

IBAK

IBAK Sewer and Manhole Inspection Systems



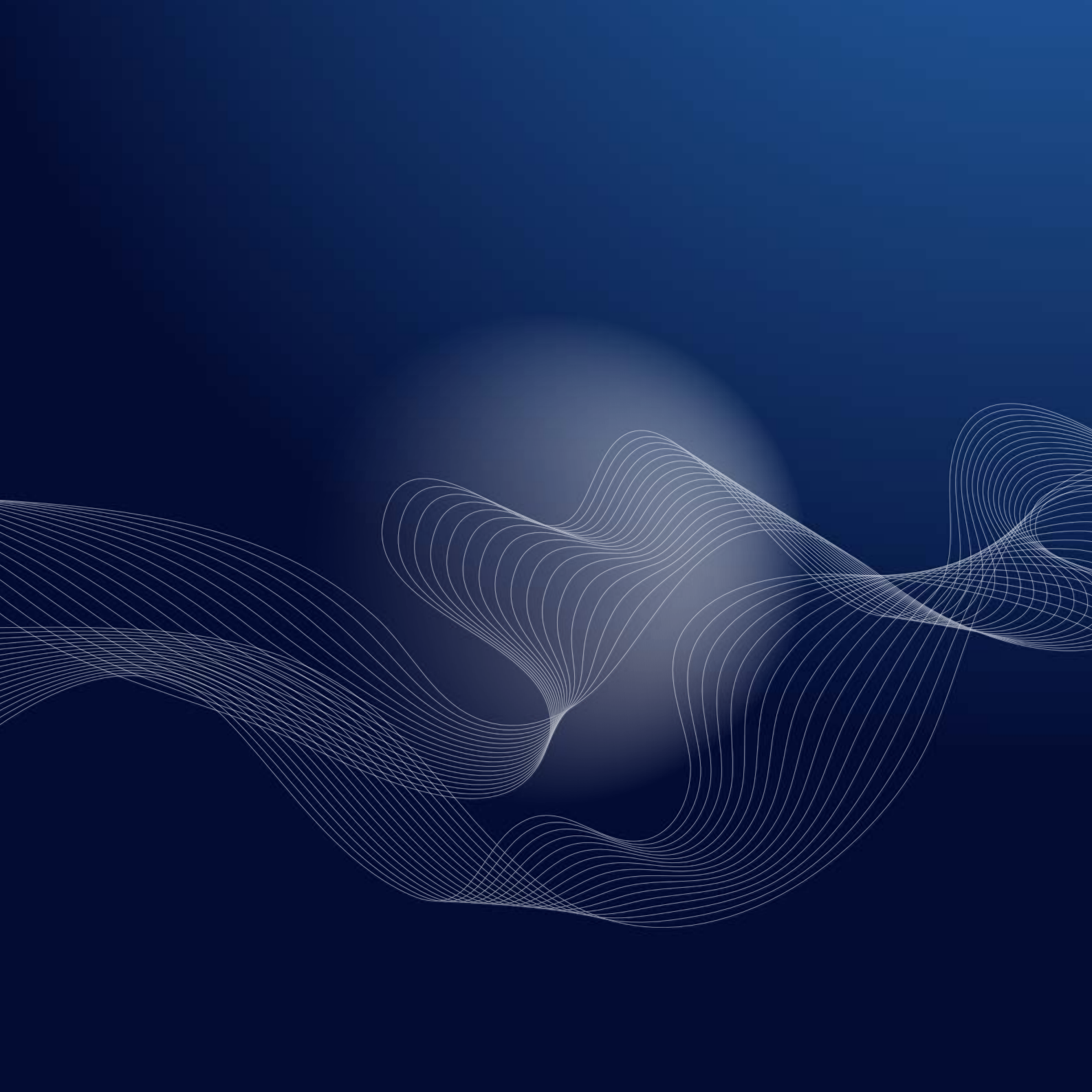


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Hindsight – Insight – Foresight

We've seen each other before...

IBAK products work in the dark, but their success is visible. Throughout the world operators use the innovative sewer inspection system by this Kiel-based market leader. IBAK's presence is felt all over the globe.

IBAK's invention

When the company founder Helmut Hunger set up his business "Ingenieur Büro Atlas Kiel" in 1945, he did not give a thought to going global. It was his personal quest to develop perfectly functioning precision instruments. Even today IBAK is just as passionate about meeting those targets. Finding innovative and user-friendly solutions is always the company's prime objective. It thus comes as no surprise that the IBAK organization, after many years of research and development, presented the first sewer TV inspection system in the world in 1957.

From human to human

Products by IBAK are technological masterpieces. And with one in six of our over 300 colleagues working in research and development, that is no wonder. Our highly experienced engineers, the continuous exchange of ideas with customers and the well-established cooperation with universities and professional bodies all ensure the development of trend-setting technologies and their conversion into practical designs. The result is that IBAK systems are powerful, durable, user-friendly, low-maintenance, high-tech solutions.

Quality shows

What started in Kiel is now well known throughout the world. Just as every year Kiel welcomes the world for its "Kieler Woche" – the biggest sailing event in the world – IBAK sets its course for more than 40 countries. All IBAK products have one thing in common: they provide 'made in Germany' quality. All system components as well as the hardware and software are developed, produced, assembled and tested by IBAK. Relevant standards, such as ISO, DIN, all EC Directives as well as ATEX and IECEx certificates of quality, constitute merely the minimum requirements for us.

Count on IBAK

With their high quality standards, IBAK products are always a safe investment. Despite the exceptional characteristics of our products, economic factors have always been decisive.

Protect the environment

Just as every department of IBAK is governed by a strict environmental management system to protect natural resources, so also do IBAK's inspection systems contribute to environmental protection. IBAK systems detect damage in fresh water pipes and sewers, thus helping to protect our valuable drinking water for the future.

The extraordinary driving experience

When talking about innovation, that is where the PEGASUS HD camera, with both its fully HD high-resolution and the brilliant picture it produces, as well as the digital PANORAMO sewer inspection system shine brightest. Driving through the world of sewers with the PANORAMO is a unique 3D experience. Analysis of the entire inspection data is not carried out in the inspection vehicle on-site as was previously the case. Instead it is analysed in the comfort of the office, although the feeling of working with a pan and tilt camera in the pipe remains.

IBAK

IBAK Sewer and Manhole Inspection Systems

CAMERAS

HYDRUS
≥ DN 50



**NANO/
NANO L**
≥ DN 80



JUNO
≥ DN 100



POLARIS
≥ DN 100



**ORION /
ORION L**
≥ DN 100



ORPHEUS 2
≥ DN 150



ORPHEUS HD
≥ DN 150



ARGUS 5
≥ DN 200



CERBERUS
Inspection of
main sewers



TRACTORS

T 66 / T66 HD
≥ DN 100



T 76 / T76 HD
≥ DN 150



T 86 / T86 HD
≥ DN 200



CAMERA SYSTEMS

PANORAMO 150
≥ DN 150



PANORAMO
≥ DN 200



PANORAMO SI
≥ DN 300
Manhole Inspection



LISY 3
≥ DN 150



CABLE DRUM KT 180
Camera cable
max. 200 m



**COMPACT
PUSH
SYSTEMS**

HSP
Camera cable
max. 80 m

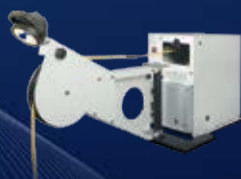


MiniLite
≥ DN 50



**CABLE
WINCHES**

KW 180
Camera cable
max. 200 m



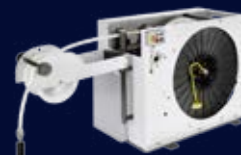
KW 305/310
Camera cable
max. 300 m



KW 505
Camera cable
max. 600 m



KW LISY Synchron
Camera cable
max. 180 m



**CONTROL
SYSTEMS**

BK 3.5



BS 3.5 / BS 7



BS 5



SOFTWARE



IBAK sewer and manhole inspection systems are modular by design. Most cameras are compatible with the tractor range or push-rod systems. Various cable winches, operating systems and suitable software complete the system.

Thus, the system can be configured to suit the requirements and the area of application – with everything from one manufacturer.

IBAK HYDRUS

Axial camera

Inspection range DN 50/DN 70 and up



The **IBAK HYDRUS** is a small inspection camera with bending capability for push operations. It is available in two versions: as a complete system with coiler and as a plug-in version. With their small diameter, both models are ideal for use in supply pipes within a building. With the HYDRUS complete system inspections are possible in DN 50 pipes and up, with the plug-in component inspections are possible in DN 70 pipes and up. Thanks to its flexibility, the HYDRUS can be easily pushed through a number of consecutive bends; the integrated and controllable LED lighting illuminates the area of inspection in an optimal way.

IBAK HYDRUS 1

Complete system with MiniLite or HSP 40/60

The compact complete system from IBAK includes the HYDRUS 1, firmly mounted onto the push rod of the MiniLite push camera systems or onto the HSP 40 / 60 cable drum. It holds 30 m of "Magic Push Rod" (guide hose with camera cable and push rod). Its flexibility is ideally adjusted to its nominal operational diameter of DN 50 upwards.

IBAK HYDRUS 2

Plug-in pushrod camera

The pluggable HYDRUS 2 fits onto the MiniLite compact push camera systems or onto the IBAK HSP 40 and HSP 60 cable reels. The HYDRUS 2 completes the modular diversity of IBAK camera systems for the use in areas with small pipe diameters. HYDRUS 2 has the same plug connection as IBAK JUNO, ORION, ORION L and POLARIS so that existing IBAK systems can be optimally complemented.



Technical system data

Camera specification	Axial camera
Inspection range	DN 50 and up
Dimensions	Ø 41 mm / length 145 mm
Weight	approx. 135 g
Push operation	yes
Tractor operation	no
Upright picture control	no
Correctly oriented image	no
Zoom	no
F (shutter)	2.0
f (focal length) (mm)	2.5
Lighting	36 white LEDs, controllable
Light sensitivity (lux)	0,05 lux (F 1.2, 1/50 s)
Luminous intensity (lumen)	80 lm
Protection class	IP 68
Permissible ambient temperature	C – +40°C during operation; -30°C – +70°C for storage
Test pressure	1 bar
Pressure monitoring	no
Shutter function	fixed shutter, automatic electronic shutter
Panning range	axial view
angle of aperture	approx. 107° diagonally
Angle of rotation	-
Focus function / range	5 cm - 15 cm, fixed
Sensor (inch)	1 / 4"
TV standard	NTSC or PAL
Horizontal image resolution	540 Lines PAL
Integrated laser	no
Integrated detector transmitter	no
Explosion protection	no

Combinable with

IBAK coilers/winches	all
IBAK push systems	all
IBAK control systems	all

Accessories (optional)

Camera guide device	DN 100 and up
Ancillary light	-

1) UPC = Upright Picture Control

IBAK NANO/NANO L

Pan and tilt camera

Inspection range DN 80 and up



The **IBAK NANO** camera that was shown for the first time in the spring of 2015 is the smallest pan and rotate camera in the IBAK portfolio. It has also been available as version NANO L with the well-known Kiel rod since the second quarter of 2016.

