

*envirobot*

# **VIPER**®

*User Manual*



# EN

English Translation

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# INTRODUCTION

## About this manual

These instructions enable the devices to be handled safely and must be kept in their immediate vicinity and accessible to the staff at all times.

The personnel must have carefully read and understood these instructions before starting any work.

The basic prerequisite for safe work is compliance with all the safety instructions and instructions in this manual.

In addition, the local accident prevention regulations and general safety regulations for the use of the device apply.

## Explanation of symbols



### **WARNING**

This symbol and signal word may indicate one dangerous situation that can lead to injuries if not avoided.



### **TIP**

This symbol highlights useful tips and information that must be observed for efficient and trouble-free operation of the device.

# **SAFETY**

## **Intended Use**

The devices are used for inspection and cleaning of pipes drains and sewers using original accessories and components from Envirobot GmbH & Co. KG. Any use that goes beyond this purpose is considered improper use.

## **User group**

These instructions and the use of the device are aimed at trained sewer inspectors, sewer and pipe cleaners or people with comparable technical knowledge and corresponding, documented instruction.

## **safety instructions**

The following section lists risks that can arise from the device even when used as intended.

### **Electrical voltage!**

If the insulation or individual components of the charger are damaged, there is a risk to life from electric shock.

- Switch off the devices when not in use and during maintenance and cleaning work.
- Immediately stop your work in the event of damage and have it repaired by a certified service center.

### **Battery safety!**

The device has a battery whose improper use can lead to an explosion:

- Never open the battery.
- Do not drop the battery.
- Protect the device from excessive heat and sunlight.
- Only charge the battery with the cables and power supplies offered by Envirobot GmbH & Co. KG.

### **Danger from components under high pressure!**

Damage to the hybrid hose, the flex segment, the camera, the hydraulic lines and components in the hose trolley as well as the inlet hose and the HP jetter

can be fatal. In the event of damage, stop work immediately and have it repaired by a certified service center.

### **Danger from ignoring safety regulations and insufficient protection of the construction site against accidents!**

Observe the safety regulations applicable in your country and prescribed for the execution of the work. Secure the construction site properly.

## **Preparation**

### **Delivery**



Claims for damages can only be asserted within the complaint period, so please file a complaint directly.

Upon receipt, the delivery must be checked for completeness and transport damage. Report damage in transit directly to the carrier.

The standard scope of delivery includes:

- Cam40 HD camera with mounted spacer
- Flex segment
- Hybrid hose
- VIPER / VIPER compact hose trolley
- Control unit with inserted battery and USB thumb drive
- Accessory case
- 240 / 110V power supply

## **Packaging**



Save the packaging for possible shipping and storage



## Storage

The device and accessories must always be stored under the following conditions:



Risk of frost damage!

Store the device only at temperatures above + 5 ° C

Even the smallest amounts of water in the hydraulic components can cause considerable damage due to frost.

Always store the device frost-free

do not store outdoors

Store dry and dust-free

Protect the device from external force

## Transport

Always observe the local load securing regulations when transporting the devices in vehicles. In addition, make sure that the device is protected against external forces. The slide rails serve to protect the vehicle and device during loading and unloading.

## PRODUCT DESCRIPTION

### Basics

VIPER is a complete system for cleaning and inspection of branched pipes in one run.

The Cam40 is a small, particularly robust Full HD camera, and is suitable for use in combination with high pressure cleaning. High power LEDs provide excellent illumination up to 16inch and blockages can be removed directly with the switchable forward jetting nozzle.

The flex segment is highly flexible and has a steering nozzle. By simply turning the hose, easy turning into branches and avoiding obstacles in the pipe is possible. Thanks to the coupling, the flex segment can be removed from the hybrid hose.

The camera cable is integrated in the hybrid hose and thus protected from damage and snagging. Identical couplings are mounted on both ends of the hybrid hose. This allows the hose to be turned for even wear.

The hose trolley is used to hold the hybrid hose, as a carrier for the control unit and to transport the system.

# Technical specifications

## CAMERA

- Full HD live camera 1080 x 1920 with digital zoom
- 160° wide-angle lens with 4mm (0,16") sapphire glass
- dimmable power LED`s for pipes larger 300mm (12")
- 3D sensor for inclination and direction indication
- locator Sonde 512 Hz / 640 Hz
- integrated forward jetting nozzle with exchangeable Nozzle
- depth rating 100 m (300 ft) with internal pressure monitoring
- hardened stainless steel body with impact protection
- detachable from the Flex Segment thanks to the modular design
- diameter 40 mm (1,6") - length 40 mm (1,6")
- spacer for pipes larger 4" (DN 100)

## Flex Segment

- -easy to steer into branches by simply turning the hose
- steering nozzle with exchangeable ceramic nozzle inserts
- integrated valve to switch the forward jetting nozzle
- rugged, highly flexible protective hose
- 6 pcs. cleaning and forward thrust nozzles, 30° angle
- exchangeable ceramic nozzle inserts, suitable for recycling water
- hardened, wear-resistant stainless steel components
- connection with quick connects

## HYBRIDHOSE

- thermoplastic HP jetter hose DN10 (3/8") or DN13 (1/2")
- integrated camera cable
- rated 300 BAR (4300 PSI), length up to 200m (600ft)
- little pressure loss, abrasion resistant, floatable and low friction
- same quick connects on each side
- reversible for even wear
- can be combined e.g. 40 m DN13 (3/8") extended with 20 m DN10 (3/8")

