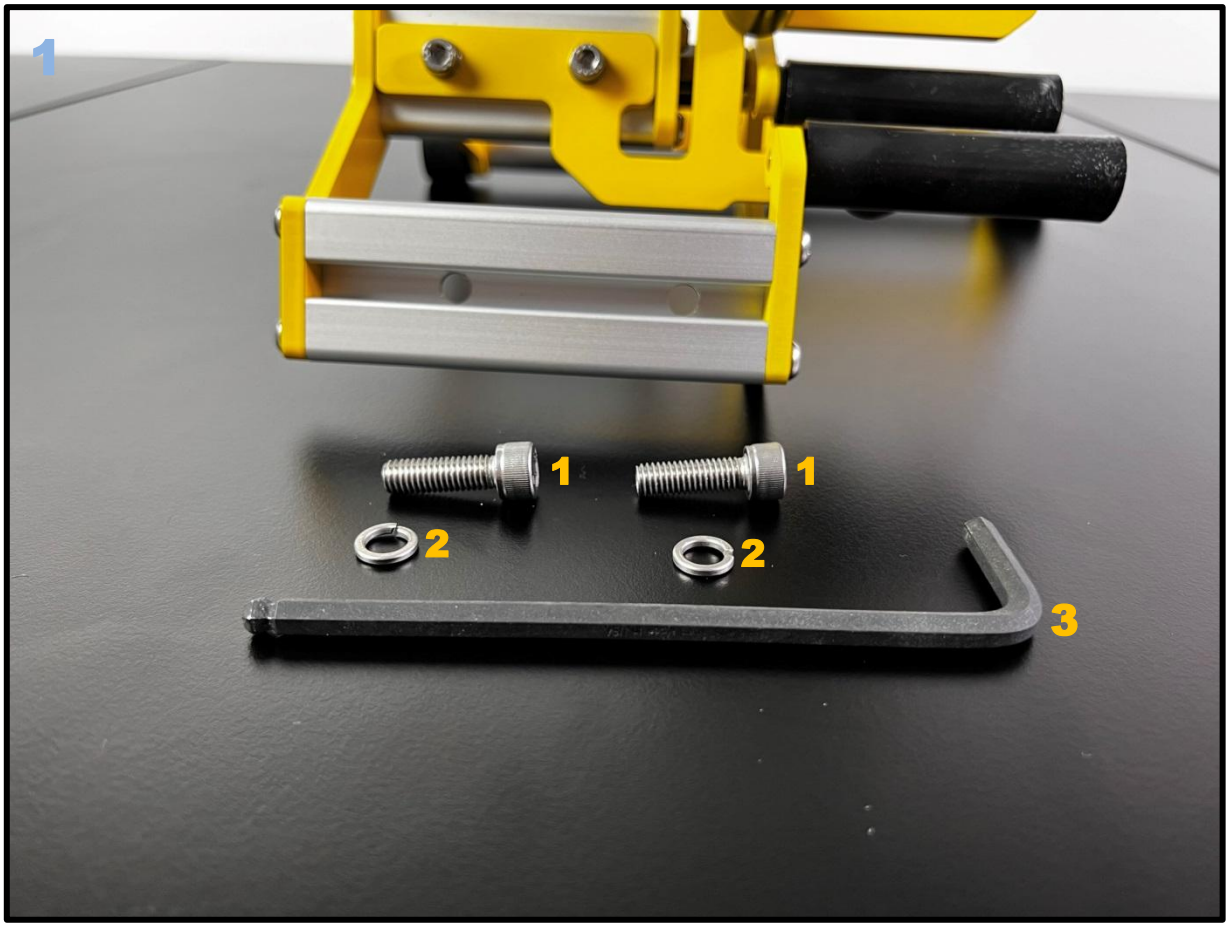
4. View of the mounted handle of the TechWorm S reel. The cable drum must always be detached from the TechWorm S reel before removing the handle.
5. To remove the handle, you need to unscrew the two main bolts - Figure 2.
6. To loosen the bolt, use the 1. allen key size 6. Turn counterclockwise.
7. For faster unscrewing you can use the other side of the allen key with a ball. After removing the bolt, do not lose the washer under the bolt.

Removing the handle from the TechWorm S reel



1. Insert 1. the allen key size 6 into the second bolt and loosen counterclockwise.
2. When loosening the second bolt, hold the handle with your other hand the whole time so that it does not fall off.
3. For faster unscrewing you can use the other side of the allen key with a ball. After removing the bolt, do not lose the washer under the bolt.
4. Remove the handle from the TechWorm S reel.