It can be operated in pipes with diameters as small as DN 80 upwards. Every desired viewing direction is reached most rapidly under microprocessor control by the pan and rotate head. The NANO can rotate endlessly around its own axis. The pan function permits a view in all directions, automatic rotation to inspection pipe joints and a view to the rear into branch pipes. The NANO generates an erect image in axial viewing direction thanks to the UPC function (upright picture control).

With its slim diameter of 47 mm, the camera can be operated with all IBAK push rod systems, camera tractors¹⁾ and the IBAK LISY satellite system and has full bend-passing capability. In addition, thanks to the optional sensor, it can be used with 3D-GeoSense systems to create 3D site plans.

The field of operation of an IBAK system can be extended with the IBAK NANO / NANO L – it is in its element in particular in relined laterals and/or complex DN 100 lateral systems. The industrial sector, where hard to access, long, complex pipe systems are often

encountered, is also an ideal field of application for the NANO and especially the NANO L. The lights are dimmable and are ideally suited to pipes of up to approx. DN 250. The use of the NANO, particularly in combination with the IBAK LISY satellite system enables versatile and efficient operation thanks to the NANO's fast forward drive speed and outstanding manoeuvrability.





System Technical Data	
Type of camera	Pan/rotate camera
Field of application	From DN 80 upwards
Dimensions	Ø 47 mm / length 84 mm
Material	Anodized aluminium
Weight	Approx. 320 g
Push rod operation	yes
Camera tractor operation	yes*
Erect image (UPC)	yes
Zoom	no
F (shutter)	2
f (focal length) (mm)	3.8
Lighting	4 white power LEDs
Automatic return to zero	yes
Light sensitivity (lux)	0.025lux (F 1.2, 1/50 s)
Protection class	IP 68
Permissible ambient temperature	Operation 0° C–+40° C Storage -30° C–+70° C
Leak test pressure	1.0 bar
Pressure monitoring	2 integrated pressure sensors (LCD display and acoustic signal in the control unit)
Shutter function	Fixed shutter, electronic shutter, remote-controlled
Pan range	+/-120°*
Angle of view	+/-150°*
Angular aperture	Approx. 68° diagonal
Angle of rotation	Endless
Focus function/range	Manual 1 cm – ∞, remote-controlled
Sensor (inches)	1/4"
TV standard	NTSC or PAL
Horizontal image resolution	420 lines PAL
Integrated laser	yes
Ex protection	Optional/in preparation
Direction-changing device	Optional/in preparation
Bend-passing capability	90° from DN 80 upwards
Integrated locator transmitter	yes, frequency range 33 kHz, on/off switchable
3D sensor	Optional

Combinable with	
IBAK tractors	all ¹⁾
IBAK coilers	all
IBAK push rod systems	all
IBAK control systems	MiniLite, from BP/BK/BS 3.5.2 onwards, BS5, BS7

*NANO L restricted function
1) T66 from version T66.1 (2016) onwards

IBAK JUNO

Axial camera

Inspection range DN 100 and up



IBAK JUNO is a versatile axial camera for inspections of pipes of DN 100 and up. Thanks to the UPC function (Upright Picture Control), the image it provides is always upright. The integrated high-performance LEDs give the ideal illumination, thus providing the best possible visibility during the inspection.

The locating transmitter determines the position of the camera quickly and conveniently and also localises any damaged areas identified. The transmitter can be switched off so erroneous findings due to the reception of external signals are avoided.

The internal pressure monitoring ensures safe operation of the camera system.

JUNO can be used during push operations with IBAK's HSP 40 and 60 reels, with the push rods of IBAK LISY (LISY Synchron winch) as well as with the compact pushrod camera system MiniLite. In tractor operation, JUNO can be used with all IBAK camera tractors.



Technical system data

Camera specification	Axial camera
Inspection range	DN 100 and up
Dimensions	Ø 60 mm / length 100 mm
Weight	approx. 500 g
Push operation	yes
Tractor operation	yes
Upright picture control	yes
Correctly oriented image	no
Zoom	no
F (shutter)	2.0
f (focal length) (mm)	2.5
Lighting	56 white LEDs, controllable
Light sensitivity (lux)	0,05 lux (F 1.2, 1/50 s)
Luminous intensity (lumen)	125 lm
Protection class	IP 68
Permissible ambient temperature	0°C – +40°C during operation -30°C – +70°C for storage
Test pressure	1 bar
Pressure monitoring	2 integrated pressure sensors ¹⁾
Aperture function	fixed shutter, automatic electronic shutter
Panning range	axial view
Angle of aperture	approx. 107° diagonally
Angle of rotation	Continuous
Focus function / range	manually 1 cm – ∞, remote-controlled in endless operation
Sensor (inch)	1 / 4"
TV standard	NTSC or PAL
Horizontal image resolution	540 Lines PAL
Integrated laser	no
Integrated detector transmitter	yes
Explosion protection	no

Combinable with

IBAK tractors	all
IBAK push systems	all
IBAK coilers/winches	all
IBAK control systems	all

Accessories (optional)

Camera guide device	DN 150 and up
Ancillary light	ZSW 65, ZSW 75

1) LCD indicator and acoustic alarm in the control unit

IBAK POLARIS

Pan and tilt camera

Inspection range DN 100 and up



The **IBAK POLARIS** pushrod camera was designed to satisfy the demand for a flexible camera suitable for bends of 90° with a 100% field of view. The POLARIS has been developed into a pan and tilt camera capable of working in pipes of DN 100 and up. The camera's position at the very front of the device means that no precision guide is visible in the images shown during inspections.

The POLARIS is compatible with IBAK's LISY satellite system and with the MiniLite pushrod camera system. Two pre-settable focus-point save points make the joint inspection panning process even more convenient. Since frequent refocusing is no longer necessary, the user can reach the targeted position even faster.





IBAK POLARIS – The benefits at a glance

The POLARIS is our new divertable camera for branched pipes from DN100 upwards.

- 360° panning to inspect joints
- 100% free field of view
- Automatic return to zero function
- Programmable approach to viewing positions
- Inspection without water-jet driving possible
- Provides an alternative to the ORION and ORION L
- With panning and tilting function
- Panning range +/- 120°
- Viewing angle +/- 150°
- High-performance Power-LED lighting
- Upright picture control in push operation
- Integrated location transmitter
(can be operated by remote control)
- Explosion protection optional
- Interior pressure monitoring
- Laser measurement

Technical system data	
Inspection range	DN 100 and up
Dimensions	Ø 60 mm / Length 285 mm (bendable)
Material	Anodised aluminium
Weight	approx. 0.8 kg
Push operation	yes
Tractor operation	no
Upright picture control	yes
Zoom	no
F (shutter)	2
f (focal length) (mm)	3.8
Lighting	4 white power LEDs
Automatic return to zero function	yes
Light sensitivity (lux)	0,025 lux (F 1.2, 1/50 s)
Luminous intensity (lumen)	440 lm
Protection class	IP 68
Permissible ambient temperature	0°C – +40°C during operation -30°C – +70°C for storage
Test pressure	1 bar
Pressure monitoring	2 integrated pressure sensors ¹⁾
Aperture function	Fixed shutter, electronic shutter with remote control
Panning range	+ / -120°
Viewing range	+ / -150°
Angle of aperture	approx. 68° diagonally
Angle of rotation	infinite (infinite rotation of camera head around its own axis)
Focus function / range	manually 1 cm – ∞, can be operated by remote control
Sensor (inch)	1 / 4" CMOS
TV standard	NTSC or PAL
Horizontal image resolution	420 Lines PAL
Integrated laser	yes
Explosion protection	optional
Bending device	yes, steerable camera boom
Bend capability	87° in DN 100 and up
Integrated detector transmitter	yes, frequency range 33 kHz, switchable
Combinable with	
IBAK coilers/winches	all
IBAK push systems	all
IBAK control systems	from BK 3.5 upwards, all BS

1) LCD indicator and acoustic alarm in the control unit

IBAK ORION

Pan and tilt camera

Inspection range DN 100 and up



The **IBAK ORION** is the all-rounder when it comes to the inspection of pipes of DN 100 and up. Every required viewing direction is reached rapidly by the microprocessor controlled pan and tilt head. ORION can rotate endlessly around its own axis. By means of the pan function it is possible to view in all directions, to pan the view automatically to inspect pipe joints, and even to view backwards into branch pipes. The ORION provides an upright image in the axial view thanks to its UPC function (Upright Picture Control). With its small diameter of 60 mm, the camera can be connected to all IBAK camera tractors and has also full bend capability when operated as a push camera.

The system is protected by an internal operating pressure of 1 bar and internal pressure monitoring – in case of a pressure drop the inspector receives a warning signal on the LCD display and a warning tone in the control unit. If the customer requires, IBAK can also deliver the ORION models with increased pressure resistance.

In 2012, various improvements were incorporated into the camera: a larger angle of aperture, excellent light sensitivity, a 3x zoom and an impressive field depth are now standard. With their enhanced features, the ORION models from version 2.7 onwards are also particularly suited for the inspection of larger pipes.

Inspections up to DN 600 can be carried out with the ORION without the need for additional lights.

Since May 2014 the ORION (version 2.9), has been equipped with a built-in sensor that enables the run of the pipe to be measured. Depending on the field of application, the camera is available with or without explosion protection. With the location transmitter that can be switched on and off as required, the position of the ORION can be determined at any time. In combination with the IBAK IKAS software, the laser that has been a feature of the camera since version 2.5 allows you to make easy diameter and deformation measurements while inspecting the sewer pipe.

The housing made of aircraft aluminium offers high pressure-resistance and has a very light weight. These combined qualities allow long travel distances in push operation, and provide maximum camera robustness at the same time. High-strength materials, which are required for the explosion resistance impact test, are used in explosion-safe and non-explosion-safe cameras.

1. *Pan and tilt camera IBAK ORION*
2. *ORION and ancillary light ZSW 65*
3. *Remote-controlled focus function and 40 controllable LEDs*
4. *Laser supported diameter and deformation measurement (2.9)*

1.



2.



3.



4.