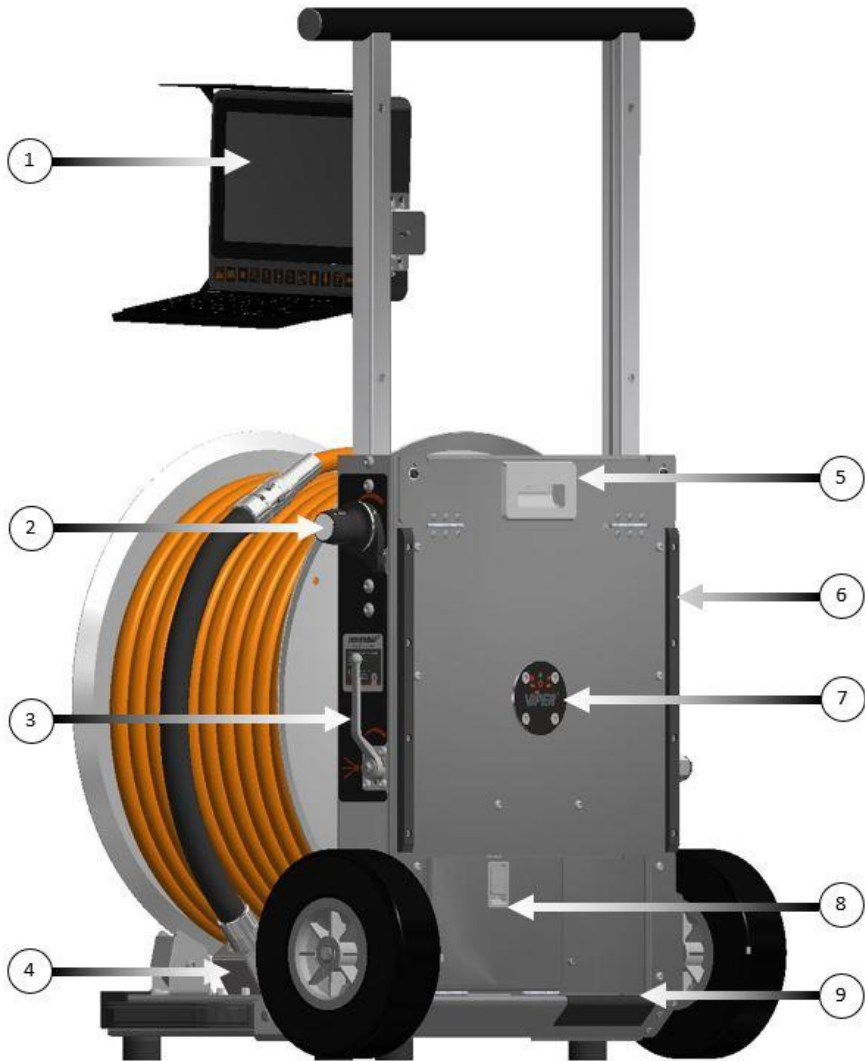
## HOSE Trolley

- rugged, ergonomic aluminum frame, powder coated
- Extendable telescopic handle with swivel mount for the control unit
- Stepless reel brake, ball valve, tool compartment
- anti flat wheels + load assist slide rail
- $\frac{1}{2}$  " size fitting for connecting to jetters

## CONTROL UNIT

- Rugged, waterproof aluminum housing
- Swivel mount bracket with quick-change system
- Exchangeable Li-Ion battery with 3 hours battery life
- 12 V/24 V DC (vehicle) 110 V- 240 V AC (shoreline)
- High-resolution 10 "display, sunlight readable, scratch-resistant protective screen
- Video- and photo capturing in HD on thumbdrive, 512 GB max. capacity
- Text overlay with memory for configurable pages, words and status lines
- Data overlay for cleaning pressure, camera internal pressure, distance counter, rotation angle, inclination, orientation, battery status, time, date
- Detachable wireless keyboard for convenient typing and for remote operation
- large buttons for video and photo recording, zoom, microphone, locator sonde, LED control, etc.
- Headset connection

# Components



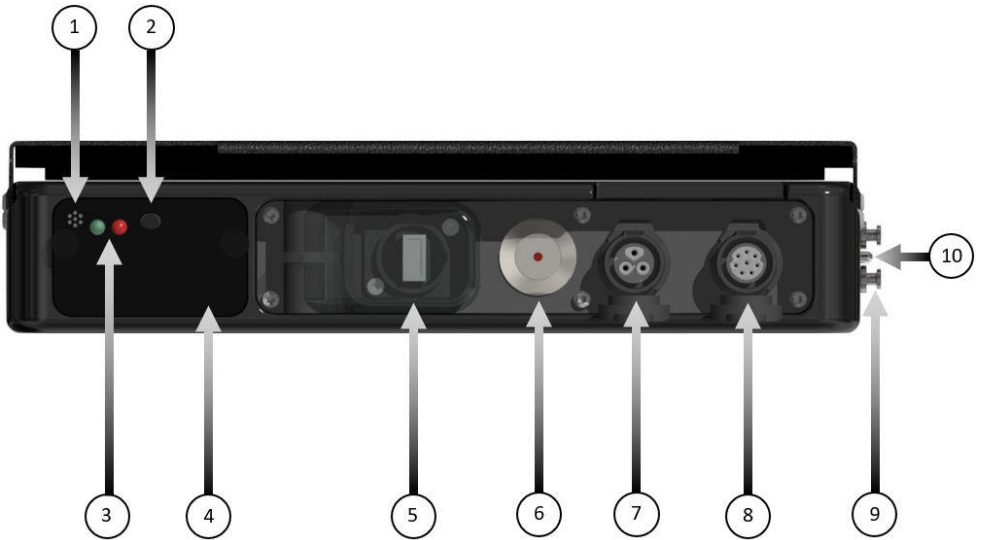
- 1) Control Unit
- 2) Brake handle
- 3) Ball Valve
- 4) Camera bracket

- 5) Release for telescopic handle
- 6) Slider
- 7) Funktionsanzeige
- 8) Toolbox
- 9) Treadplate



- 1) swivel bracket
- 2) manufacturer's plate with serial number
- 3) water connection G 1/2

- 4) anti flat Tyres
- 5) Handle
- 6) Telescopic handle
- 7) Foldable crank



- 1) Internal microphone
- 2) Headset connection
- 3) Status display
  - = Power Supply
  - = Battery is being charged
- 4) Battery cover
- 5) USB thumb drive
- 6) Main switch
- 7) Charging socket
- 8) System socket
- 9) Retaining bolt
- 10) Release button

# Usage

## Power supply

Connect the supplied AC adaptor to the mains socket and to the charging socket on the control unit.

The green status light indicates the connection.



Only use Envirobot chargers and accessories. If the insulation or individual components of the charger are damaged, there is a risk to life from electric shock. In the event of damage, stop work immediately and have it repaired by a certified service center.

## Battery pack

When the control unit is supplied with power, the Li-ion battery charges automatically regardless of whether the device is switched on.

The red status indicator signals the charging process and goes out when the battery is 100% charged.

