

CamFlex[®]

Art.-No. 9900



Instruction Manual

Contents

1 General Information	
1.1 About the Manual	3
1.2 Manufacturer	3
1.3 Explanation of Symbols Used	3
1.3.1 Safety Instructions	3
1.3.2 Tips and Recommendations	4
1.4 Limitation of Liability	4
1.5 Copyright	4
1.6 Warranty Conditions	4
2 Safety	
2.1 Proper Use	4
2.2 Basic Risks	5
2.3 Behaviour in the Event of Danger and Accidents	6
2.4 Responsibility of the Owner	6
2.5 Personnel Requirements	7
2.5.1 Qualifications	7
2.5.2 Training	7
2.6 Personal Protective Equipment	7
2.7 Spare Parts	8
3 Specifications	
3.1 Specifications Push Rods/Reels H-XL75 and H-XXL100	8
3.2 Specifications CamFlex®	9
4 Overview and Brief Description	
4.1 Overview CamFlex®	9
4.2 Brief Description CamFlex®	10
4.3 Overview Push Rods/Reels H-XL75 and H-XXL100	10
4.4 Brief Description Push Rods/Reels H-XL75 and H-XXL100	10
5 Transport, Packaging and Storage	
5.1 Safety Instructions for Transport	11
5.2 Inspection upon Receipt	11
5.3 Packaging	11
5.4 Storage	12
6 Mounting and Dismounting the Camera	
6.1 Safety Instructions for Mounting/Dismounting the Camera	12
6.2 Mounting/Dismounting the Camera	12
7 Initial Operation	
7.1 Putting the Camera into Operation	14
7.2 Working with the Camera	14
7.2.1 Normal Operation Mode	14
7.2.2 Halt Position Operation Mode	14
7.2.3 Calibrating the Camera	15
7.2.4 Pulling Back the Camera	15
7.3 Work Conclusion	15
8 Cleaning and Maintenance	
8.1 Cleaning and Maintenance CamFlex®	16
8.2 Cleaning and Maintenance Push Rod/Reel	16
9 Troubleshooting	16
10 Disposal	17
11 Accessories	18

1 General Information

1.1 About the Manual

This manual ensures the safe operation of the device. The manual is an integral part of the product and must be kept with the device, immediately accessible for any personnel.

All personnel are to carefully read and understand the manual before taking up work. As a precondition for safe operation, all safety instructions and operational procedures given in this manual must be observed.

Furthermore, the local accident prevention regulations and safety provisions applicable for the device's range of use are to be heeded.

Illustrations in this manual are intended to better represent the facts explained and may differ from the actual design of the device.

1.2 Manufacturer

Address:

Kummert GmbH
Albert-Einstein-Str. 8
D - 97447 Gerolzhofen

Contact:

Phone: +49 (0) 9382 - 9727 - 0
Fax: +49 (0) 9382 - 9727 - 900
Email: info@kummert.de
Internet: www.kummert.de

1.3 Explanation of Symbols Used

1.3.1 Safety Instructions

Safety instructions in this manual are indicated by means of symbols. The safety instructions are being preluded by signal words, which express the extent of the hazard.



Warning!

This combination of symbol and signal word identifies a possibly dangerous situation, which may cause death or severe injuries if not avoided.



Caution!

This combination of symbol and signal word identifies a possibly dangerous situation, which may cause minor or slight injuries if not avoided.



NOTE

This combination of symbol and signal word identifies a possibly dangerous situation, which may cause damage to property and environment if not avoided.

1.3.2 Tips and Recommendations



Tip

This symbol highlights useful tips and information for an efficient and trouble-free operation of the device.

1.4 Limitation of Liability

All information and instructions given in this manual were compiled in consideration of applicable standards and regulations, the current state-of-the-art technical development and our long-term insights and experiences.

The manufacturer is not liable for damage in the following cases:

- nonobservance of this manual
- improper use of the device
- assignment of untrained personnel
- unauthorized modifications
- technical alterations
- use of unauthorized spare parts

The manual was translated to the best of our knowledge. However, we are not liable for any translation errors. The German version of this manual overrides any translation.