Technical system data

Camera specification	Pan and tilt camera
Inspection range	DN 100 and up
Dimensions	Ø 60 mm / length 100 mm
Weight	approx. 500 g
Push operation	yes
Tractor operation	yes
Upright picture control	yes
Correctly oriented image	no
Zoom	3x digital
F (shutter)	3.5
f (focal length) (mm)	3.0
Lighting	40 white LEDs, controllable
Light sensitivity (lux)	0,05 lux (F 1.2, 1/50 s)
Luminous intensity (lumen)	90 lm
Protection class	IP 68
Permissible ambient temperature	0°C – +40°C during operation -30°C – +70°C for storage
Test pressure	1 bar
Pressure monitoring	2 integrated pressure sensors ¹⁾
Aperture function	Fixed shutter, electronic shutter with remote control
Panning range	+ / -120°
Angle of aperture	approx. 90° diagonally
Viewing range	+ / -155°
Angle of rotation	continuous
Focus function / range	manually 1 cm – ∞, remote-controlled in endless operation
Sensor (inch)	1 / 4"
TV standard	NTSC or PAL
Horizontal image resolution	540 Lines PAL
Integrated laser	yes
Integrated detector transmitter	yes
Explosion protection	optional

Combinable with

IBAK tractors	all
IBAK coilers/winches	all
IBAK push systems	all
IBAK control systems	from BK 3.2, BE 3.2, all BS

Accessories (optional)

Camera guide device	DN 150 and up
Ancillary light	ZSW 65 for DN 200 and up ZSW 75 for DN 300 and up

1) LCD indicator and acoustic alarm in the control unit

IBAK ORION L

Pan and tilt camera

Inspection range DN 100 and up



In heavily branched networks, a special version of the IBAK ORION pan and tilt camera is used: the **IBAK ORION L**.

Its guide unit, the “Kiel rod”, can be panned and rotated in all directions and guides the camera smoothly into the target pipe. Its fast direction-changing function and mechanical sturdiness set the ORION L apart from other divertable camera systems for the inspection of house drains.

The ORION L (version 2.6L) has been available since the beginning of 2012 with a larger angle of aperture, a 3x digital zoom and increased light sensitivity. In addition, the image quality and the field depth have been further improved in the course of model upgrading.

Mid 2014, a further product improvement was implemented: the ORION L was equipped with a 3D sensor which has now become a standard feature of the series from version 2.8 L onwards. This sensor enables the run of the pipe* to be measured automatically in the sewer network, thus considerably increasing the value of the inspection data of house drains.

This camera, which can be deployed in DN 100 and up, has all the identifiable ORION features: full rotatability of the camera head, remote-controlled operation of the viewing direction and all functions of the lens system and internal pressure monitoring. Specially arranged LEDs provide excellent illumination of the inspection area and ensure a superb picture that shows up even the smallest defects. The ORION L provides an upright image in the axial view thanks to its UPC function (Upright Picture Control).

The IBAK ORION L can be modularly connected to all IBAK push rods and is particularly effective in combination with the LISY 3 satellite system. An explosion-safe model of the user-friendly, robust and low-maintenance camera is also available.



ORION L with flushing nozzle „PHOBOS 3D“

* in combination with the appropriate system components, the software and when calibrated



Technical system data

Camera specification	Pan and tilt camera
Inspection range	DN 100 and up
Dimensions	ø 60 mm / length 100 mm
Weight	approx. 500 g
Push operation	yes
Tractor operation	yes
Upright picture control	yes
Correctly oriented image	no
Zoom	3x digital
F (shutter)	3.5
f (focal length) (mm)	3.0
Lighting	40 white LEDs, controllable
Light sensitivity (lux)	0,05 lux (F 1.2., 1/50 s)
Luminous intensity (lumen)	90 lm
Protection class	IP 68
Permissible ambient temperature	0°C – +40°C during operation -30°C – +70°C for storage
Test pressure	1 bar
Pressure monitoring	2 integrated pressure sensors ¹⁾
Aperture function	Fixed shutter, electronic shutter with remote control
Panning range	+/-45° ²⁾ , +120°/-45° ³⁾
Angle of aperture	approx. 90° diagonally
Viewing range	+155°/-75° ²⁾ , +/-155°
Angle of rotation	continuous
Focus function / range	manually 1 cm – ∞, remote-controlled in endless operation
Sensor (inch)	1 / 4"
TV standard	NTSC or PAL
Horizontal image resolution	540 Lines PAL
Integrated laser	no
Integrated detector transmitter	yes
Explosion protection	optional

Combinable with

IBAK tractors	all
IBAK push systems	all
IBAK coilers/winches	all
IBAK control systems	from BK 3.2, BE 3.2, all BS

Accessories (optional)

Camera guide device	DN 150 and up
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1) LCD indicator and acoustic alarm in the control unit

2) with rod, dependent on pipe diameter

3) without rod and holder, on camera tractor

IBAK ORPHEUS 2

Pan and tilt camera

Inspection range DN 150 and up





The **IBAK ORPHEUS 2** has been available since 2016. In comparison to its predecessor, it impresses above all with higher resolution, high light sensitivity and very good illumination that eliminates the need for additional lighting in big pipe diameters. Illumination is provided by 12 power LEDs which can be switched on and off in groups. In addition, it is equipped with integrated joint gap lighting and a temperature-controlled light. This prevents the camera from overheating at maximum light intensity. The camera can be operated in DN 150 to DN 2000 pipes and is therefore versatile in operation. It combines the proven functionalities of the ORPHEUS such as the full rotatability of the camera head and automatic panning to inspect joints. In addition, it has a 10 x optical zoom and an innovative laser measurement system with two lasers. The LaserScan deformation measurement system permits the analysis of the deformation over the entire length of the sewer section. The results are displayed in graphical form on the monitor and in a clearly arranged report.

Technical system data	
Camera specification	Pan and tilt camera
Inspection range	DN 150 and up
Dimensions	Ø 110 mm / length 160
Weight	approx. 1.6 kg
Push operation	no
Tractor operation	yes
Upright picture control ¹⁾	yes
Correctly oriented image	e-Flip, every 180° (switchable)
Zoom	10x optical; 12x digital zoom optional
F (shutter)	1:1,8 to 1:2,9
f (focal length) (mm)	4.2 to 42
Lighting	10+2 High Power LEDs, (2x for illuminating joint gaps) switchable, controllable, temperature controlled
Light sensitivity (lux)	1.0 lux (F 1.8, 1/50 s)
Luminous intensity (lumen)	5244 lm (max 1,5A)
Protection class	IP 68
Permissible ambient temperature	0° C—+40° C during operation -30° C—+70° C for storage
Test pressure	1 bar
Pressure monitoring	2 integrated pressure sensors ²⁾
Aperture function	manually, automatic, can be operated by remote control
Panning range	+/-120°
Angle of aperture	approx. 60° diagonally
Viewing range	+/-150°
Angle of rotation	continuous
Focus function / range	manually, one-push autofocus, 1 cm – ∞, can be operated by remote control
Sensor (inch)	1/2,5"
TV standard	NTSC or PAL
Horizontal image resolution	530 Lines PAL
Integrated laser	yes, 2 lasers, LaserScan Mode
Integrated detector transmitter	optional
Explosion protection	in preparation
3D GeoSense	optional (for mains)
Combinable with	
IBAK tractors	T 66 ³⁾ , T 76, T 86
IBAK control systems	BK 3.5.2, BS 3.5.2, BS 5, BS 7
Accessories (optional)	
Manhole adapter	yes
Ancillary light	no

1) UPC = Upright Picture Control

2) LCD indicator and acoustic alarm in the control unit

3) T66 from version T66.1 (2016) onwards

IBAK ORPHEUS 2 HD

Pan and tilt camera

Inspection range DN 150 and up



The **IBAK ORPHEUS 2 HD** is a high resolution pan and rotate camera for the Full HD sewer inspection system.

IBAK is the pioneer of this technology on the market and provides a system with which videos can be created, transmitted, displayed, processed and archived in full HD quality.

The ORPHEUS 2 HD camera is equipped with an image sensor in full HD format ($1920 \times 1080 = 2.08$ million pixels) which has approximately 5 times as many pixels as a conventional PAL sensor.

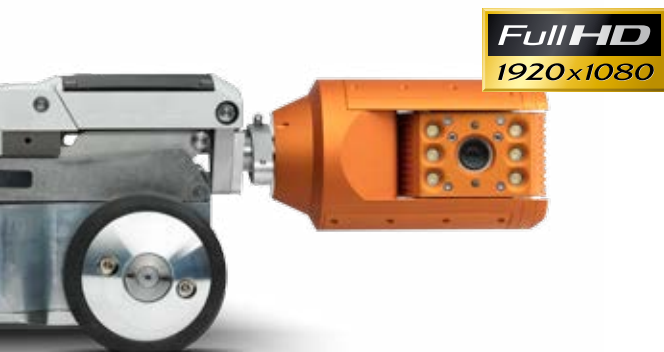
The picture transmission is entirely digital, from the generation of the image in the camera head through to display and storage in the control unit. Thus, the camera image produced is of unrivalled quality in terms of resolution and colour fidelity. The full HD resolution of the ORPHEUS 2 HD is transmitted via optical fibre and highly efficiently compressed using the H.264 standard.

With its vertical image resolution of 1080 pixels, the ORPHEUS 2 HD fulfils the requirements of the DWA advisory leaflet M149-5 for the inspection of large diameter pipes (e.g. the required vertical resolution of at least 1000 pixels for DN 1000 pipes).

Besides high resolution digital image generation, the ORPHEUS 2 HD has all the important functions of a conventional pan and rotate camera such as a 10x optical zoom, automatic image routines and easy-to-handle defects measurement during inspections in the sewer.

All data are displayed and processed in the IKAS evolution software.





Technical system data

Camera specification	Pan and tilt camera
Inspection range	DN 150 and up
Dimensions	Ø 110 mm / length 170
Weight	approx. 1.6 kg
Push operation	no
Tractor operation	yes
Upright picture control ¹⁾	yes
Correctly oriented image	e-Flip, every 180° (switchable)
Zoom	10x optical
F (shutter)	1:1,8 to 1:3,4
f (focal length) (mm)	3.3 to 33
Lighting	10+2 High Power LEDs, (2x for illuminating joint gaps) switchable, controllable, temperature controlled
Light sensitivity (lux)	0.5 lux (F 1.8, 1/50 s)
Luminous intensity (lumen)	5244 lm (max 1,5A)
Protection class	IP 68
Permissible ambient temperature	0° C–+40° C during operation -30° C–+70° C for storage
Test pressure	1 bar
Pressure monitoring	2 integrated pressure sensors ²⁾
Aperture function	manually, automatic, can be operated by remote control
Panning range	+/-120°
Angle of aperture	approx. 60° diagonally
Viewing range	+/-150°
Angle of rotation	continuous
Focus function / range	manually, one-push autofocus, 1 cm – ∞, can be operated by remote control
Sensor (inch)	1/3" (Full HD 16:9, 4.080.000 pixel)
TV standard	HD, Full HD
Horizontal image resolution	horizontal 1920, vertical 1080
Integrated laser	yes, 2 lasers, LaserScan Mode ³⁾
Integrated detector transmitter	optional
Explosion protection	in preparation
3D GeoSense	optional

Combinable with

IBAK tractors	T 66 HD, T 76 HD, T 86 HD
IBAK control systems	BS5, BS7

1) UPC = Upright Picture Control

2) LCD indicator and acoustic alarm in the control unit

3) In Preparation

IBAK ARGUS 5

Pan, tilt and rotate camera

Inspection range DN 200 and up



The **IBAK ARGUS 5** is a pan, tilt and rotate camera that can be adapted to the required settings for each specific inspection at the push of a button. Thus, pan mode (direction of view: right/left, e.g. for lateral service connections) or tilt mode (direction of view: up/down, e.g. for pipe invert) can be accessed using the preselect button. The other selectable functions "45° angle of view*", "90° angle of view" (both of which settings are available in all directions: right / left / up / down), "reset" and "automatic joint inspection" ensure highly efficient inspection procedures.