It takes approximately 100 minutes to charge the battery to 80%.

Charging to 100% takes approximately 160 minutes.

With a full battery you can work approx. 160 minutes independent of the mains.

With the available replacement batteries, you can extend the operating time accordingly. To replace the battery, loosen the two knurled screws on the battery cover, push the screws outwards and pull out the battery cover. Pull out the empty battery, insert a full battery and mount the battery cover.



In addition to replacement batteries, stationary and mobile chargers and quick charging stations are also available. (See spare parts and accessories)



## USB thumb drive

The USB thumb drive with a capacity of 128GB is located behind the waterproof cover of the USB port.

For data backup, pull out the USB stick and connect it to a PC. Now all files can be copied.



Only the USB thumb drives offered by Envirobot guarantee proper functioning.

## Starting up the system

Make sure that the hybrid hose is completely and properly wound on the drum to ensure accurate path length measurement.

Switch on the system with the main switch on the underside of the control unit. The status indicator of the main switch starts to flash and lights up permanently as soon as the system has started up.

The status display on the hose trolley also lights up and the camera lighting works at 70% power.



Never look directly into the LED lighting of the camera!

The high light intensity can permanently damage the eyes.

## HP Jetter connection

Connect the hose of your HP jetter to the ½ "screw connection of the water connection and tighten the nut with the key from the tool box.

## Insert the camera into the tube

Release the drum brake and insert the camera into the tube.



Push the camera at least one meter into the pipe and leave the danger zone! Otherwise you could be hit by the water jets from the nozzles or loose parts.

Bring the camera into the upright position by turning the hose to start the inspection with the forward jetting nozzle switched off.



In order to protect the hybrid hose from damage, the use of manhole deflection rollers or protective hoses is recommended when accessing through manholes.

## Inspection of pipes

Start the HP jetter, hold the hybrid hose firmly and open the ball valve on the hose trolley. The pressure at the hose trolley is displayed on the control unit and you can feel how the tractive force builds up. Now travel through the pipe by giving in the hose. To prevent contamination of the camera lens, turn the hose so that the camera is at the top of the tube. To do this, also observe the rotation angle display on the monitor. 0 degrees corresponds to the upright position and you move forward at 12 o'clock position of the tube.

Stop driving immediately if you recognize sharp-edged objects such as shards or other objects that lead to damage or could hinder withdrawal.

Stop immediately if the hose can no longer be pulled back easily. Check this continuously while moving forward.

## Steering around obstacles



If you encounter obstacles such as protruding pipes consider whether a smooth retraction after passing the object is still guaranteed. Stop if you are unsure about it.

By turning the hybrid hose and slowly releasing the hose, you steer the camera sensitively around the problem area.

Set Meter counter 2 to zero in order to be able to react appropriately at the obstacle when pulling in the hose. This helps to minimize damage and snagging.

## **Steering through bends**

Support the passage of tight bends by turning the exit of the bend to the 12 o'clock position by turning the hybrid hose. Now give in the hose and the power of the steering nozzle helps to steer the camera head into the bend.

## **Steering into branches**

If you reach a branch turn the hybrid hose until the pipe to be inspected is on the upper side of the screen. Give in hose and the camera turns into the desired strand.

This also applies to steer into laterals from the mainline. To determine the length of the lateral, set meter counter 2 two to zero.

## **Use of the forward jetting nozzle**

If you reach blockages when you are driving, these can be resolved with the forward jetting nozzle.

Bring the camera into the overhead position by rotating the hose. As a guide, bring the rotation angle to approx. 180 degrees. Switch off the water pressure, wait a moment until the pressure in the system has decreased and switch on the water pressure again. To do this, operate the ball valve on the hose trolley or control directly on the HP jetter.

In the video picture you can now see the water jet that you can control by turning and moving the hose back and forth to unclog the pipe.

To switch off the forward jetting nozzle, bring the camera into the upright position, which corresponds to a rotation angle of 0 degrees. Now switch off the water pressure, wait a moment again and switch on the water pressure again. Now you can continue driving.

## **Withdraw and clean**

Pull the camera back and watch the cleaning result. If cleaning is incomplete, improve the cleaning result by cleaning again and pulling back more slowly.

(See also Maintenance / Improve cleaning performance)



For streak-free cleaning in preparation for a TV inspection, we recommend using the optionally available flex segment with rotating nozzle, item no. 01472

## **Retreat through tight arches and obstacles**

If problems occur when pulling back, you can help drive through tight bends and problem areas by turning and simultaneously pulling back the hose. (for more tips see avoiding obstacles)

If you get caught on obstacles or in arches when pulling back, do not increase the tractive force but instead drive approx. one meter forward. Turn off the water pressure and try to free the camera by pulling it back jerkily.

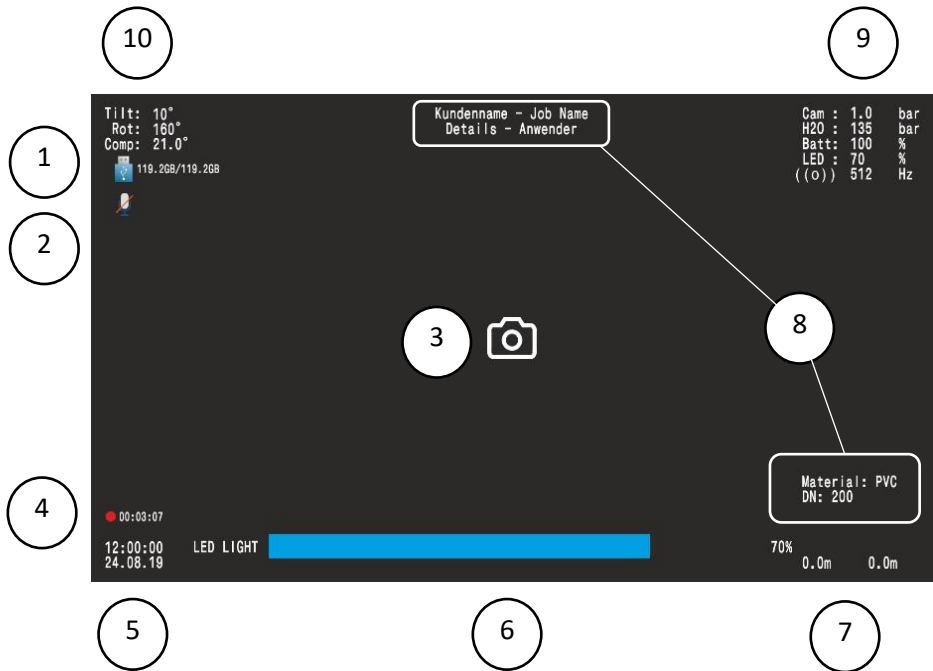
Pulling the hybrid hose with very high force leads to heavy wear and, in extreme cases, damage to the hybrid hose, flex segment or camera.