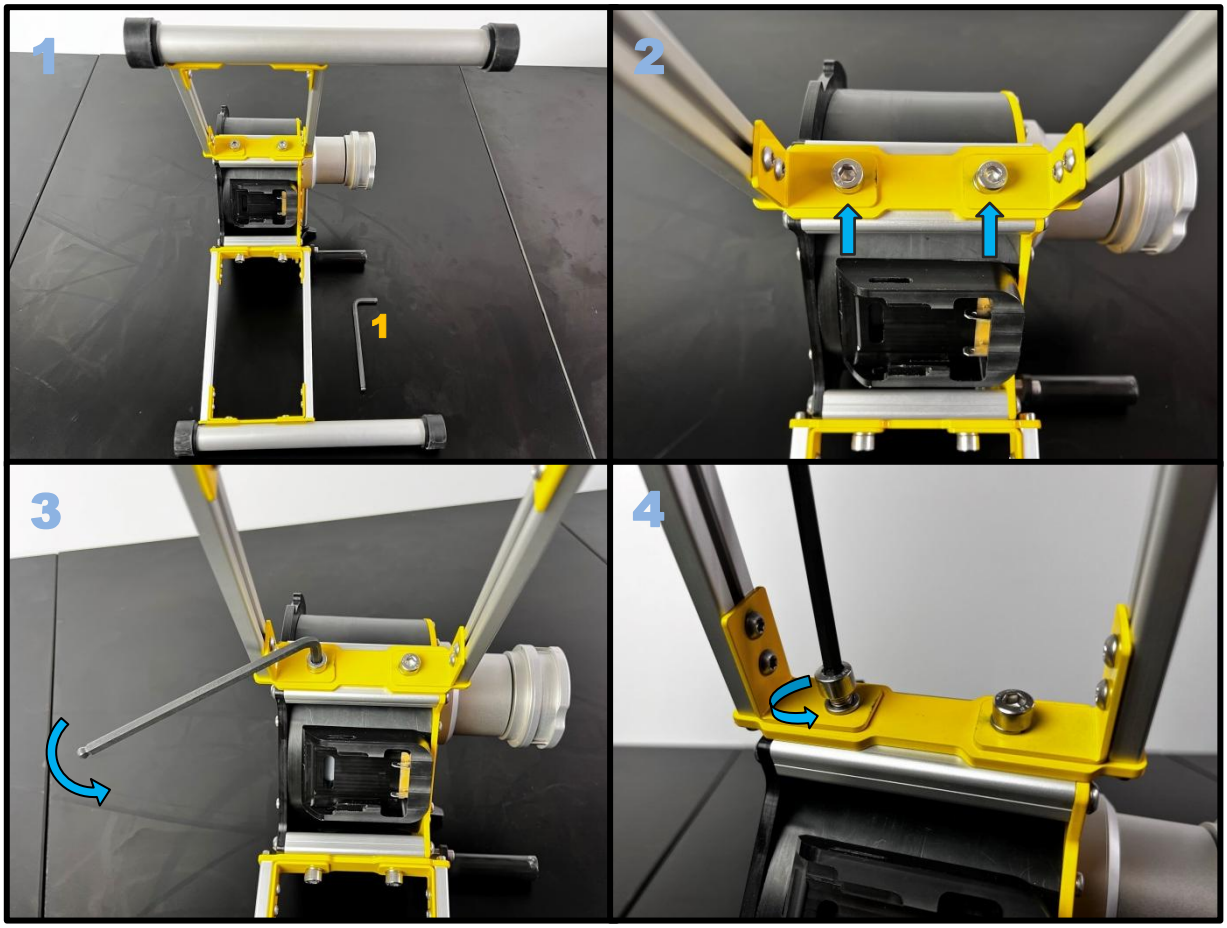
Removing the handle from the TechWorm S reel



1. Set of handle fasteners.
   - 1. Bolt - DIN 912 M8 x 25 A2 (stainless steel)
   - 2. Split spring lock washer - DIN 7980 8.1 A1 (stainless steel)
   - 3. Allen key size 6

Use the reverse process to mount the handle. Tighten the bolts with about a medium force. Do not forget to place the spring lock washers under the bolt heads, they prevent the bolts from loosening spontaneously.