With the ARGUS 5, the camera picture always stays right-side up and correctly oriented thanks to the ROTAX panning mechanism, even when the camera head is panned, tilted or rotated. This in turn helps orient the user.

The integrated, adjustable high-power LEDs assure optimum illumination at both close and long range. They also make it possible to inspect larger diameter pipes without the need for additional lighting. The left and right-hand lighting units can be switched on and off separately* and follow the movements of the camera head, thus making it easier to identify defects clearly and to distinguish them from e.g. grout shadows. With its integrated joint gap lighting, which can be switched on when required, and the automatic joint inspection function, the ARGUS certainly lives up to its name.

IBAK has optimised the advantages of automatic focussing with its innovative "one-push autofocus": whenever the camera head changes position or returns to the default position, the autofocus only needs to be triggered once and immediately generates a sharp picture.

In combination with IBAK's IKAS software, the integrated laser enables you to perform diameter, deformation and defect measurements easily during sewer inspections.

* only BS 5

1.



2.



3.



Technical system data

Camera specification	Pan, tilt and rotate camera
Inspection range	DN 200 and up
Dimensions	ø 120 mm / length 195 mm
Weight	approx. 3.5 kg
Push operation	no
Tractor operation	yes
Upright picture control	yes
Correctly oriented image	yes
Zoom	10x optical; 4x digital zoom optional
F (shutter)	1.8 to 2.9
f (focal length) (mm)	4.2 to 42
Lighting	8 white power LEDs, 6 white 5 mm LEDs for illuminating joint gaps
Light sensitivity (lux)	1.5 lux (F 1.8, 1/50 s)
Luminous intensity (lumen)	1600 lm
Protection class	IP 68
Permissible ambient temperature	0°C – +40°C during operation -30°C – +70°C for storage
Test pressure	1 bar
Pressure monitoring	2 integrated pressure sensors ¹⁾
Aperture function	manually, automatic, can be operated by remote control
Panning range	+ / -120°
Angle of aperture	approx. 60° diagonally
Viewing range	+ / -150°
Angle of rotation	continuous
Focus function / range	manually, one-push autofocus, 1 cm – ∞, can be operated by remote control
Sensor (inch)	1 / 2.5"
TV standard	NTSC or PAL
Horizontal image resolution	460 Lines PAL
Integrated laser	yes
Integrated detector transmitter	no
Explosion protection	optional

Combinable with

IBAK tractors	all
IBAK control systems	from BK 3.2 upwards, BE 3.2, all BS

1) LCD indicator and acoustic alarm in the control unit

1. IBAK ARGUS 5 on T76 with tractor tyres
2. IBAK ARGUS 5 on T 86 with ovoid pipe device
3. IBAK ARGUS 5 with its high-power LEDs in operation

IBAK CERBERUS

Axial hand camera

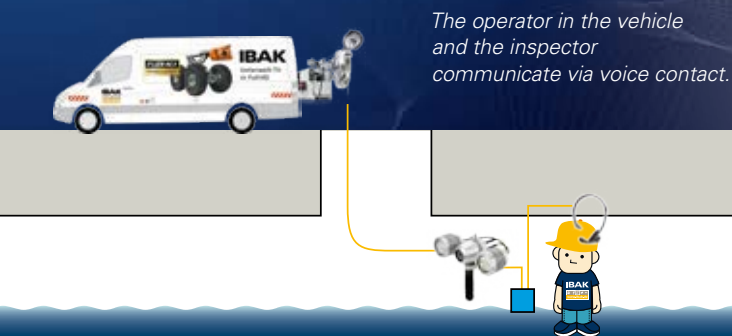
Inspection of main sewers



The **IBAK CERBERUS** is an ideal extension to all IBAK TV systems in order to visually assess the condition of large human-accessible sewers.

The CERBERUS is a hand-held TV camera – with its ergonomically designed holder, lightweight design and automatic shutter and focus functions that can be activated if required, video recording is as easy as pie. The CERBERUS features all desirable camera functions, such as a 10x optical zoom, autofocus and automatic/manual shutter.

The CERBERUS is connected to TV systems via the extension kit. Continuous voice contact is possible between the operator and the inspector, as a headset ensures interference-free communication with the control centre via the camera cable. In this way operator and inspector can work closely while performing special inspection tasks. Two durable high-power LED headlights and the 10x optical zoom lens are particularly useful for showing up cracks and small defects. By projecting two laser points on the TV picture at a defined distance from each other, the inspector can easily estimate relative sizes depicted in the picture and thus efficiently evaluate the condition of the sewer.



Technical system data	
Camera specification	Axial hand camera
Inspection range	Inspection of main sewers
Dimensions	W 290 mm / H 240 mm / D 110 mm
Weight	approx. 2.6 kg
Push operation	no
Tractor operation	no
Upright picture control	no
Correctly oriented image	no
Zoom	10x optical; 4x digital zoom optional
F (shutter)	1.8 to 2.9
f (focal length) (mm)	4.2 to 42
Lighting	2 ancillary lights 10 with 3 high-power-LEDs
Light sensitivity (lux)	1.5 lux (F 1.8, 1/50 s)
Luminous intensity (lumen)	1200 lm
Protection class	IP 68
Permissible ambient temperature	0°C – +40°C during operation -30°C – +70°C for storage
Test pressure	1 bar
Pressure monitoring	2 integrated pressure sensors ¹⁾
Aperture function	manually, automatic, can be operated by remote control
Angle of aperture	approx. 60° diagonally
Viewing range	360°
Focus function / range	1 cm – ∞, manually, autofocus, remote-controlled
Sensor (inch)	1 / 4"
TV standard	NTSC or PAL
Horizontal image resolution	460 Lines PAL
Integrated laser	yes
Integrated detector transmitter	no
Explosion protection	no
Combinable with	
IBAK coilers/winches	KT 180, KW 180, KW 305/310/505 (only with the extension kit)
IBAK control systems	from BK 3.2 upwards, BE 3.2, all BS
IBAK extension kit	yes

1) LCD indicator and acoustic alarm in the control unit

IBAK RETRUS

Back-Eye Camera

Inspection range DN 100 and up



The **IBAK RETRUS** is a back-eye camera which can be used on almost all IBAK camera tractors. The RETRUS allows easier and safer reversing in many situations. Problematic areas detected during forward travel, such as protruding obstructions, damage and displacements are recognised during reversing, so that the operator can react accordingly and prevent damage to the system.

Optimised synchronisation between IBAK winches and IBAK camera tractors guarantees a maximum range at constant speed and a fast automated reversing. However, there are situations where controlling the reverse procedure with a back-eye camera is recommended. For example, if a steerable tractor is in a rectangular conduit, RETRUS makes the reversing procedure for the inspector easier. The danger of a collision between camera tractor and pipe wall is avoided using the back-eye option.

RETRUS also offers invaluable advantages when it comes to reversing with a disconnected winch (with synchronisation switched off). The danger of the camera tractor running over the camera cable is minimised with the back-eye camera.



Technical system data	
Camera specification	Back-Eye Camera
Inspection range	DN 100 and up
Dimensions	L 100 mm / W 60 mm / H 70 mm
Weight	approx. 1 kg
Push operation	–
Tractor operation	yes
Upright picture control	yes (fixed by camera tractor)
Correctly oriented image	yes (fixed by camera tractor)
Zoom	no
F (shutter)	2
f (focal length) (mm)	2.5
Lighting	2 white LEDs, controllable
Light sensitivity (lux)	0.025 lux (F 1.2, 1/50 s)
Luminous intensity (lumen)	400 lm
Protection class	IP 68
Permissible ambient temperature	0°C – +40°C during operation -30°C – +70°C for storage
Test pressure	1 bar
Pressure monitoring	2 integrated pressure sensors ¹⁾
Aperture function	Fixed shutter, electronic shutter with remote control
Panning range	–
Angle of aperture	approx. 90° diagonally
Viewing range	see angle of aperture
Angle of rotation	–
Focus function / range	fix focus
Sensor (inch)	1 / 4" CMOS
TV standard	NTSC or PAL
Horizontal image resolution	420 Lines PAL
Integrated laser	no
Explosion protection	optional
Combinable with	
IBAK tractors	all ²⁾
IBAK control systems	from BK 3.2 upwards, BE 3.2, all BS

1) LCD indicator and acoustic alarm in the control unit

2) but T76 HD, T86 HD and older KRA tractors

IBAK T 66/T 66 HD

Camera tractor

Inspection range from DN 100 upwards



The **IBAK T 66** is a versatile camera tractor for the inspection of sewers of DN 100 and up. It can either be used as a portable inspection system or for extending an existing camera tractor system.

A variety of camera connections, wheel sets and a tractor extension kit make it possible to configure the T 66 optimally for different requirements. It is equipped with the modular IBAK camera connection so that all IBAK cameras can be operated with the T 66. Even when used with large zoom cameras, ORPHEUS 2 or ARGUS 5, it achieves good stability and traction.

In narrow spaces the T 66 copes in combination with the camera connection CC1.1 that can be panned and folded. Because the folding connector for the camera cable can also be moved horizontally and vertically, the camera tractor can be easily inserted into any pipe of DN 100 and up, as well as through compact manholes and maintenance openings.

Larger pipe diameters are easily mastered by the T66 if fitted with the FW 66 tractor extension kit. It is recommended to use the easily installed FW 66 for DN 300 upwards.

The T 66 contains an electronic stabilisation function (ATC = **A**uto-**m**atic **T**ilt **C**ompensation). This function provides active overturn protection, allowing the tractor to drive safely in the pipe invert.

The T 66's modular design and the use of only a single tool for fitting individual components result in short set-up times for the pipe adaptations, resulting in more efficient working.

Top performance using a portable system

IBAK's ORION pan and tilt camera, the KT 180 cable drum, the BK 3.5 and the T 66 camera tractor, will provide you with a compact, high-performance, portable inspection system. (Not for T 66 HD)

An extension to the existing tractor system

The power spectrum of the existing IBAK tractor range has been enhanced by the addition of the T 66 camera tractor, which makes pipe inspections of DN 100 and up possible.