## **End of work**

Switch off the control unit with the main switch and fold in the keyboard and the sun visor. Swivel the control unit into the transport position, unscrew the jetters HP hose, let the water drain out of the hose via the water connection if possible and then close the ball valve.

# Documentation

## Basic functions



- 1 Status display of the inserted USB memory  119.2GB/119.2GB
- 2 Status display of the microphone 
- 3 Photo shooting indicator
- 4 Video recording indicator
- 5 date and time
- 6 lighting control
- 7 distance counter
- 8 Job information
- 9 camera pressure, jetting pressure, battery, lighting, location transmitter
- 10 inclination, rotation angle and compass



Press the video button to start recording. The recording symbol appears.


● 00:03:07

Press the video button again to pause the recording. The pause symbol appears. || 00:03:07

Press the video button again to continue recording. The recording symbol appears again. ● 00:03:07

Stop the video recording with the stop button to save the recording!



Press the photo button to save the current screen as a photo. The photo symbol  appears on the screen for 2 seconds. A photo can also be saved while a video recording is in progress



Press the stop button to stop and save the video recording. The red dot on the display of the recording time disappears.



Press the zoom button to zoom 2, 4 and 8 times into the live image. You can use the arrow keys to move the zoom area. Press again to return to the original size. Video and photo recordings are not affected by the use of the zoom function.



Press the microphone button to switch the microphone on and off. Our headset (Art. No. 01385) can be connected to the headset socket for sound recording in noisy environments and for sound reproduction on the control unit.

Be sure to turn on the microphone on the headset.



Press the locator button to turn on the 512Hz location transmitter. Pressing repeatedly changes frequency to 640Hz. To switch off the location transmitter, press the button again.



Press the button for the lighting control to adjust the brightness of the camera lighting. The brightness can be made lighter and darker with the



buttons, as long as the status display of the lighting control is open.



Press the menu button to access the system menu. Press again to exit the system menu.



Set distance counter 2 by pressing the up-down buttons. Press and hold a button to quickly adjust the value.

If you press both buttons simultaneously, meter counter 2 is reset to zero.



Set the incline value by pressing the o.k. button to zero



Set meter counter 1 by pressing the right / left buttons. Press and hold a button to quickly adjust the value. If you press both buttons simultaneously, distance counter 2 is reset to zero.

## Text entry

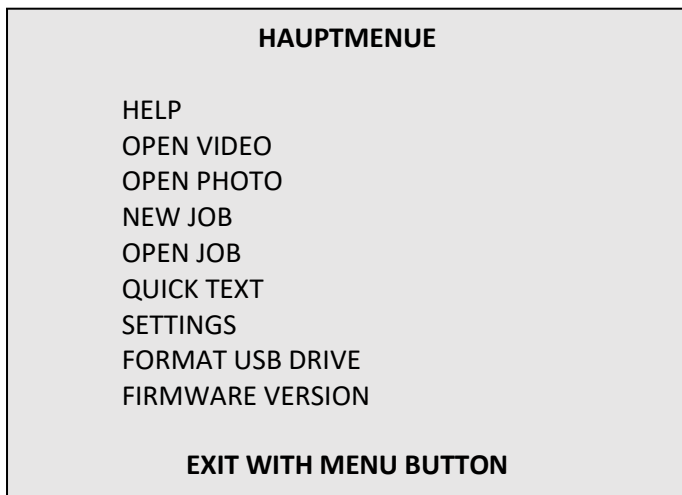
Press F1 to turn text input on and off.

Press F2 to clear the entry.

Press F3 to switch the job data on and off.

## Main Menu

The main menu is opened and closed using the menu button.






### HELP

Here you will find a brief guide to the most important functions.

### OPEN VIDEO

Opens the directory with the saved video files. Select the desired file and


confirm with  or the Enter key. The video is now playing.

Press  or  to control the playback speed of the video.

### OPEN FOTO

Opens the directory with the saved photo files. Select the desired file and

confirm with  or the Enter key.

Press  or  to view the previous or next photo.



## NEW JOB

Opens an empty job form to create a new job.

**CREATE NEW JOB**

Customer Name: \_\_\_\_\_

Job Name: \_\_\_\_\_

Operator: \_\_\_\_\_

Pipe Material: \_\_\_\_\_

Pipe Dimension: \_\_\_\_\_

Details: \_\_\_\_\_

**EXIT WITH MENU BUTTON**

Enter the information in the appropriate field. Select SAVE JOB and confirm with the OK button.

## Open JOB

Opens the directory with the jobs already created. Select the relevant JOB and confirm with the OK button. The selected JOB is now displayed as a form. If necessary, you can still make changes. To accept the JOB, select the SAVE JOB field and confirm with the OK button

## QUICK TEXT

Opens the menu for creating, editing or deleting observations (quick texts)

## Create new Quick Text

**Create new Quick Text**

Quick Text Shortcut: \_\_\_\_\_

Quick Text Line 1: \_\_\_\_\_

Quick Text Line 2: \_\_\_\_\_

Quick Text Line 3: \_\_\_\_\_


Quick Text Line 4: \_\_\_\_\_

Quick Text Line 5: \_\_\_\_\_

**EXIT WITH MENU BUTTON**

To create a new observation (Quick Text), first enter an abbreviation (Quick Text Shortcut) under which you want to save the observation. In the following 5 lines, enter the text that is to be displayed when the abbreviation is called.

Finally, select SAVE and confirm with the OK button or the ENTER key on the keyboard.