In case of special versions, utilization of additional ordering options or newest technical modifications, the actual scope of delivery may differ from the product explained and illustrated in this document. If you have any questions, please contact the manufacturer.

1.5 Copyright

The contents of this manual are protected by copyright and may be utilized only for work on or with the device. Any improper use is prohibited without the manufacturer's written certificate of release.

1.6 Warranty Conditions

The warranty conditions are included in the manufacturer's General Terms and Conditions, which you can find under www.kummert.de

2 Safety

2.1 Proper Use

The camera CamFlex® is solely intended to be used for the inspection of cleaned private sewer and drains connections in combination with original accessories and components made by Kummert GmbH.

Observing all instructions given in this manual constitutes yet another aspect of proper use.

Any use of the device beyond and/or other than the above specified application is considered improper use.

2.2 Basic Risks

The following chapter lists residual risks which remain, even when the device is used in a proper manner.

To reduce the risk of personal injuries and property damage and avoid dangerous situations, the safety instructions listed below as well as the safety instructions listed in the sections to come are to be observed strictly!



Warning!

Risk of blinding by LEDs!

If the camera is outside of a pipe, its LEDs may blind you and others. Therefore:

- *Never point the camera light at passing vehicles!*
- *Never look directly into the camera light or point the camera at an individual's eyes!*



Warning!

Hazard of chemical or biological materials/liquids!

When inspecting pipes that hazardous materials/liquids run through, observe the following:

- *Start the inspection only once it has been determined that no danger will arise from the materials or liquids.*
- *Rinse pipes before the inspection with a suitable liquid (e.g. water).*
- *Adhere to the Material Safety Data Sheets (MSDS) on the chemical or biological materials/liquids.*
- *Clean the push rod thoroughly after each use.*



Warning!

Risk of injury from push rod!

The push rod is a glass-fiber reinforced plastic rod. By reason of energy stored in the rod, it may suddenly lash out, e.g. when the rod has gotten stuck.

- *Keep the rod as short as possible outside of the pipe to be inspected.*
- *Reel the push rod in immediately after use.*



Caution!

Risk of injury from dirt and scattered objects!

Dirt and scattered objects constitute slip and stumble hazards. Falling accidents may cause injuries. Therefore:

- *Always keep work area clean.*
- *Remove objects no longer needed from work area, particularly from ground level.*
- *Mark unavoidable stumble-risk areas with noticeable tape.*



Warning!

Explosion hazard!

The device is not explosion-proof. Therefore:

- *Never operate the device in an explosive atmosphere. In this context, also make sure that the pipes to be inspected do not contain or leak explosive gases/liquids.*



Warning!

Electrical hazard!

Electric current can cause severe injuries or death. In case of damaged insulation or other components, there is a risk of death by electric shock. Therefore:

- *Always disconnect the camera from the push rod or the reel from the base unit before performing work on the camera (e.g. cleaning it).*

2.3 Behavior in the Event of Danger and Accidents

First-aid equipment (first-aid kit, eye rinsing bottle, etc.) and a fire extinguisher must be stored in close proximity. All personnel must be familiar with the use and location of safety, accident reporting, first-aid and rescue equipment. This ensures the prevention of dangers and the best possible help in the event of accidents.

The device requires a responsible and circumspect operation. Incorrect operation or operation by unauthorized individuals endangers others.

2.4 Responsibility of the Owner

Owner is the person, who him-/herself operates the device for industrial or business purposes or leaves the device to a third party to be used, and who, during the device's operation, bears legal product responsibility for the protection of the operator, all personnel or third parties.

Owner responsibilities

The device is being deployed in the industrial field. Therefore, the owner of the device is required to comply with occupational safety regulations.

In addition to the safety instructions in this manual, the regulations for safety and accident prevention, as well as the environmental regulations, effective at the device's area of application must be observed.

Furthermore, the following applies:

- The owner is to gather information on the applicable occupational safety regulations and to identify additional risks, which result from specific working conditions at the device's place of operation, in a risk assessment. In a company directive, the owner is to specify any additional procedure and safety instructions resulting from the risk assessment.
- During the device's entire time of operation, the owner is to verify, whether the company directives issued by him/her comply with the current version of regulations, and to conform them if necessary.