Removing the foot from the TechWorm S reel

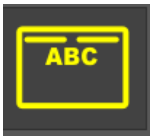


1. To remove the foot from the TechWorm S reel, place the reel on its side. To loosen the bolts, you will need 1. the allen key size 6.
2. To remove the foot, you need to unscrew the two main bolts - Figure 2.
3. Insert the allen key into the bolt head and turn counterclockwise.
4. For faster unscrewing you can use the other side of the Allen key with a ball. After removing the bolt, do not lose the washer under the bolt.

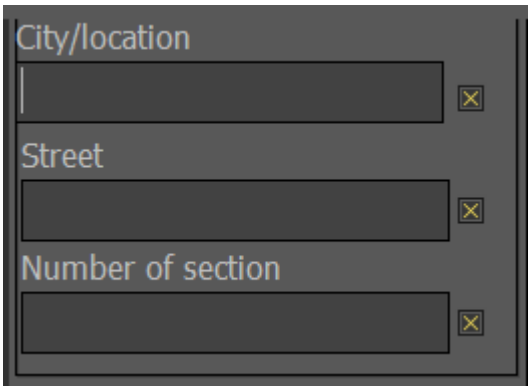
3.10. Operating Software IKAM Basic

3.10.1. Entering the initial inspection data

At the beginning of the inspection, you must enter the initial data for the inspection. These data are used to create a folder to store the inspection data (video, photos). If these data are not entered, after pressing the record button  the recording will not be started because the program has not determined where to store the data. A menu will be automatically called up to enter this data. Since the folder name is made up of these data, it is not allowed to use some characters - / \ : * ? " < > | these characters are used by the system to separate folders. The program automatically changes all these characters to _ .

To enter this data, press the button 

The required data are:



City/Place – enter the location where the pipeline is situated.

Street - enter the street where the pipeline is situated.

Section number - enter the section number.

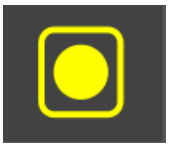
The values are automatically displayed in the image when entered.

The menu is closed after entry by pressing again the button 

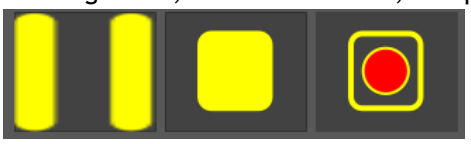
The program always remembers the last entered data even after switching off.

3.10.2. Starting the recording

!!! To start the recording, you must have done the step 1.1 Entering the initial inspection data

To record the video of the inspection, press the button  and the program will start recording the video of the inspection into the folder of the section you specified in the step 1.1

(c:\camera\data\place\street\number)

When recording starts, the /Pause Rec/ , /Stop Rec/ buttons will appear and the REC light will turn yellow  .

The button  is used to pause recording without stopping. When pressed, it only stops the video recording, but does not terminate it. If pause recording is selected, the button changes to  . If the button is pressed again, the video continues recording and the button changes back to  .

The button  is used to stop recording. When pressed, both the /Pause Rec/ and /Stop Rec/ buttons go off and the REC button is reactivated for new recording.

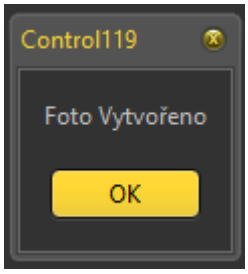
The video file name is composed of: Date_Time.asf

Example: the video will be recorded on 5.8.2019 at 10:47 a.m. The video file will be named 5 8 2019_10 47 06.asf

3.10.3. Creating photos

!!! To create a photo, you must have done the step 1.1 Entering the initial inspection data

A photo is created by pressing the button  and saved in a folder in the same way as a video file.

After saving the photo, the message 

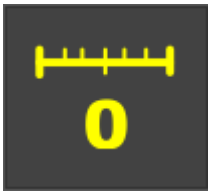
will be displayed and the program will continue after pressing the OK button.

The photo file name is composed of: Date_Time.jpg

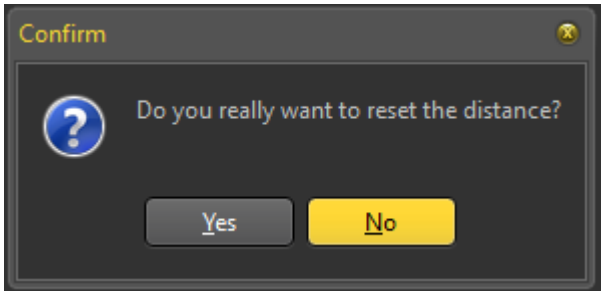
Example: the photo will be created on 5.8.2019 at 10:47 a.m. The photo file will be named 5 8 2019_10 47 06.jpg and will be saved in the folder

(c:\camera\data\place\street\number).