 **To call up a saved observation, hold the the CTRL key, enter the corresponding abbreviation (Quick Text Shortcut) and release the CTRL key.**

## Edit / delete Quick Text

**EDIT QUICK TEXT**

Quick Text Shortcut:  ▼

Quick Text Line 1: \_\_\_\_\_

Quick Text Line 2: \_\_\_\_\_

Quick Text Line 3: \_\_\_\_\_

Quick Text Line 4: \_\_\_\_\_

Quick Text Line 5: \_\_\_\_\_

**EXIT WITH MENU BUTTON**

In order to edit or delete an already created observation (QUICK TEXT), the field with the abbreviation (shortcutname) must be activated, which is indicated by the outline with a dotted line.

Now press the OK key to view the abbreviations that have already been created. Select the relevant abbreviation and confirm with the OK key

Now you can edit the corresponding observation (Quick Text) and save it again.

Select the EDIT field and confirm with the OK button.

You can then edit the individual texts.

To save your changes, select the SAVE field and confirm with the OK button.

## EXPORT and IMPORT catalog

You have the option of exporting and importing your observations (quick text).

This is helpful if you are using several VIPER systems and you want to use the same QUICK TEXT on all control units.

To export, select QUICK TEXT EXPORT in the Quick Text menu and confirm with the OK button. The QUICK TEXT CATALOG is saved on the inserted USB stick.



**Make sure that there is a USB thumb drive with sufficient free space in the control unit. If there is no USB thumb drive in the control unit or the USB drive is full, you will receive the error message "Export failure" when you try to export the catalog.**

To import, insert the USB stick with the exported QUICK-TEXT catalog into the control unit. In the QUICK-TEXT menu, select IMPORT QUICK TEXT CATALOG and confirm with the OK button.

If no USB stick with QUICK TEXT CATALOG file is inserted, you will receive the error message:

"Error! Quicktext directory not found! "

## **SETTINGS**

Opens the settings menu to set menu language, keyboard layout, units of measurement, date / time and the displayed values on the screen.



A changed keyboard layout is only after a restart of the device accepted.

## **FORMAT USB DRIVE**

Formats the connected USB Drive



**All existing data on the USB stick will be deleted.**

## **FOLDER STRUCTURE**

For a better overview, photos and videos are saved on the USB stick in folders with the date and time of the recording.(e.g. "20190101\_101500").

When a job has been created, photos and videos are saved in folders that correspond to the customer name. The individual videos and photos are saved in these folders under the job name.

## FIRMWARE

### Version indicator


Select FIRMWARE in the main menu to display the version of the installed firmware.

### Update

This function can be used to update the system firmware. Innovations, improvements and special adaptations can be transferred to your control unit.

You will receive the corresponding file for updating the firmware from the manufacturer or your certified service center by email if required.

Unzip the ZIP file and you will see a folder e.g. looks like this.

 UpdatePack-20200703

Copy this folder to an empty USB stick and insert it into the control unit. Then select FIRMWARE in the main menu.

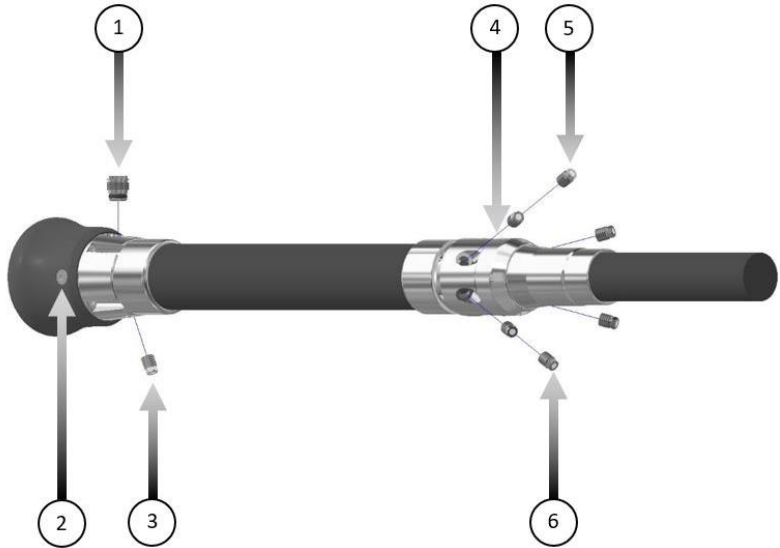
The currently installed firmware version is displayed and the new version that is on the USB stick.

By confirming, the new firmware is installed on the control unit. When the update is finished you will get the message "UPDATE SUCCESSFUL". Only now switch the control unit off and on again and check whether the just installed update appears in the version display.



Under no circumstances may the control unit be switched off during the update. The battery must also be charged. We recommend to power the control unit with the supply during the update.

# Adaptation of the system to the HP jetter



- 1) screw of forward jetting valve
- 2) screws for spacer
- 3) steering nozzle

- 4) nut for the coupling
- 5) upper cleaning nozzles
- 6) lower cleaning nozzles



- 1) screw of pressurizing valve
- 2) forward jetting nozzle
- 3) spacer

## Nozzle configuration

The nozzle assembly ex works is designed according to the following table on the hybrid hose of the most common HP jetters

<b>HP Jetter 140 -190Bar 45-60L/min Pressure at the VIPER System 90-170BAR</b>					
<b>VIPER</b>	<b>Nozzle</b>	<b>50m</b>	<b>60m</b>	<b>70m</b>	<b>80m</b>
<b>Hybrid hose DN10 3/8"</b>	<b>Lower cleaning nozzles</b>	<b>3x1,1</b>	<b>3x1,1</b>	<b>3x1,0</b>	<b>3x0,9</b>
	<b>Upper cleaning nozzles</b>	<b>3x0,6</b>	<b>3x0,6</b>	<b>3x0,6</b>	<b>3x0,6</b>
	<b>Steering nozzle</b>	<b>1,1</b>	<b>1,1</b>	<b>1,1</b>	<b>1,1</b>
	<b>Forward jetting nozzle</b>	<b>1,1</b>	<b>1,1</b>	<b>1,1</b>	<b>1,1</b>

The ceramic nozzle inserts are available in 0.1mm increments from 0.6mm to 1.8mm and are replaced with the hexagon wrench from the accessory case. The forward jetting nozzle is available in 1.1, 1.2 and 1.4 mm and is exchanged with the Torx 20 screwdriver from the tool box. The nozzle diameter is determined using the diameter gauge from the accessory case.