- The owner must precisely direct and define the responsibilities in respect of installing, operating, trouble-shooting and cleaning the device.
- The owner is to ensure that all individuals handling the device have read and understood this manual. Furthermore, the owner must periodically train all personnel and inform them about the dangers.
- The owner has to provide the personnel with the necessary protective equipment and must require the mandatory wear thereof.

Furthermore, the owner bears responsibility that the device is in a technically sound state at all times. Therefore the following applies:

- The owner is to ensure that the instructions on transporting, storing and cleaning the device are being observed as described in this manual.

2.5 Personnel Requirements

2.5.1 Qualifications



Warning!

Risk due to insufficiently qualified individuals!

Insufficiently qualified individuals cannot assess the risks when handling the device and subject themselves and others to the risk of severe or deadly injuries.

- ***All work must be conducted by qualified individuals only.***
- ***Insufficiently qualified individuals must be kept out of the work area.***

Only individuals who can be expected to do their work in a reliable manner are authorized to work on or with the device. Individuals, whose reactions are impaired, e.g. by drugs, alcohol or medication, are not authorized.

2.5.2 Training

The owner must periodically train all personnel. For best-possible tracking purposes, training minutes must be drawn up with the following minimal contents:

- date of training
- name of trainee(s)
- training objectives
- name of trainer
- signatures of trainee(s) and trainer

2.6 Personal Protective Equipment

Personal Protective Equipment protects individuals against occupational health and safety infringements.

Throughout work with or on the device, all personnel are required to wear their personal protective equipment, which is, in particular, being pointed out in the individual chapters of this manual.

Description of personal protective equipment:



Protective Gloves

Protective gloves protect hands against friction, abrasions, punctures or deeper injuries, as well as contact with hot surfaces.

2.7 Spare Parts



Warning!

Risk of injury due to using incorrect spare parts!

The use of incorrect or faulty spare parts may pose a risk to the personnel, as well as cause damage, malfunctions or breakdown. Therefore:

- *Use only original spare parts supplied by or spare parts authorized by the manufacturer.*
- *Always contact the manufacturer in case of questions.*



Information

Loss of warranty!

Use of unauthorized spare parts will void the manufacturer's warranty.

Spare parts can be obtained from authorized dealers or directly from the manufacturer (see chapter "1.2 Manufacturer").

3 Specifications

3.1 Specifications Push Rods/Reels H-XL75 and H-XXL100

	H-XL75	H-XXL100
Weight:	12 kg	15 kg
Diameter:	9 mm	9 mm
Length:	75 m	100 m
Reel diameter:	67 cm	67 cm
Meter counter:	reflex light barriers and micro controller	
Brake:	adjustable freewheel brake, reel lock	
Bending radius:	max. 250 mm	
Storage temperature:	0° to +50° C	
Operating temperature:	0° to +40° C	

3.2 Specifications CamFlex®

Weight:	1050 g
Diameter:	72 mm
Length:	30 cm
Camera:	¼" Color-CCD; 0.5 Lux; 350 lines
Lens:	2.4 mm
Focus:	controlled by motor
Range of use:	DN100 to DN200
Bending range:	90° in all directions
Depth of field:	5 mm to infinite
Illumination:	18 white high-power LEDs
Sealing:	O-rings, waterproof up to 1 bar
Storage temperature:	0° to +50° C
Operating temperature:	0° to +40° C
Special features:	automatic self-leveling slope measurement with 0.1° accuracy loss gyro sensor for taking bend measurements

4 Overview and Brief Description

4.1 Overview CamFlex®



- 1 connecting socket
- 2 bellows
- 3 camera head
- 4 lens with LEDs
- 5 carrying case



4.2 Brief Description CamFlex®

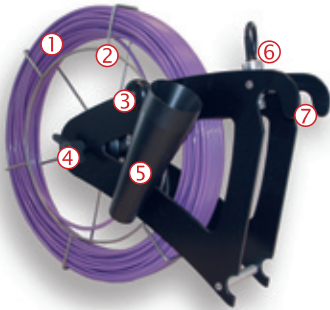
The camera CamFlex® was specifically developed for the inspection of branched sewer systems. It stands out due to its capacity to bend itself from a straight position to a 90° angle. Thus, nearly all laterals from DN100 to DN200 can be navigated. The vermicular camera also moves through bends easily. Even 90° bends are possible from DN125.