1. T66 with CC2.1 and ORION
2. T66 with CC2.1, ORION and granulated wheels
3. T66 with CC2.1, ORION and wheels with tread
4. T66 with CC2.1, ARGUS 5 and tractor extension kit FW 66
5. T66 with CC1.1, ORION and mixed tyres



Technical system data	
Inspection range	DN 100 and up
Weight	approx. 9 kg (with rim 93 and CC2.1)
Steering function	yes
Speed	continuously variable
Folding connector	bends horizontally and vertically
Protection class	IP 68
Pressure monitoring	2 integrated pressure sensors ¹⁾
ATC ²⁾	yes
Explosion protection	optional

Combinable with

IBAK cameras	T66: all tractor cameras except HD T66 HD: all tractor cameras ³⁾⁴⁾
IBAK camera connections	CC1.1/CC1.1HD (pivoted and hinged), CC2.1/ CC2.1HD (fixed), CC5.1/ CC5.1HD (vertically adjustable and for additional light operation)
IBAK cable winches	T66: all T66 HD: KW 310 HD, KW 505 HD
IBAK control systems	T66: BK 3.5, BS 3.5, BE 3.5, BS 5, BS7 T66 HD: BS 5, BS7

Accessories (optional)

Tilt measurement	yes
Temperature measurement	yes, via temperature measurement module
Additional weights	for DN 150 pipes and up
Ancillary light	-
Wheel sets	rim, tyres, pneumatic tyres, granulated wheels, wheels with tread to optimally suit nominal diameters
Tractor extension kit	FW 67 for DN 300 pipes and up
Back-Eye Camera	RETRUS for DN 100 pipes and up
Height adjustment	yes, via camera connection CC5.1/ CC5.1HD
Camera connections	various, for different deployment purposes

- 1) LCD indicator and acoustic alarm in the control unit
- 2) ATC = Automatic Tilt Compensation = electronic stabilisation function
- 3) Depending on camera type an adapter can be necessary
- 4) NANO/NANO L from version T66.1, 2016

IBAK T76/T76 HD

Camera tractor

Inspection range DN 150 and up



The **IBAK T76** is a robust and steerable camera tractor for the inspection of sewers of DN 150 and up.

In combination with a lowering device, the vertically and horizontally bendable folding connector for the camera cable and the bendable camera connection assure easy handling. The camera tractor can be easily and conveniently introduced into any pipe of DN 150 and up – with the corresponding accessories also through manholes with diameters of DN 300 and DN 400 and up.

The wheel sets are supplied with the camera tractor and the optional integrated electronic height adjusting device; this allows convenient inspections with a centred camera in pipe diameters up to DN 700. For pipes with larger diameters, suitable accessories are available. The T 76 has an electronic stabilising function which automatically guides the camera tractor back into the pipe invert if its position deviates. All components and sub-assemblies are designed for maximum robustness and reliability.

The T 76 as well as the T 86 are designed as a modular system consisting of the tractor base, the camera base, a positioning unit and wheels. Both tractors can be easily assembled and reconfigured as necessary by the user with just a few manual actions required. Customers with an IBAK KRA 75 or 85 can use their existing wheels on the T 76 and the T 86 too.

1.



2.



3.



4.



1. T 76 HD with ORPHEUS 2 HD, electronic positioning unit and pneumatic tyres
2. T 76 with camera connection CB 3
3. T 76 with camera connection CB 3, ARGUS 5 and electronic positioning unit
4. T 76 with camera connection CB 3 and ORPHEUS
5. T 76 with ORPHEUS, electronic positioning unit and granulated tyres

1) LCD indicator and acoustic alarm in the control unit
 2) ATC = Automatic Tilt Compensation = electronic stabilisation function
 3) Depending on camera type an adapter can be necessary

Technical system data

Inspection range	DN 150 and up
Weight	approx. 21 kg (with size 93 rims and CB3)
Steering function	yes
Speed	continuously variable
Folding connector	bends horizontally and vertically
Protection class	IP 68
Pressure monitoring	2 integrated pressure sensors ¹⁾
ATC ²⁾	yes
Explosion protection	optional

Combinable with

IBAK cameras	T76: all cameras for tractors except for HD T76 HD: all cameras for tractors ³⁾
IBAK camera base	camera connection CB3/CB3HD, LISY 3, CB3S
IBAK cable winches	T76: all · T76 HD: KW 310 HD, KW 505 HD
IBAK control systems	T 76: from BK 3.5, all BS T 76 HD: BS 5, BS 7

Accessories (optional)

Tilt measurement	yes
Temperature measurement	yes, via temperature measurement module
Additional weights	for DN 300 pipes and up
Ancillary light	ZSW 65 for DN 200 pipes and up ZSW 75 for DN 200 pipes and up
Wheel sets	rims, tyres, pneumatic tyres, granulated wheels, wheels with tread to optimally suit nominal diameters
Tractor extension kits	ovoid pipe device/overturn protection 200/300 mm or DN 300 pipes and up; Tractor extension kit for DN 800 pipes and up
Back-Eye Camera	RETRUS, for DN 150 pipes and up
Drive unit for lateral inspection	LISY 3 (not T 76 HD) Height adjustment
Height adjustment	electric, lift of up to 210 mm

5.



IBAK T 86/T 86 HD

Camera tractor

Inspection range
DN 200 and up



The **IBAK T 86** is an efficient camera tractor for inspecting pipes of DN 200 and up. Its powerful drive enables it to perform pipe inspections proficiently also over long distances.

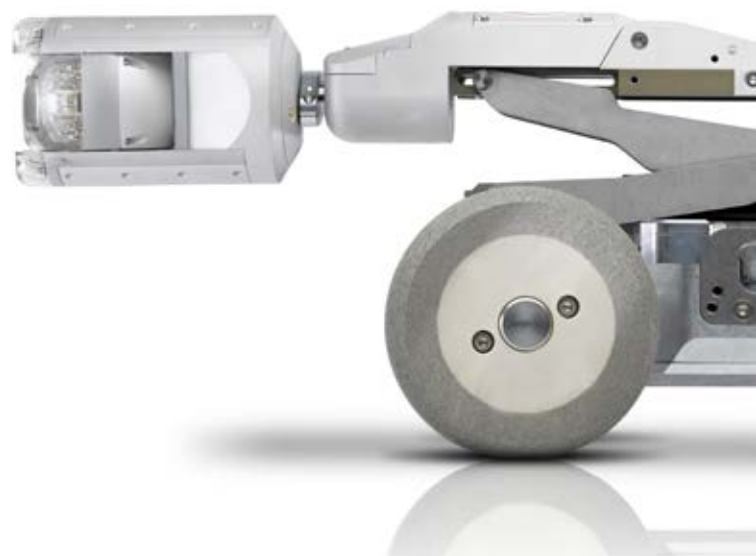
The electrical positioning unit (available as an option) positions the camera at the optimal height in the sewer pipe. Together with the lowering device, the folding connector that bends horizontally/vertically for the camera cable and the camera connection ensure simple and safe introduction of the camera tractor into the pipe.

After inspection, the tractor's fast reverse speed makes it possible to finish the work procedures quickly.

All components and sub-assemblies are designed for maximum robustness and reliability.

Both the T 76 (see previous pages) and the T 86 are designed to form part of a modular system consisting of the tractor base, the camera base, a height adjusting device and wheels. Both tractors can easily be assembled and reconfigured as required by the user with just a few manual actions.

Customers with an IBAK KRA 75 or 85 can use their existing wheels on the T 76 and the T 86 too.



1.



2.



1. T 86 with camera connection CB 3
2. T 86 with camera connection CB 3, ARGUS 5 and electronic positioning unit



Technical system data

Inspection range	DN 200* and up
Weight	approx. 35 kg (with size 93 rims and CB3)
Steering function	no
Speed	continuously variable
Folding connector	bends horizontally and vertically
Protection class	IP 68
Pressure monitoring	2 integrated pressure sensors ¹⁾
ATC ²⁾	no
Explosion protection	optional

Combinable with

IBAK cameras	T86: all cameras for tractors except for HD T86 HD: all cameras for tractors ³⁾
IBAK camera base	camera connection CB 3/CB3 HD, LISY 3
IBAK cable winches	T86: all · T86 HD: KW 310 HD, KW 505 HD
IBAK control systems	T86: from BK 3.5, all BS T86 HD: BS5, BS7

Accessories (optional)

Tilt measurement	yes
Temperature measurement	yes, via temperature measurement module
Additional weights	for DN 300 pipes and up
Ancillary light	ZSW 65 for DN 200 pipes and up ZSW 75 for DN 300 pipes and up
Wheel sets	rims, tyres, pneumatic tyres, granulated wheels, wheels with tread to optimally suit nominal diameters
Tractor extension kits	ovoid pipe device/overturn protection of 250/375 mm or of DN 300; tractor extension kit of DN 800 pipes and up
Back-Eye Camera	RETRUS, from DN 300 upwards (not T 86 HD)
Drive unit for lateral inspection	LISY 3 (not T 86 HD)
Height adjustment	electric, for DN 225 and up, lift of up to 210 mm

*) with ARGUS 5: for DN 225 pipes and up

1) LCD indicator and acoustic alarm in the control unit

2) ATC = Automatic Tilt Compensation = electronic stabilisation function

3) Depending on camera type an adapter can be necessary

IBAK LISY 3

Lateral inspection module for
T 76 and T 86

Inspection range DN 150 and up



The photos are examples; current models may diverge.

The **IBAK LISY 3** module turns the IBAK camera tractors T 76 and T 86 into a lateral inspection system. It can be operated in mainline sewers of DN 150 diameter upwards. An articulated joint allows easy entry into sewers, even where there is a bend in the sewer. With the plug-in height adjustable elements contained in the assembly kit, the camera tractor can be easily adapted to the pipe diameter with LISY 3.

Using LISY 3, laterals of DN 100 and up can be inspected from mainline sewers. The LISYCam 3 attachable control camera, which is used to continuously monitor the position of the equipment and which assists with inserting and forward feeding of the inspection camera, assures a seamless work flow.

To flush and inspect in a single operation, the push rod of the KW LISY Synchron winch can be equipped with a flushing nozzle from the PHOBOS product series. The LISY generation from 2015 onwards (version 3.2 and later) is 3D-GeoSense capable so that inspection

and recording of the pipe run can be performed in a single operation. The push rod can be driven forward both in flushing mode and purely electrically. The forward drive speed is very high and can be freely selected. For the flushing version of the 3D-GeoSense pipe run measurement and/or hydrostatic level measurement, a precalibrated camera and a PHOBOS 3D flushing nozzle are required. The hydrostatic level measurement enables the elevation to be determined even more accurately (the z-coordinate is determined accurately to one centimetre).

The pipe run measurement can also be performed in push rod operation, without flushing; in addition to a calibrated camera, the DEI-MOS camera guide unit is required for this.

In combination with the T 76 /T 86 camera tractor, the LISY 3 is a rugged and durable inspection system that meets individual requirements and convinces both with a high forward drive speed and simple handling.