Tables for HD pumps with higher pressure, other hose diameters and hose combinations as well as for special applications are provided on [www.envirobot.com](http://www.envirobot.com)

## Operation with recycling water

In addition to fresh water, the VIPER system can also be operated with recycled water. Due to the abrasive particles, all components that come into contact with the water are subject to increased wear. The forward jetting nozzle must be deactivated to operate with recycling water. See also (deactivate the jet nozzle)

# **Adaptation of the system for special applications**

## **Increase traction and travel long distance**

To travel over great lengths, we recommend using the DN13 ½ “hybrid hose to reduce the pressure loss and thus increase the tractive force. The combination of DN13 ½ “hose and DN10 3/8“ hose with the hose connector Part No. 01295 allows longer lengths to be covered.

The tractive force can also be increased by using the shortest possible connecting hose between the HP Jetter device and VIPER.

Another way to increase the tractive force is to close the steering nozzle and enlarge the other nozzles. For maximum traction, please also ensure that the nozzles are correctly matched. (see nozzle configuration)

## **Combine different hybrid hoses**

The VIPER hybrid hoses DN10 ½ “and DN13 3/8“ have identical couplings. With the hose connector Part No. 01295 two hoses can be connected. For example, combinations of hoses of different diameters can be set up, which are ideal for accessing laterals from the main sewer.

The procedure for installing the hose connector largely corresponds to the instructions for installing and removing the steering piece.

## **Drive through diameters over 16inch**

When driving on nominal widths above 16inch the standard nozzle configuration does not develop enough force to lift the hybrid hose up to the top of the pipe. As a result, the camera is directed against the pipe wall, which has an impact on the image quality. This effect can be counteracted by closing the upper three cleaning nozzles and enlarging the lower three cleaning nozzles. The use of suitable centering aids is also recommended.

## **Improve cleaning performance**

Even in the standard nozzle configuration, an excellent cleaning effect is achieved thanks to the spray angle of 30 °. Due to the asymmetrical nozzle configuration, 75% of the cleaning performance works directly in the dirty pipe base and only 25% in the mostly clean pipe crown.



The efficient principle of the asymmetrical nozzle distribution can be reinforced by disabling the three upper cleaning nozzles with the screw plugs from the accessory case. The three lower nozzles can then be enlarged and 100% of the cleaning performance works directly in the pipe base.

## **Streak-free cleaning with the rotating nozzle**

For streak-free cleaning to prepare for TV driving, we recommend using the steering piece with a rotating nozzle.

As with the standard flex segment nozzles the ceramic nozzle inserts are also interchangeable with the rotating nozzle.

Like the standard cleaning nozzle, the rotating nozzle also lifts up during operation and enables it to move as usual in the apex or any other position in the pipe. Due to the greater length of the flex segment with rotating nozzle, 90 ° bends can only be passed in pipes bigger than 5 inches.

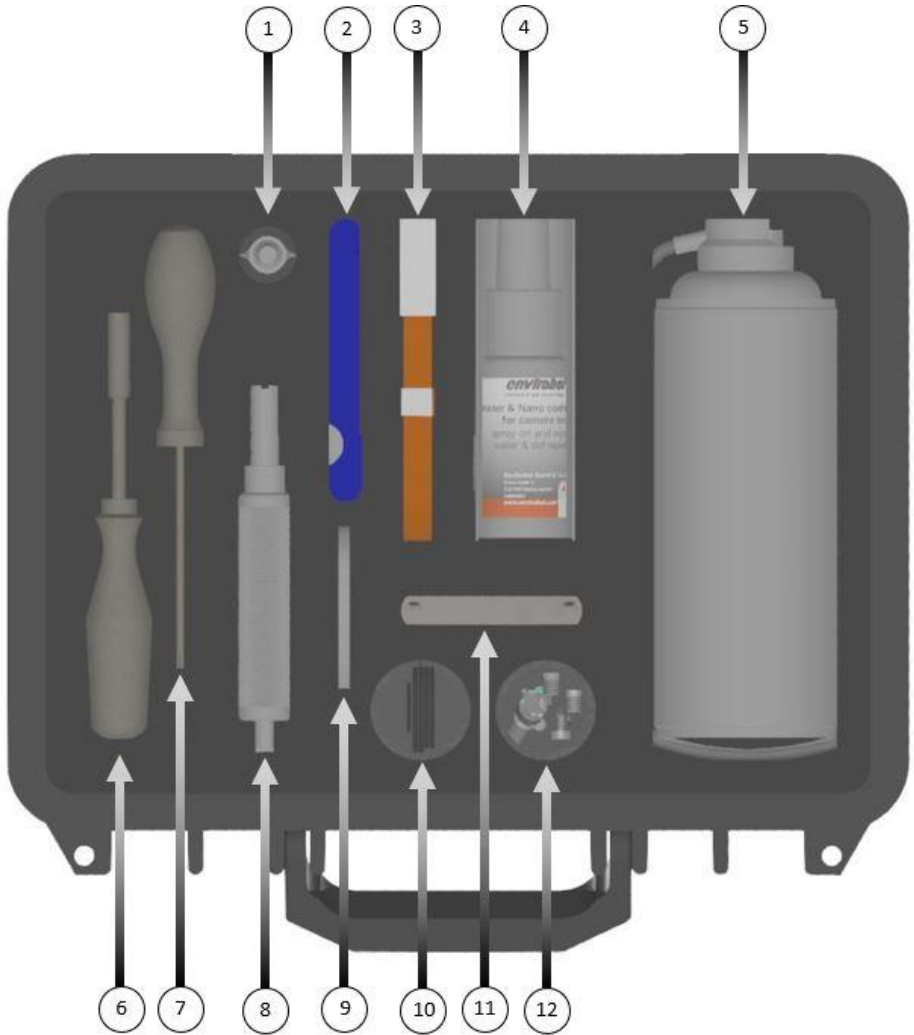
## **Deactivate the forward jetting nozzle**

In certain situations such as when operating with recycling water, it is possible to deactivate the forward jetting nozzle.

To do this, remove the retaining screw of the forward jetting valve with the multitool from the accessory case. Remove the valve ball and keep both parts in a plastic box in the accessory case. Check whether both O-rings are mounted on the locking screw, which is also in a plastic box. Check the O-rings for damage and cleanliness and turn the locking screw hand-tight into the valve with the multitool.