3.10.4. Resetting the distance counter

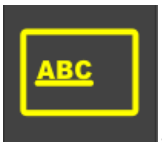
After pressing the button 

a confirmation window will appear

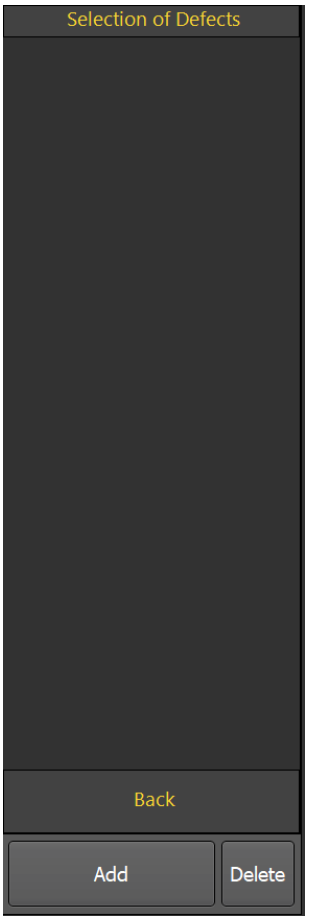


By confirming YES the program will reset the counter, if NO is pressed the distance counter will not change.

3.10.5. Specifying a fault in the pipeline

The description of faults in the pipeline is done by pressing the button 

. After pressing this button, the menu for entering faults is displayed:

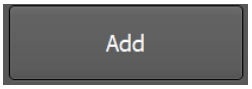


This menu can be closed by pressing again the button 

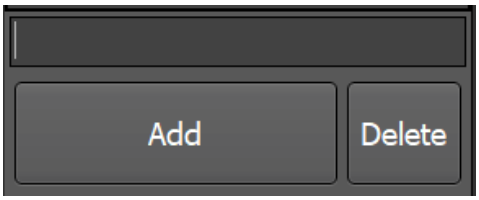
.

The faults entered by the user are automatically saved and can be reused. In this way, the program allows you to create your own database of fault descriptions regardless of the field in which the program is used.

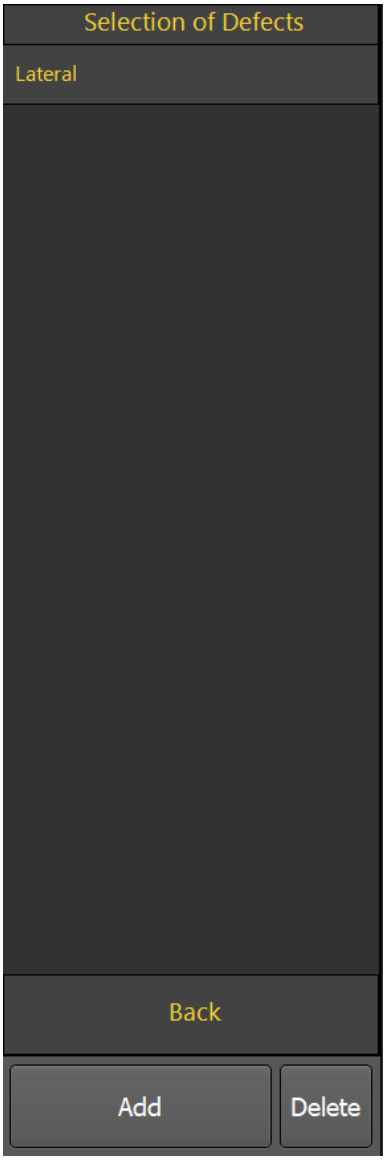
Creating a description of the fault:

Press the button 

to display a menu for entering a description of the fault

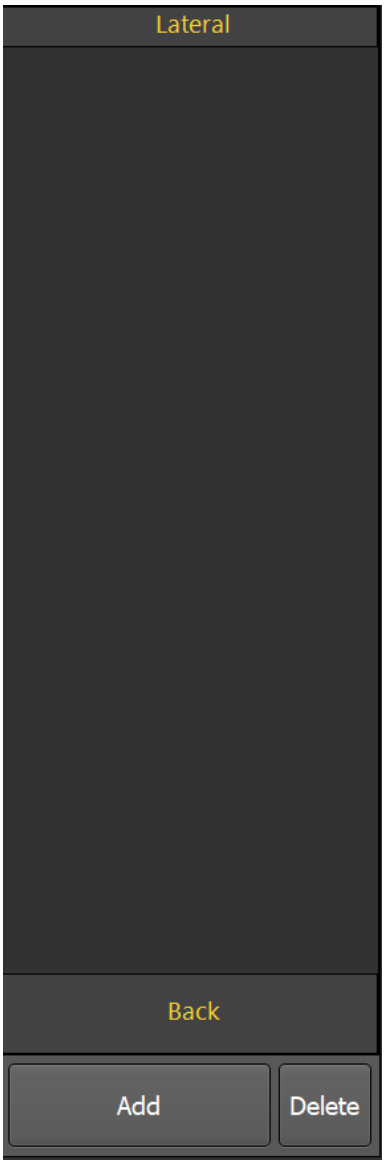


In the cursor field, type the description label (e.g. /connection/) and press the /ENTER/ key on the keyboard. The fault will be added to the list (the /Esc/ button will end the entering without change):



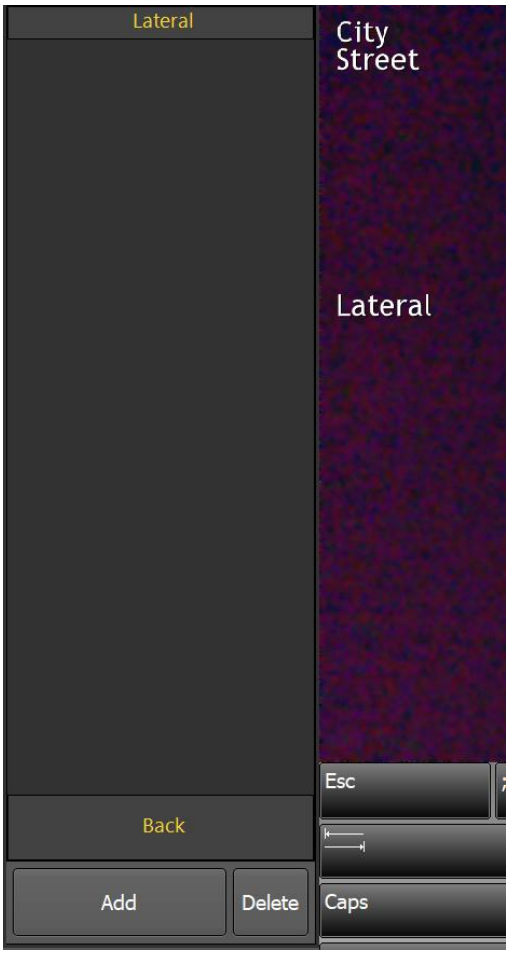
After clicking on the new description in the list, this description will appear on the screen.

>>>>>

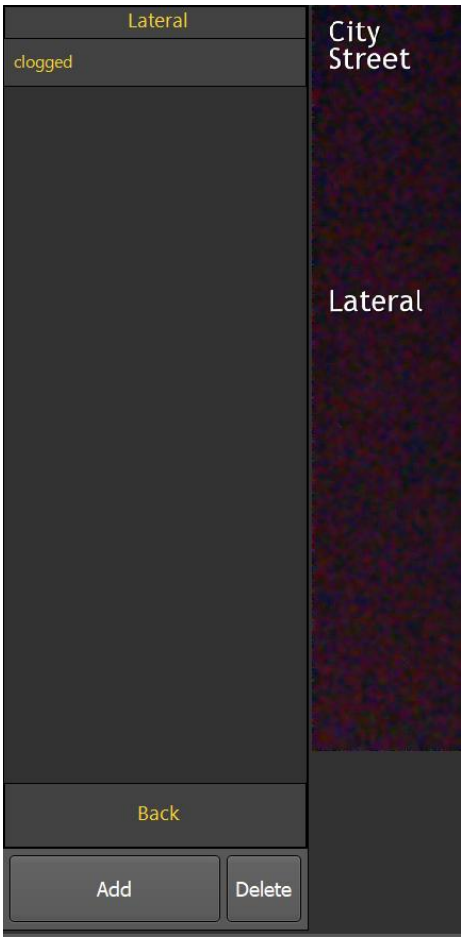


Entering descriptions has a possibility of creating submenus, that n
description in an already entered description that is displayed in the video, a submenu will be created only for this particular description.