The CamFlex® has another strong point in its outstanding stability. The concave shape minimizes the outer shell's wear and tear as it reduces the contact area in the pipe. Furthermore, the high-tech materials used protect the camera's interior.

During the inspection, the CamFlex® facilitates a constant upright image for a best possible orientation. The integrated sensors collect all data for creating an automatic and real-time 3D pipe plan. Perfectly illuminated images in excellent quality are the key to a sophisticated CCTV inspection.

In-between uses and during transport, the camera is optimally protected in the supplied carrying case.

4.3 Overview Push Rods/Reels H-XL75 and H-XXL100



- 1 push rod
- 2 reel basket
- 3 reel lock
- 4 freewheel brake
- 5 tubular
- 6 connecting plug
- 7 reel fastening hooks

4.4 Brief Description Push Rods/Reels H-XL75 and H-XXL100

The reel H-XL75 consists of a 75-meter push rod, the reel H-XXL100 of a 100-meter push rod. This rod is made of glass-fiber-reinforced plastic with a thickness of 9 mm.

An integrated impulse transmitter facilitates a precise length measurement in connection with a micro controller. The adjustable freewheel brake prevents unwanted coasting of the push rod during an inspection. Furthermore, a tubular attached to one side of the reel houses the mounted camera.

All cameras and push rods in the Kummert CamMobile® line are interchangeable. However, to guarantee optimal push performance and pipe bend mobility, the manufacturer's recommendations for the combination of camera and push rod should be followed:

DN100 and up = push rod H-XL75 + CamFlex® or push rod H-XXL100 + CamFlex®

5 Transport, Packaging and Storage

5.1 Safety Instructions for Transport



NOTE

Property damage due to improper transport!

Improper transport may damage the camera, reel and push rod.

- *Always transport the push rod reeled in.*
- *Always transport the camera in the carrying case.*
- *When transporting the reel in a vehicle, secure it against falling over.*

11

5.2 Inspection upon Receipt

We recommend inspecting the entire delivery for completeness and possible transport damage immediately upon receipt.

If damage is externally visible, take the following steps:

- Do not accept delivery or accept it under reserve only.
- Indicate the suspected damage in the carrier's documents of transport or delivery slip.
- Institute a claim.



Information

Legal times for claims

Report every fault as soon as it has been discovered. Claims for damages can only be asserted within the legal time for claims.

The manufacturer is not liable for transport damage.

5.3 Packaging

The devices are being delivered in different packaging.

Packaging materials primarily consist of cardboard and plastics (foil, foam). Packaging may also comprise materials added to the packages for the protection against moisture or frost (e.g. silica gel bags, antifreezing agents).

Unless recovery of packaging has been agreed upon, the packaging materials remain with the customer.



NOTE

Danger to the environment due to incorrect disposal!

Packaging materials are precious resources and, in many cases, can be reused or recycled. Incorrect disposal of packaging materials may cause damage to the environment.

- *Dispose of packaging materials in an environmentally safe manner.*
- *Dispose of packaging materials according to applicable legal regulations and local directives. If necessary, a specialist firm must be commissioned to dispose of the materials.*

5.4 Storage

Always store the CamFlex® and push rod/reel under the following conditions:

- Do not store outdoors.
- Always store the camera in the carrying case or, at least, with the protective cap mounted to the connector.
- Store in a dry and dust-free place.
- Do not expose to aggressive media.
- Do not expose to direct sunlight.
- Storage temperature CamFlex®: 0° to +50° C
- Storage temperature push rod/reel: 0° to +50° C
- When storing the device for more than 3 months, periodically check the general condition of all parts.

6 Mounting and Dismounting the Camera

6.1 Safety Instructions for Mounting/Dismounting the Camera



NOTE

Property damage due to faulty mounting and dismounting!

Faulty mounting and dismounting of the camera may cause property damage or breakdown.