To reactivate the forward jetting valve, remove the locking screw and reinsert the valve ball and the retaining screw. Here, too, the O-ring must be checked for damage and cleanliness and greased.

# Maintenance



- |                             |                        |
|-----------------------------|------------------------|
| 1) O-Ring grease            | 7) Torx 10 screwdriver |
| 2) Nozzle cleaner tool      | 8) Multitool           |
| 3) USB Cable (optional)     | 9) Hose Key            |
| 4) Lens cleaner and coating | 10) Accessory Box      |
| 5) Pressurizing kit         | 11) Diameter gauge     |
| 6) Nozzle key               | 12) Accessory Box      |

## Visual inspection

For error-free and safe operation, it is necessary to carry out visual checks and to keep the devices clean.

Before use	All screw connections between hybrid hose, steering piece and camera head are tightened
	Internal camera pressure between 0.5 and 1.2 BAR (see filling the camera with compressed air)
After use	Check device for damage after use
	Clean the device (see cleaning)
	Check the hybrid hose for damage
	Check nozzles for contamination

In the event of damage, stop work immediately and have it repaired by a certified service center.

## Cleaning the device components

You can rinse the camera head and the steering piece with clear water. Then clean the front area of the camera with the microfiber cloth and the Nano Cleaning & Coating Spray from the accessory case. This causes the dirt and water to roll off the camera lens and helps to achieve a better inspection result.

Clean the nozzle inserts with the nozzle cleaning tool from the accessory case  
Clean the control unit and the hose cart with a damp, clean cloth.

Clean the hybrid hose with a damp cloth when you collect it.

- Do not use a pressure washer for cleaning.
  - Close the connections with the protective caps provided.
  - Do not use aggressive cleaning agents, solvents or alcohol-based cleaners
- Do not clean electronic parts under running water.



Risk of property damage!

Improper cleaning can lead to damage and even failure of the system

## **Pressurizing the camera**

The camera of the VIPER system is filled with compressed air and equipped with a pressure sensor for monitoring the internal pressure. This ensures that the camera head is continuously sealed against water. The internal pressure of the camera is shown on the display of the control unit and should be between 0.5 BAR and 1.3 BAR. A slight increase in pressure when the camera head is heated up is normal.

If the internal pressure of the camera is below 0.5 BAR, compressed air must be refilled with the pressure filling set from the accessory case according to the following instructions. The accessory case contains everything you need.

Carry out this work sitting, in a clean, dry and well-lit workplace.

Clean the front area of the camera with the microfiber cloth and the Nano Cleaning & Coating Spray. Switch on the system with the main switch and adjust the lighting to 0% so as not to be dazzled. Use the multitool to loosen the valve screw from the accessory case and set it aside with the O-ring. Due to the pressure filling, no moisture may be pumped into the camera head.

Therefore, remove any moisture from the area of the valve opening by blowing off with the pressure filling set. Insert the orange filling adapter into the valve opening and hold the adapter in this position.

Now press the valve of the compressed air can CAREFULLY and only FOR A SHORT MOMENT and observe the pressure display PCAM on the display.

Repeat this step until a pressure of 0.8 BAR is reached.

Close the opening of the filling valve with the valve screw and make sure that the O-ring is correctly seated on the screw. Make sure that the O-ring is clean and greased. Use the multitool to hand-tighten the valve screw.

## **Cleaning the forward jetting valve**

The forward jetting valve is a gravity-controlled ball valve with a self-holding function.

To clean, loosen the retaining screw with the multitool from the accessory case and remove the valve ball.

There is a sieve on the inside of the retaining screw. Check the strainer for contamination and remove any foreign objects. Use the compressed air can

from the accessory case to clean the retaining screw from the inside and outside. Check the O-ring of the retaining screw for damage and cleanliness and grease it lightly.

Check the valve ball for deposits and clean the valve ball.

Also check the valve bore in the steering piece for foreign bodies and remove them. Use the compressed air can to remove all particles.

Insert the valve ball and tighten the retaining screw with the multitool.

## **Adjusting the drum brake**

If the braking effect of the drum brake decreases, you can adjust the braking force according to the following instructions.

Release the drum brake completely and unwind the hybrid hose from the hose reel. Now you have free access to the plastic adjusting screw on the brake cable inside the drum core.

Turn the adjusting screw clockwise to increase the braking effect and to the left to reduce the braking effect.

Adjust the adjusting screw so that the hose reel can be freely rotated when the brake lever is in position 1 and is firmly locked when the brake lever is in position 3.

## **Attach and remove the camera**

The camera is screwed to the steering piece and must be removed if either the steering piece or the camera itself is to be replaced.

Carry out this work sitting, in a clean, dry and well-lit workplace.

### **Remove the camera**

Clean the steering piece and camera under running water and remove all dirt from the heads of the four screws that hold the camera head. Use the nozzle cleaning tool to loosen the dirt in the screw heads from the accessory case and rinse off all dirt thoroughly with clear water. Dry the camera head and the steering piece and remove all moisture with compressed air from the pressure filling set. Now loosen the four screws with the Torx 10 screwdriver and pull the camera head carefully and without twisting it from the steering piece.

### **Attach the camera:**

Check the contact surfaces between the steering piece and camera as well as the four holes on the steering piece and the four threads in the camera for absolute cleanliness. Remove the O-ring on the steering piece and check for damage and cleanliness and lightly grease the O-ring.

If necessary, replace the O-ring with a new one. Place the O-ring in the groove on the steering piece.

Clean the gold-plated contacts on the steering piece and the gold-plated spring pins in the camera with a cotton swab and alcohol. Check the smooth running of each spring pin by carefully moving it with a soft object such as a cotton swab.

Place the camera head on the steering piece without twisting it and make sure that the O-ring is correctly seated in the steering piece. Screw both parts with the four screws and tighten them carefully.

Turn on the system and check the functions of the

### **Attach and remove the flex segment**

The flex segment is screwed to the hybrid hose and to the camera and can be replaced by a flex segment with a rotating nozzle. The flex segment is also removed from the hybrid hose when it is turned or replaced.

Carry out this work sitting, in a clean, dry and well-lit workplace.