Technical system data	
Inspection range	DN 150 and up (T 76) DN 200 and up (T 86)
Weight	approx. 9 kg (only LISY 3 module)
Steering function	yes (T 76), no (T 86)
Speed	depending on the tractor
Folding connector	on tractor T 76 / T 86
Protection class	IP 68
Pressure monitoring	integrated pressure sensors ¹⁾
ATC ²⁾	depending on the tractor
Explosion protection	optional
Height adjustment	mechanical (up to DN 300 inclusive)
Combinable with	
IBAK cameras	POLARIS, NANO, NANO L, JUNO, ORION, ORION L
IBAK tractors	T 76, T 86
IBAK coilers/winches	KW LISY Sync. plus KW 305/310/505
IBAK control systems	from BK 3.5 upwards, all BS
Accessories (optional)	
Tilt measurement	yes (accessory T 76/T 86)
Height adjustment	mechanical (from DN 300 upwards)
Temperature measurement	in preparation (with temperature measurement module as accessory for T 76/T 86)
Additional weights	for DN 300 pipes and up (accessory T 76/T 86)
Observation camera	Observation camera FK40F with integrated high-power LED from DN 300 upwards
Wheel sets	yes (accessory T 76/T 86)
Tractor extension kit	ovoid pipe device/ overturn protection for 200/300 mm or for DN 400 pipes and up (accessory T 76/T 86)
Cleaning package	yes, for the inspection and cleaning in one work step (with flushing nozzle PHOBOS), operational distance for DN 200 and up

1) LCD indicator and acoustic alarm in the control unit
2) ATC = Automatic Tilt Compensation = electronic stabilisation function

IBAK PANORAMO

Camera system/3D Scanner

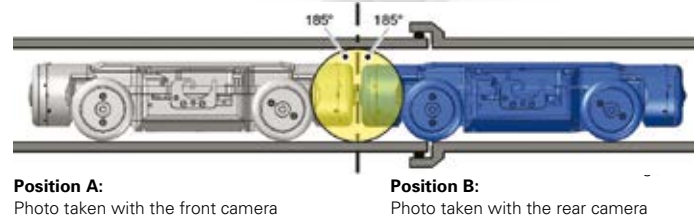
Inspection range DN 200 and up



The **IBAK PANORAMO** boasts unique scanner technology for highly-efficient sewer pipe inspections. On the one hand, pipe inspections can be carried out at a substantially **higher speed** than with conventional systems. On the other hand, the user receives a processed illustration in addition to the 3D film containing a **seamless recording** of the entire pipe inspection.

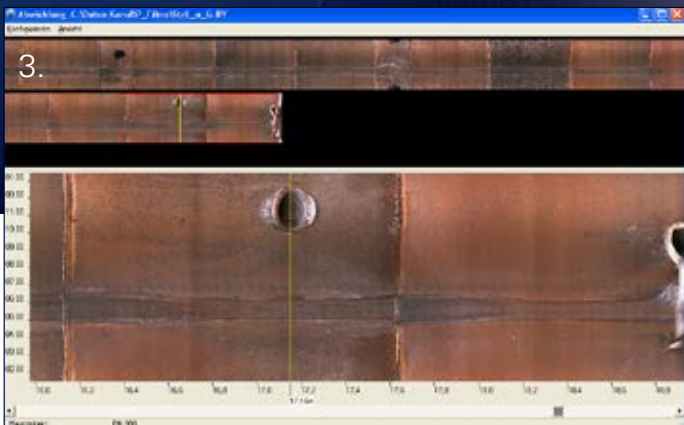
Priceless advantage: irrespective of the actual sewer inspection, it is possible to evaluate the condition in the office at any time – just as if the inspector was live on-site. The viewer can move freely in the sewer pipe without any viewing restrictions, stop at any position, pan round 360°, zoom, look into inlets and even look backwards – all this **without affecting the recorded imaging material in any way**. All objects, such as displaced joints, protruding pipe connections etc. can be viewed in detail from all sides.

In addition to the possibility of inspecting sewer pipes using the scanner technology, the PANORAMO digital cameras (see right: "The PANORAMO principle") allow the operator to set the **video mode** for the image display during the inspection run when passing significant sections. In this way moving elements such as **running water** can be shown, as with conventional sewer cameras.



The PANORAMO principle

The IBAK PANORAMO, unlike conventional sewer TV systems, uses two high-resolution digital photo cameras with 185° fisheye lenses, which each take images at distances of 5 cm. Due to the extremely wide angle an all-round view of a pipe section is therefore captured every 5 cm. These pipe section sequences are transmitted digitally to the inspection vehicle, where they are put together using PANORAMO software to create a true 3D interior view of the complete sewer pipe, both in and against the direction of travel. In contrast to video technology, in which the continuous light emitted from a moving vehicle results in a large amount of motion blur in recordings, the IBAK PANORAMO pins sharp images: the stroboscopic light given off by the device's integrated Xenon flash system lights up the pipe so brightly that, despite the very high speed of inspection of up to 35 cm per second, the system can guarantee very high-quality images, showing details in pin-sharp quality.



1. View of projecting obstruction in direction of travel
2. View of projecting obstruction against direction of travel
3. PANORAMO unfolded view for a quick overview of the entire inspection.
4. PANORAMO with electronic positioning unit
5. PANORAMO with wheel set using 108 rims



Technical system data	
Inspection range	DN 200 and up
Weight	approx. 46 kg (with camera tractor + size 108 rims)
Steering function	no
Speed	continuously variable, max. 35 cm/sec.
Folding connector	bends horizontally and vertically
Protection class	IP 68
Pressure monitoring	2 integrated pressure sensors ¹⁾
ATC ²⁾	no
Explosion protection	optional
Viewer software	IBAK PANORAMO Viewer (Freeware)

Combinable with	
IBAK cameras	not applicable; 2 fisheye cameras integrated
IBAK cable winches	KW 310, KW 505
IBAK control systems	BS 5, BS 7

Accessories (optional)	
Tilt measurement	yes
Temperature measurement	no
Additional weights	for DN 300 pipes and up
Ancillary light	no
Wheel sets	rims, tyres, pneumatic tyres and granulated wheels to optimally suit nominal diameters
Tractor extension kits	ovoid pipe device/ overturn protection for 250/375 mm or for DN 400 pipes and up
Height adjustment	electric, for DN 250 pipes, lift of up to 210 mm
Software	IKAS PANORAMO-Analysis

1) LCD indicator and acoustic alarm in the control unit
 2) ATC = Automatic Tilt Compensation = electronic stabilisation function



IBAK PANORAMO 150

Camera system/3D Scanner

Inspection range DN 150 and up



The **IBAK PANORAMO 150** is a steerable camera system for operational distances for DN 150 pipes and up. As with the well-established PANORAMO (for DN 200 pipes and up) and the manhole camera PANORAMO SI, it boasts tried and tested 3D scanner technology – the user receives a 3D film containing the complete recordings of the entire pipe inspection as well as a processed illustration. Priceless advantage: irrespective of the actual sewer inspection, it is possible to evaluate the condition in the office at any time – just as if the inspector was live on-site. The viewer can move freely in the sewer pipe without any viewing restrictions, stop at any position, pan round 360°, zoom, look into inlets and even look backwards – all this without affecting the recorded imaging material in any way. All objects such as displaced joints, protruding pipe connections etc. can be viewed in detail from all sides.

The PANORAMO 150 is ideally suited for the inspection of DN 200 pipes repaired with liners. A range of rims and wheels are naturally available for the PANORAMO 150 as well as profiled and granulated wheels for the the various nominal diameters. With its mechanical positioning unit, the PANORAMO 150 also masters bigger nominal diameters, making it a flexible and versatile device that completes the PANORAMO family.

1.



2.



1. PANORAMO 150 with granulated wheels
2. PANORAMO 150 with wheels with tread

Technical system data

Inspection range	DN 150 and up
Weight	approx. 13 kg (with camera tractor + size 93 rims)
Steering function	yes
Speed	continuously variable
Folding connector	bends horizontally and vertically
Protection class	IP 68
Pressure monitoring	2 integrated pressure sensors ¹⁾
ATC ²⁾	yes
Explosion protection	optional
Height adjustment	yes, mechanically
Viewer software	IBAK PANORAMO Viewer (Freeware)

Combinable with

IBAK cable winches	KW 310, KW 505
IBAK control systems	BS 5, BS 7

Accessories (optional)

Tilt measurement	yes
Temperature measurement	no
Additional weights	yes
Ancillary light	no
Wheel sets	rims, tyres, pneumatic tyres, granulated wheels, wheels with tread to optimally suit nominal diameters
Tractor extension kit	no
Software	IKAS PANORAMO-Analysis

1) LCD indicator and acoustic alarm in the control unit

2) ATC = Automatic Tilt Compensation = electronic stabilisation function

Size comparison:
PANORAMO and PANORAMO 150



IBAK PANORAMO SI

3D Scanner for manhole inspection

Inspection range DN 300 and up



With the **IBAK-PANORAMO SI**, the user has the distinctive advantages of PANORAMO technology also at their disposal for manhole inspection. The result is the ability to visually assess the condition of manholes quickly and completely.

The 3D scanner uses two high-resolution digital cameras with specially designed distortion-free wide-angle lenses, which optically scan the entire interior of the manhole in a few seconds in one single vertical run. The digitally transmitted image data is immediately at the operator's disposal as a live picture. The condition of the manhole is then evaluated either in the office or directly on site.

Unlike a video from a conventional pan and tilt camera, which only shows the section of view saved at the time of recording, the IBAK PANORAMO SI viewer software provides a seamless inspection of the manhole. The inspector can stop at any position in the manhole, pan 360°, zoom and save snapshots.

An unfolded view of the manhole can be generated at the same time. This gives a rapid overview of the of the structure's condition and enables the user to measure objects on the manhole walls.

For further assessment of the data IBAK's IKAS sewer analysis software, the PANORAMO SI option manhole inspection, is available. With this software PANORAMO SI films are analysed easily and efficiently.

The results are inspection reports and inspection data to suit all commonly used data interfaces. The licence-free IBAK viewer software provides the customer with a complete overview.

The IBAK PANORAMO SI manhole inspection camera can be operated as an extension to IBAK PANORAMO inspection systems with a BS 5/BS7 control unit, or as an installation kit for a vehicle (e.g. VW T5).





At the top: PANORAMO-SI-shelf for insertion into the camera drawer.