- *Prior to mounting, ensure that the connectors are completely dry.*
- *Prior to connecting, check the connectors for dirt and damage.*
 - *If the connectors are dirty, clean them.*
 - *If the connectors are damaged, refrain from mounting and using the device and arrange for repair.*
- *Check the O-rings for damage like tears and porosity to ensure that the plug-and-socket connection will seal correctly.*
- *Check the camera's bellows for tears and other damage.*
 - *In case of tears or other damage, refrain from mounting and using the camera and arrange for repair.*

6.2 Mounting/Dismounting the Camera



NOTE

Before connecting or exchanging the camera head, the reel must be disconnected from the base unit. Otherwise, interferences may be the result.

Mounting

The reels possess a freewheel brake to regulate the push rod's free movement. Thus, unwanted coasting of the push rod and unreeling impediments can be avoided.

1. Turn the wing nut (fig. 1) counterclockwise to reduce the braking force of the freewheel brake.

fig. 1



2. Turn the knob for the reel lock (fig. 2) while holding on to the push rod or reel. The lock pin releases the reel.
3. Slightly unreel the push rod and turn the knob for the reel lock (fig. 2) to set the reel lock again.

fig. 2



4. Connect the camera socket to the push rod's plug. Make sure the connecting pins are positioned correctly (fig. 3).

fig. 3



5. When screwing the plug-and-socket connection together, it is imperative that you hold the camera tight and turn the reel's sleeve only (fig. 4).
Only hand-tighten the sleeve.

fig. 4



NOTE

Property damage due to faulty mounting!

Failure to observe points 4 and 5 may cause damage to the plug-and-socket connection.

Dismounting

To dismount the camera, proceed in the reverse order.

7 Initial Operation



NOTE

Property damage due to faulty initial operation and use!

Faulty initial operation and use of the camera may cause property damage or breakdown. Therefore:

- ***Never push or pull the rod across sharp edges.***
- ***The rod may only be used to operate the camera. It must not be used as a towing rope.***
- ***Never bend the rod more than the designated radius of 250 mm.***

7.1 Putting the Camera into Operation

Protective equipment: protective gloves

1. Mount the camera (see chapter "6.2 Mounting/Dismounting the Camera").
2. Connect the reel's plug with the socket on the base unit.
3. Switch on the base unit.

7.2 Working with the Camera

The maximum illuminated pipe diameter depends greatly on the degree of reflection of the pipe's inner wall. Generally, a dark surface absorbs the light; a bright and wet surface reflects the light more intensely. Illumination in larger pipe diameters is improved by a stronger reflection.



NOTE

An inspection with the CamFlex® should generally be conducted against the flow direction. Only then can the camera navigate into laterals.

7.2.1 Normal Operation Mode

As long as the CamFlex® is being pushed through the pipe in-between findings, the camera should always be in normal operation mode. In this mode, if the camera is controlled via joystick, it moves in a quick and fluent manner and returns to its straight shape once the joystick is being released.

7.2.2 Halt Position Operation Mode

When measuring laterals and bends, the CamFlex® automatically switches to the halt position mode of operation. In this mode, the camera moves very slowly and stays bent, even if the joystick is being released.



NOTE

Property damage due to constant halt position mode of operation!
In the halt position mode of operation, the motors are exposed to great strain. Therefore, do not operate the camera in the halt position mode for a lengthy period of time to keep the wear and tear as minimal as possible.

To manually switch from normal to halt position mode of operation and vice versa, refer to the *Hardware Manual CamMobile® Profi 3*.

7.2.3 Calibrating the Camera

During an inspection, the CamMobile® Profi 3 automatically calibrates the CamFlex® several times if the need arises.

This happens before the first lateral or bend is being measured, as well as every time before measurements are taken and the camera's temperature has changed by 5° C or more since the last measurement.

A window pops up showing a „ticking clock“, the quality of the calibration and the drift resulting thereof. Furthermore, the calibration will be reconducted automatically, if the recorded measurements strongly deviate from an admissible tolerance.

During calibration, the camera best lay still.

7.2.4 Pulling Back the Camera

If the camera is pulled back through the pipe without the camera movement being adjusted via the joystick, the slip clutch may engage when navigating a lateral or bend. This happens to protect the motors inside the camera, yet results in the camera then staying bent.