### **Remove the flex segment:**

Clean the steering piece, hose connection and camera under running water and remove all dirt. Dry the steering piece, hose connection and camera and remove all moisture with compressed air from the pressure filling set.

Use the hose wrench from the toolbox to loosen the screw connection between the hybrid hose and the steering piece and push the nut back behind the black kink protection.

Carefully pull the steering piece off the hose coupling.

### **Attach the flex segment:**

Check the contact surfaces between the steering piece and hose coupling, the inside of the nut, and the threads on the steering piece and nut for absolute cleanliness. Remove all O-rings from the steering piece and hose

coupling, check for damage and cleanliness and grease the O-ring slightly. If necessary, replace the O-rings with new ones. Place the O-rings back in their original positions.

Clean the gold-plated spring pins on the steering piece and the gold-plated contact surfaces on the hose connector with a cotton swab and alcohol. Check the smooth running of each spring pin by carefully moving it with a soft object such as a cotton swab. Make sure that there is no moisture in the contact area and insert the hose coupling into the steering piece so that the guide pin is seated in the associated hole. Screw both parts together with the union nut and tighten it with the hose wrench.

Turn on the system and check the functions of the camera

## **Turn, replace or extend the hybrid hose**

There are identical couplings on both ends of the hybrid hose. The service life of the hose can be significantly extended by turning the hose. The hose is removed from the steering section and hose cart and the low-stress rear hose end is connected to the steering section. The more worn front hose end is connected in the drum core.

The procedure for assembling and disassembling largely corresponds to the instructions "Assembling and disassembling the steering piece"

In the drum core, however, the hose wrench from the tool box is not used, but the hose wrench from the accessory case. Before winding, the hose must be attached to the drum core with four cable ties.

Turn on the system and check the functions of the camera.

## **Adjust the swivel, sun visor and keyboard holder**

If the control unit is no longer reliably held in the desired position, both axes of the swivel joint can be retightened independently of one another.

If the sun visor or keyboard is no longer reliably held in the desired position, these joints can also be retightened. To do this, use the Torx 20 screwdriver from the tool box and secure the screw thread with thread locking lacquer. To prevent the screws from loosening, do not move the sun visor and keyboard until the paint has hardened

## Replace and adjust support rollers

The hose reel is additionally stabilized by two support rollers. If the support rollers do not rotate when moving the drum, they must be readjusted to compensate for wear.

To do this, hold the nuts on the underside and loosen both screws until the roll holder can be moved. Adjust the roll holder so that the support roll rotates again with the drum and lock the screws.

If wear on the support rollers can no longer be compensated for by adjusting them, replace the support rollers with new ones. To do this, the roll holder is completely removed from the drum frame, the roll is replaced and readjusted and tightened as described above.

## Troubleshooting Guide

If errors occur, you can use the following list to narrow down possible causes and, in many cases, solve problems yourself.

Problem	Solution
No camera image	Check power supply
	insert full battery
	Check the status display of the hose trolley. If the green signal lamp does not light up, check the connecting cable between the control unit and the hose trolley for damage
	Check the connections between the drum, hybrid hose, steering piece and camera are tightened.
	Check the flex segment and hybrid hose for damage
	Check the setting of the camera lighting.
Low tractive force	Check the the nozzles for clogging and, if necessary, use the cleaning tool from the accessory case to clean them



	<p>Measure the nozzle diameter using the diameter gauge from the accessory case. Check the nozzle configuration (see nozzle configuration)</p>
	<p>Check the jetter pressure on the display and increase it to at least 90 BAR</p>
	<p>Check the steering nozzle for blockage and, if necessary, clean it with the cleaning tool from the accessory case</p>
	<p>Check the jetter pressure on the display and increase it to at least 90 BAR if necessary</p>
	<p>Measure the nozzle diameter using the diameter gauge from the accessory case. Check the nozzle configuration (see nozzle configuration)</p>
<p>The forward jetting nozzle cannot be switched</p>	<p>Check the forward jetting nozzle for clogging and, if necessary, clean it with the cleaning tool from the accessory case</p>
	<p>Check the forward jetting valve for clogging. Cleaning (see Cleaning the forward jetting valve)</p>
<p>The forward jetting nozzle switches itself off by turning the hose</p>	<p>Check the sieve on the inside of the retaining screw for contamination and clean it. (see Cleaning the forward jetting valve)</p>

## Accessories and spare parts

All spare parts and a wide range of accessories are available for your VIPER system.

The most important spare parts and accessories with article numbers can be found in this overview.

<b>Item Number</b>	<b>Description</b>
01129	Spacer 55mm
01616	Spacer 70mm
01617	Brushed Spacer 150mm
01472	Flex Segment with rotating Nozzle
01178	Hose connector
01362	Link cable from control unit to hose trolley
01020	Li-Ion BNattery72,0Wh mwith charging level indicator
01449	Power Adaptor 10V-32V,for mobile use,with VIPER connection cable
01473	Quick charging bay for Li-Ion Battery, 110V-240V AC
01474	Quick charging bay for Li-Ion Battery, 10V-32V DC
01385	Headset
01618	Umbrella holder with umbrella
01550	USB drive 128GB
01619	USB drive256GB
01620	USB drive 512GB
01495	Ceramic Nozzle insert 0,6mm
01496	Ceramic Nozzle insert 0,7mm
01497	Ceramic Nozzle insert 0,8mm

01498	Ceramic Nozzle insert 0,9mm
01499	Ceramic Nozzle insert
01500	Ceramic Nozzle insert 1,1mm
01502	Ceramic Nozzle insert 1,3mm
01503	Ceramic Nozzle insert 1,4mm
01504	Ceramic Nozzle insert 1,5mm
01505	Ceramic Nozzle insert 1,6mm
01506	Ceramic Nozzle insert 1,7mm
01507	Ceramic Nozzle insert 1,8mm
01536	Ceramic Nozzle insert 1,1mm
01492	Forward jetting Nozzle 1,2mm
01493	Forward jetting Nozzle 1,4mm

## DISPOSAL

After the end of use of the device has been reached, it must be dismantled and disposed of in an environmentally friendly manner. Unless a return or disposal agreement has been made, the operator must ensure that it is recycled or disposed of in an environmentally friendly manner.

- Scrap metals
- Send plastic elements for recycling
- Dispose of other components sorted according to material properties