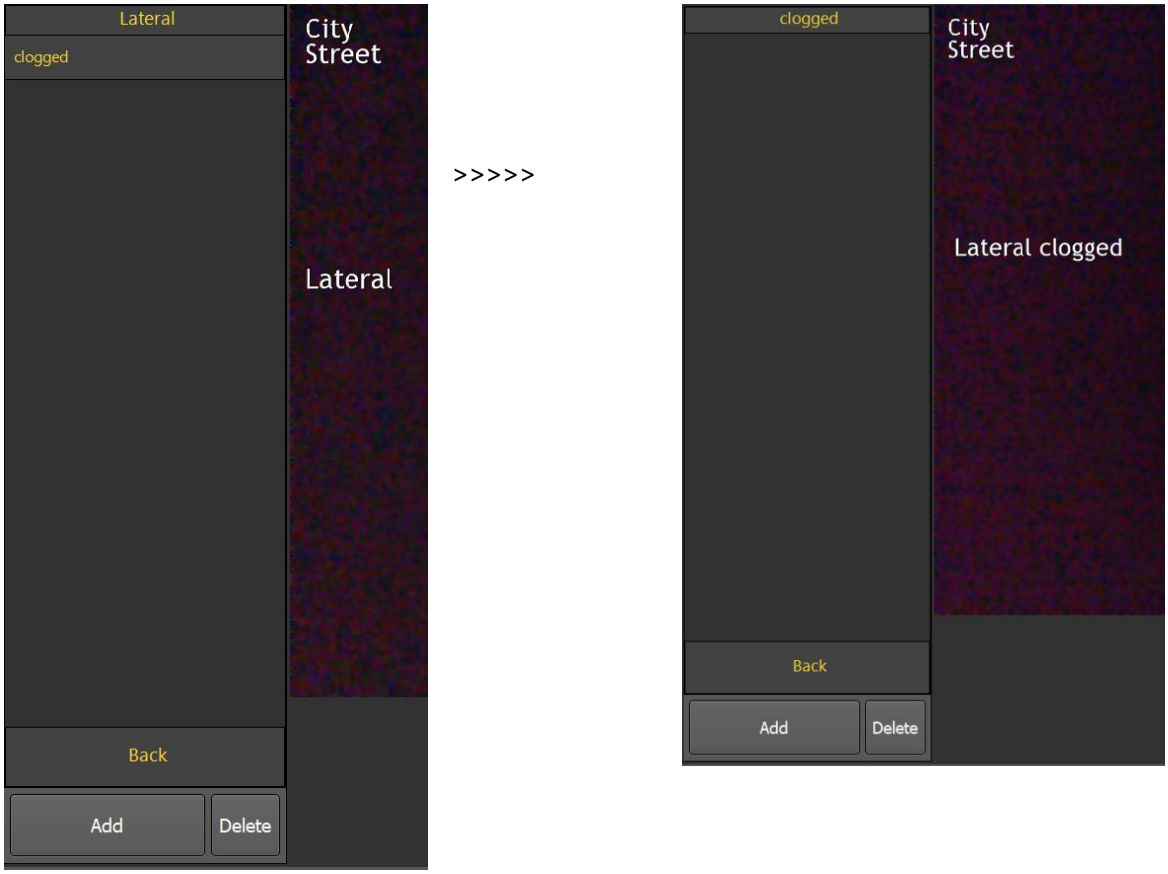
When you enter a new description in an already selected description, a submenu is automatically created

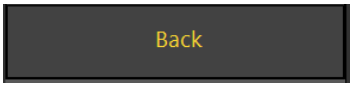


>>>>>>>>>

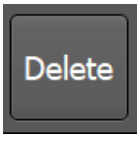


When you click on a new item in the submenu, the item is added to the main menu in the camera screen.



Up to 10 data levels can be entered in this way. The submenu can be navigated by clicking on an item, by clicking on the button 

it is possible to go back one step in the submenu.

Deleting an entry can be done in the open list or in a submenu by pressing the button 

. For records that can be deleted, the button 

will light up. Pressing this button will delete the corresponding record.