To straighten out the camera, push the aligning-button on the CamMobile® Profi 3 twice (fig. 5/1).

If the camera remains bent, please contact our Technical Support using the phone no. +49 (0) 9382 9727 - 710.



fig. 5



Tip

To read more on how to use the CamFlex® in connection with the CamMobile® Profi 3 and the software can3D®, please refer to the “Hardware Manual CamMobile® Profi 3” and the “Quick User Guide - Software CamMobile® Profi 3”.

7.3 Work Conclusion



NOTE

Clean the push rod with a clean cloth as soon as the reeling in starts to avoid soiling of the reel.

1. Dismount the camera (see chapter “6.2 Mounting/Dismounting the Camera”).
2. Check the camera and the bellows, in particular, for tears and damage.
3. Clean the camera (see chapter “8 Cleaning and Maintenance”).
4. Store the camera in the carrying case until the next use.



NOTE

Property damage due to incorrect cleaning!

Incorrect cleaning may cause damage or breakdown. Therefore:

- *Clean the camera and reel only in a de-energized state.*
- *Never use a high-pressure washer or similar means for cleaning.*
- *Do not use abrasive, corrosive or other aggressive detergents.*
- *Clean the camera and push rod after each use.*
- *Make sure that no moisture penetrates the connectors.*
- *Do not soak camera in disinfectant or rubbing alcohol over a longer period (e.g. overnight).*

8.1 Cleaning and Maintenance CamFlex®



NOTE

Bellows

Prior to cleaning the camera, it is imperative to check the bellows for tears and damage! Water penetrating the camera's interior through the bellows will cause severe damage and result in high repair costs.

The camera must be cleaned under running water after each use. To keep moisture away from the connecting socket, seal it with the supplied protective cap prior cleaning.

Clean the bellows with a soft brush made of synthetic material. Never use a wire brush!

In-between uses, store the camera in the carrying case to protect it against dirt and damage.

8.2 Cleaning and Maintenance Push Rod/Reel

In order to keep dirt and moisture away from the connectors, cover them with protective caps, which are either supplied or available from our range of accessories.

Never fully immerse the entire reel or its axis, in particular, in water. Moisture will penetrate and cause damage.

The push rod must be cleaned with a moist, clean cloth as soon as reeling in starts.

9 Troubleshooting

camera

poor image

clean the camera lens

image interferences

ensure that either reel H-XI75 or H-XXL100 is connected – if another reel is being used, sufficient voltage supply is not guaranteed.

no image

switch on the base unit, check the power supply, check the plug connection

poor illumination	clean the lighting dome
camera bent	push the aligning-button on the CamMobile® Profi 3 twice (see chapter “7.2.4 Pulling Back the Camera”)
push rod/reel reel is blocked	check if object extends into the basket and remove it, if needed; release reel lock pin
push rod unreels with difficulty	loosen freewheel brake
push rod does not unreel	release reel lock pin and/or loosen freewheel brake
push rod unreels uncontrollably	fasten freewheel brake
other faults	Please contact our Technical Support: Phone: +49 (0) 9382 9727 - 710

10 Disposal

When the device has reached the end of its useful life, it has to be disassembled and disposed of in an environmentally safe manner.

Unless both parties agreed otherwise on recycling or disposal, all components must be properly dismantled and recycled as follows:

- Scrap any metal parts.
- Recycle any plastic parts in the appropriate manner.
- Dispose of all other components separately depending on the nature of material.



NOTE

Danger to environment due to incorrect disposal!

Incorrect disposal may cause dangers to the environment. Therefore:

- ***Electrical waste, electronic components, lubricants and other substances may only be disposed of by certified specialist companies.***
- ***When in doubt, ask for information on environmentally safe disposal at your local authorities or specific waste management companies.***

11 Accessories



- Protective cap for the HR-plug of the rod and locating transmitter (camera side)

Art.-No. 5916



- Protective cap for the HR-plug of the cameras, centering trolley with additional lighting and locating transmitter (rod side)

Art.-No. 5917



- Protective cap for the 7-pin plug of the reel

Art.-No. 7298



- HR-70 locating transmitter, 512 Hz, 4 m locating range, can be mounted between camera and reel

Art.-No. 10392

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