Technical system data

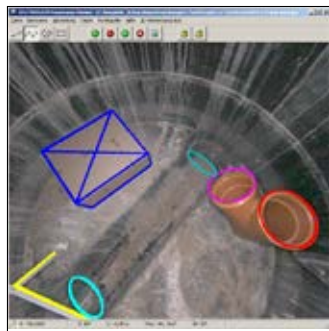
Inspection range	DN 300 and up, manhole inspection
Weight	approx. 7.5 kg
Speed	max. 35 cm/sec.
Protection class	IP 68
Pressure monitoring	2 integrated pressure sensors ¹⁾
Explosion protection	optional
Viewer software	IBAK PANORAMO Viewer (Freeware)

Combinable with

IBAK cameras	not applicable; 2 fisheye cameras integrated
IBAK cable winches	KW 310, KW 505, KW 180 SI ²⁾
IBAK control systems	BS 5, BS 7

Accessories (optional)

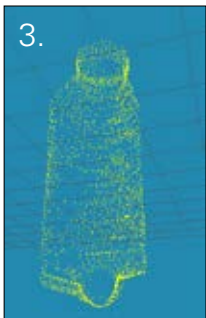
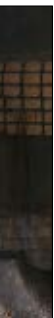
Safety stand, aluminium	e.g. for the placing of the deflection roller
Deflection roller	yes, with support
As autarkic compact module to be built into vehicle	yes, e.g. for VW T5
Software	IKAS PANORAMO-Analysis



As an extension to the IBAK IKAS inspection software, the "3D measurement" offers the capacity to measure objects using the option "PANORAMO analysis". With just a few mouse clicks you can define lines, outlines and circles. Measurements taken are highlighted in colour and displayed in the viewer.



PANORAMO SI as pallet installation kit for the VW T5 (autarkic compact module) and as extension to an inspection system



1. View into the manhole
2. Unfolded view of the manhole
3. Point cloud for measuring the manhole

Extension Kit

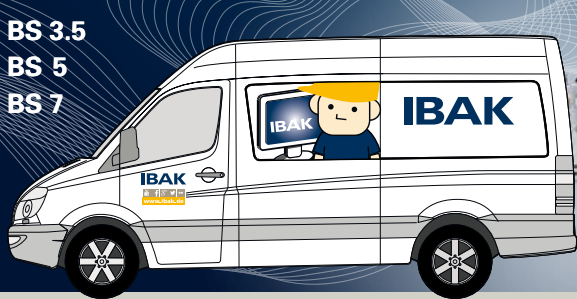
Extension set for IBAK cable winches

Extension for push operation systems using operating systems, BS 3.5, BS 5 and BS 7

BS 3.5

BS 5

BS 7



The operator in the vehicle and at the push device communicate via a voice connection

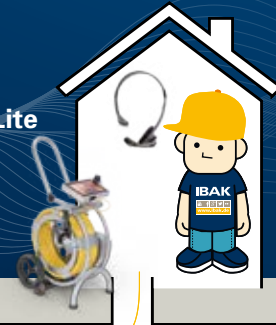
KT 180

KW 180

KW 305/310

KW 505

MiniLite



HYDRUS, NANO, JUNO, ORION, ORION L, POLARIS

The modular portable tractor and pushrod systems supplied by IBAK can be connected to IBAK inspection vehicles using extension kits. This allows you to inspect sewer sections and laterals from your vehicle that are difficult to access. The entire reporting software of the vehicle, including recording devices, is also available for your push

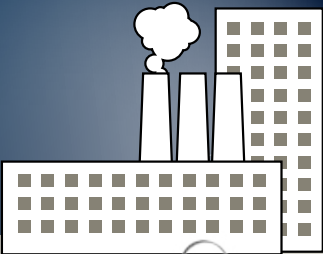
rod system. The camera cable both supplies the energy and delivers the video stream and the distance and direction data to your inspection vehicle. The inspector and the pushrod system operator can remain in contact using an integrated two-way voice connection.

Extension for tractor-operation using the BS 5 operating system



KW 310
KW 505

The first operator in the vehicle and the second operator communicate via voice contact.



Deep-level garage

KT 180

Extension-Box



T66, NANO, JUNO, ORION, ZSW 65, Fahrwagenzusatz T66

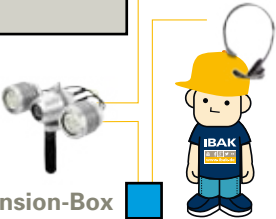


Extension for inspection using the BS 3, BS 5 or BS 7 operating systems

BS 7
BS 3.5
BS 5



KW 180
KW 305/KW 310
KW 505



The vehicle operator and the inspector keep in contact via a voice connection.

IBAK KT 180

Cable drum

Portable



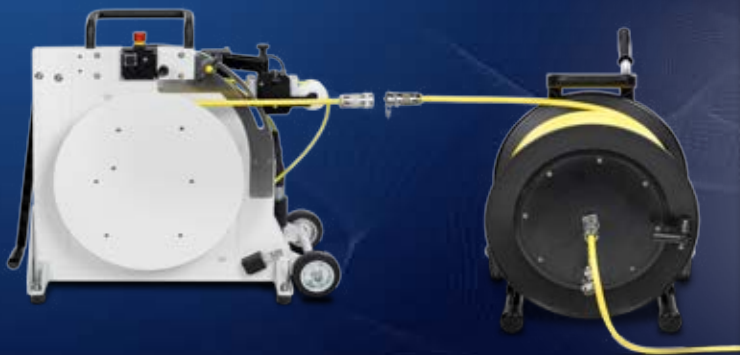
The **IBAK KT 180** is a portable cable drum which can hold up to 200 m of camera cable. A length measuring device is integrated into the cable winch. The drive motor and a swivel cable guide help the operator to wind the camera cable evenly.

To ensure convenient and flexible operation, the cable drum is equipped with wheels and a folding transport handle.



IBAK KT 180, adjustable cable guide for even cable winding





IBAK KT180 with extension cable VT 50 for the extension of the radius of action. VT 50 is available as an accessory.

Technical system data	
Product classification	portable cable drum
Max. cable length	200 m
Width x height x depth	310 x 610 x 670 mm
Weight	with 180 m cable: 31 kg
Length measurement / display	yes
Motor-driven	motor-supported winding device
Even winding of cable	yes
Remote control	available as accessory (optional)
Protection class	IP 54
Emergency-stop switch	yes

Combinable with	
IBAK cameras	all except PANORAMO
IBAK tractors	all
IBAK control systems	all except BS 7 ¹⁾

Accessories (optional)	
Remote control	yes
Extension system	yes (VT 50)
Vehicle mounting kit	yes (telescopic rails)



IBAK KT 180, transport handle



Vehicle mounting kit for the KT 180

1) BS 5 only in conjunction with Box B5 FKT

IBAK KW 180

cable winch

Motor-driven



The **IBAK KW 180** is a stationary, motor-driven cable winch holding up to 200 m of camera cable. The powerful motor and an automatic winding guide ensure even winding of the camera cable. A length measuring device is integrated into the cable winch. A workplace light can be installed on the boom with deflection pulley. If necessary, the cable winch can also be operated using the remote control unit (e.g. from the rear section of the vehicle).



Technical system data	
Product classification	cable winch
Max. cable length	200 m
Width x height x depth	330 x 520 x 630 mm (without boom)
Weight	with 180 m cable: 41 kg (with boom)
Length measurement / display	yes – display on the monitor and on the cable winch
Motor-driven	yes
Even winding of cable	yes
Remote control	yes
Protection class	IP 54
Emergency-stop switch	yes
Combinable with	
IBAK cameras	all except PANORAMO
IBAK tractors	all
IBAK control systems	BK 3.5, BS 3.5
Accessories (optional)	
Remote control	yes
Extension system	yes
Workplace light	yes



1. IBAK KW 180, automatic cable guide
2. IBAK KW 180, length measuring display
3. IBAK KW 180, remote control

IBAK KW 305/310/505

Cable winches with integrated boom

Fully automatic, motor-driven



The **IBAK KW 305**, **KW 310** and **KW 505** are fully automatic, motor-driven cable winches holding up to 600 m (KW 505 with BS 5) of camera cable. All three are designed for the operation with IBAK camera tractors and cameras. Also IBAK LISY on T76/T86 in combination with the LISY winches is operated with KW 305/310/505. The IBAK camera systems PANORAMO, PANORAMO 150 and PANORAMO SI can be operated with KW 310 and KW 505 (with FO cable).

The integrated traction regulating device synchronises camera tractor and cable winch operation: the cable is coiled onto and uncoiled from the winch in accordance with the speed of the camera tractor. This intelligent regulating system prevents the camera tractor from running over the camera cable and at the same time ensures that the camera tractor reverses at a consistent speed.

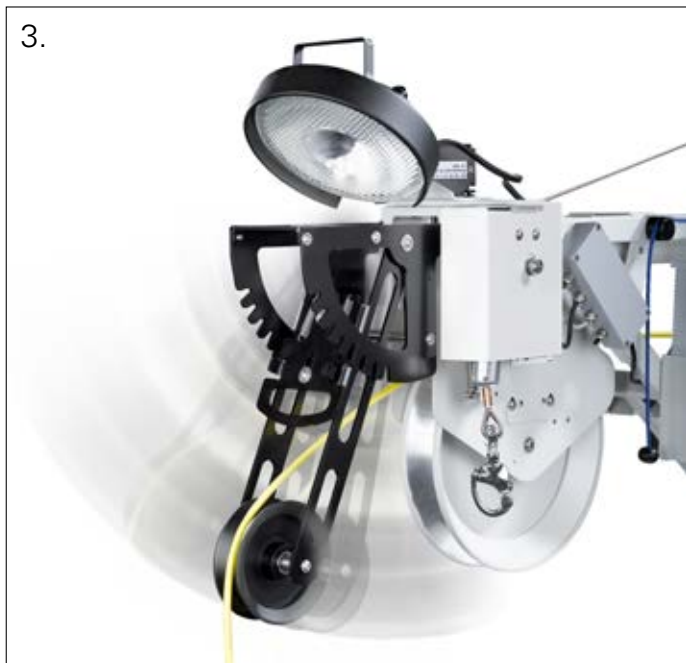
The swivel boom enables exact positioning of the camera system over the manhole. The relevant camera system can then be lowered safely and accurately into the manhole with the hoist, whilst the integrated workplace light provides optimum illumination of the manhole opening.

The automatic cable guide ensures even winding of the camera cable onto the winch.

In addition, the user can take advantage of the autostop function. This stops the camera tractor automatically at pre-defined positions when it is moving in reverse direction. This is particularly useful when it is approaching the entry manhole – a further example of the great user-friendliness of IBAK inspection systems.

The IBAK cable winches KW 310 and KW 505 provide digital and loss-free image videos. Both utilize a fibre-optic cable (FO) for this. With the KW 305, coaxial cable is used for analog video transmission.

The cable reel KW 505 holds a maximum of 600 metres of camera cable in combination with a BS 5.



Technical system data

Product classification	fully automatic, motor-driven cable winch
Max. cable length	KW 305: 300 m KW 310: 300 m KW 505: 500/600 m*
Width x height x depth (without boom)	KW 305: approx. 500 x 780 x 720 mm KW 310: ca. 550 x 780 x 760 mm KW 505: ca. 550 x 860 x 900 mm
Weight (with boom)	KW 305: with 300 m cable: ca. 105 kg KW 310: with 300 m cable: ca. 140 kg KW 505: with 500 m cable: ca. 170 kg
Length measurement / display	yes – display on the monitor and on the cable winch
Motor-driven	yes
Even winding of cable	yes, automatic
Remote control	yes
Protection class	IP 54
Emergency-stop switch	yes
Steel rope winch ¹⁾	yes

Combinable with

IBAK tractors	KW 305: T66/T76/T86 KW 310: all KW 505: all
IBAK control systems	KW 305: from BK 3.2, BE 3.2 KW 310: BS 5, BS 7 KW 505: BS 5, BS 7
IBAK camera systems	KW 305: all except PANORAMO KW 310/ 505: all cameras for tractors
IBAK extension kit	yes

Accessories (optional)

Workplace light	yes
Cable deflection device	yes
Positioning roller PANORAMO SI	yes, for KW 505 and 310
Telescopic boom	yes, for KW 505
foot-operating switch for steel rope winch	yes

1) for insertion of the camera system

* in combination with the control system BS 5

1. IBAK KW 305/310/505, cable deflection device for difficult to access manholes
2. IBAK KW 305/310/505, foot switch for steel rope winch
3. IBAK KW 305/ KW 505, PANORAMO SI positioning roller

IBAK KW LISY Synchron

Cable winch for IBAK LISY operation

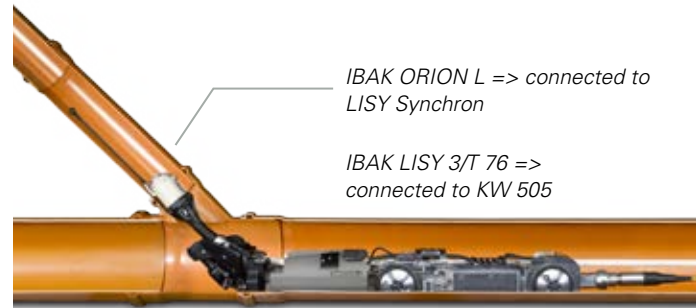
KW LISY Synchron



The **KW LISY Synchron** supports the cameras that are connected to the IBAK LISY inspection system. The motor-driven winch KW LISY Synchron which is permanently installed in the inspection van is available for operation with the LISY 3. It holds 180 metres of camera cable, 40 metres of which are what is known as the Magic Push Rod. This is a guide hose that combines the camera cable and the push rod. The semi-rigid drive hose is bend-capable and at the same time provides a powerful drive and permits long push distances during lateral inspections.

With the KW LISY Synchron, winding the cable on and off is automatically synchronized to the speed of the cable winch used (e.g. KW 305 or 505) and the LISY-3 camera tractor connected to it by means of an electronic regulator unit. This makes for particularly easy and efficient working.

Application example



Technical system data	
Product classification	Cable winch with camera cable and push rod for IBAK-LISY operation
Max. cable length	180 m (including 40 m push rod)
Width x height x depth (without boom)	410/540/680 mm
Weight (with boom)	ca. 52 kg
Length measurement / display	omitted, because integrated in KW 305 / 310 / 505
Motor-driven	yes
Even winding of cable	yes, automatically
Remote control	yes
Protection class	IP 54
Emergency-stop switch	yes
Steel rope winch ¹⁾	omitted, because integrated in KW 305 / 310 / 505
Combinable with	
IBAK cameras	HYDRUS, NANO, NANO L, POLARIS, JUNO, ORION, ORION L
IBAK camera systems	LISY 3
IBAK control systems	from BK 3.2, BE 3.2, alle BS

1) for insertion of the camera system



Cable winch IBAK KW 505



*LISY synchronous winch:
up to 180 m of camera cable
incl. 40 m push rod*



IBAK HSP

Manual coiler

Coiler support frame with rollers and transport handle

IBAK HSP 60

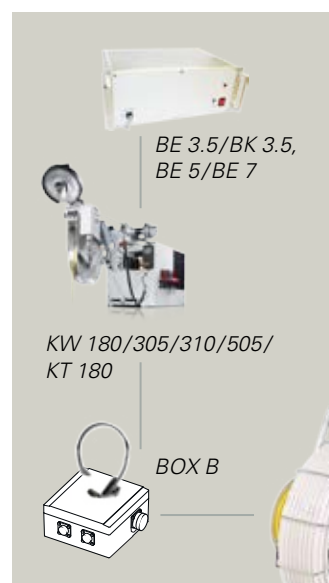


IBAK HSP 40

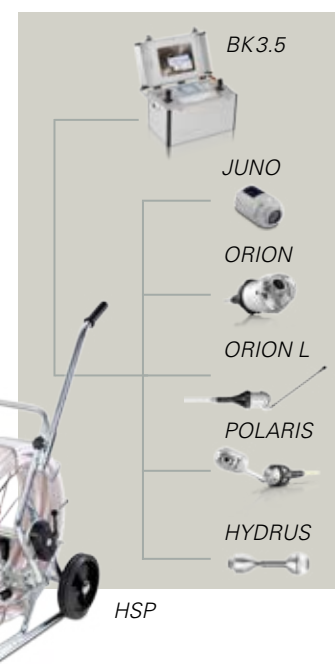


The **IBAK HSP 40** and **HSP 60** are manual coilers and hold 40 or 60 metres of the IBAK "Magic Push Rod" or 80 meters of the "Perfect Push Rod". These rods are guide hoses containing both the camera cable and the push rod. The semi-rigid, easy-grip propulsion hose provides exceptionally long push lengths and a unique bend capability. A length measuring device is integrated in the coilers. The coiler can be operated using a control unit or connected to IBAK cable winches using an IBAK extension kit. This allows the operator to work at a good distance from the vehicle and still be able to take advantage of the evaluation made on board. This increases the mobility and flexibility of the inspection process.

Example for extension with extension kit



Example for combination of HSP with BK 3.5





1.



2.

1. IBAK HSP, handbrake
2. IBAK HSP, slip ring transmission with plug

Technical system data	
Product classification	manual coiler for inspections in push operation
Max. cable length	HSP 40: 40 m (MPR), 80 m (PPR) HSP 60: 60 m (MPR), 80 m (PPR)
Width x height x depth	HSP 40: approx. 570 x (700 – 980) x 360 mm HSP 60: approx. 700 x 900 x 360 mm
Weight with push rod	HSP 40: 20 kg HSP 60: 24 kg
Length measurement	yes
Length display	in the control unit
Motor-driven	no
Even winding of cable	manual rewind omitted
Protection class	IP 54
Explosion protection (push rod)	optional for HSP 40 and HSP 60
Combinable with	
IBAK cameras	HYDRUS, POLARIS, JUNO, ORION, ORION L
IBAK extension kit	yes
IBAK control systems	all
Accessories (optional)	
Vehicle mounting kit	yes

IBAK MiniLite

Compact push
camera system

Inspection range DN 50 and up



The **IBAK MiniLite** is a compact push rod camera system for the inspection of building and estate drainage systems. It convinces with easy operation via a splashproof 10 inch touch display and a joystick. The operator can handle it flexibly. He can use his finger or a stylus or can connect a keyboard. The system can be reliably operated after only a short training period thanks to intuitive menu guidance. Text can be entered and image or video files (MPEG 4 AVC/H.264) can be saved with the IKAS recorder to the integrated PC. Easy data exchange is possible via a USB stick. In combination with the ORION, the NANO or the POLARIS camera, laser measurements can be performed (optional).

Depending on the requirements, the system can be additionally equipped with an extension function and software. IKAS Mini is available for simple projects without any complicated data exchange formats. With this software, inspections of sewage systems can be performed in compliance with the EN 13508-2 standard which is valid in Europe. The inspection result is output to paper or a pdf-file in the form of clearly arranged reports. If particular data exchange formats are required or if a 3D site plan is to be created, complete IKAS evolution software can be installed on the system .





Technical System Data

Product Classification	Compact push rod system
Perfect Push Rod	80 m (exchange drum 500/10)
Width x height x depth	400 x 780 x 720 mm (without the control console)
Control console dimensions	W x H x D: 340 x 190 x 40 mm
Monitor	Water spray protected, IP 43, 10 inch touch display, with a protective pane of glass
Weight of control console	approx. 2.8 kg
Weight of coiler	approx. 29.5 kg (incl. the exchange drum)
Data storage	Text input or storage of image or video files (MPEG 4 AVC/H.264) on the integrated PC, data exchange via USB 3.0
Length measurement/indicator	yes
Power Pack	18VDC 4 Ah (Li-Ion), 2 off

Combinable with

IBAK cameras	HYDRUS, POLARIS, ORION, ORION L, JUNO, NANO, NANO L
IBAK extension kit	yes

Accessories (optional, subject to extra charge)

Exchange drum	Magic Push Rod: 500/12 with HYDRUS camera incl. 30 m of push rod, operation from DN 50 upwards
	500/15 incl. 40 m of push rod, operation from DN 100 upwards
	Perfect Push Rod: 500/10 incl. 80 m of push rod, operation from DN 100 upwards
Software	IKAS mini
Safety device	Safety switch
External counter	yes, in conjunction with 3D GeoSense



IBAK BK 3.5

Control box

Mobile control and operating unit



The **IBAK BK 3.5** control box is easily transported in the box housing thanks to its compact design. Used either installed in an inspection vehicle as well as a portable unit, BK 3.5 facilitates the operation of IBAK inspection systems.

All functions of the camera tractor and the camera can be controlled and operated using the two joysticks, the control buttons and the integrated keyboard. At the same time, the operating status of the individual system components is clearly indicated on a 5.7" colour display.

The inspection itself is monitored from a 12" TFT colour monitor with excellent picture reproduction. In addition, texts and symbols can be overlaid on the video picture via the keyboard and an integrated data display generator.

Optionally, the BK 3.5 control box can also be equipped with a PC module. This makes it IKAS-capable and permits a complete analysis of the condition of the inspected sewer on-site.

For clear menu guidance, the IKAS BK edition software includes a specially optimised analysis assistant, which enables the parallel display of the video image and software dialogues on the screen. The video images can be digitised in MPEG format. In addition, an external mouse can be connected to the PC module and data transfer is also possible via the USB port or a network interface (LAN). The video data in MPEG 4 format can be transferred to a memory card (Accessory SD-Option) without using your existing PC (or with it switched off).

Firmware updates of optional IBAK components can be carried out by the user with the aid of a standard SD card.

Technical system data	
Product classification	Control box
Monitor	TFT monitor, 12", control display 5.7"
Width x height x depth	550 x 296 x 350 mm (with handle)
Weight	approx. 19 kg (w/o PC), 21 kg (w PC)
Data display generator	yes
Video output	yes
Connection for external keyboard	yes
TV standard	NTSC/PAL
Digital video recording MPEG/JPEG (optional)	Storage of digital videos and pictures, data transfer via SD card
Data storage with PC module and IKAS (optional)	Storage of digital videos, individual images/photos and inspection reports; data transfer via USB interface or LAN
Operating voltage	100-240 VAC +6% -10%, 50/60 Hz
Length measurement / display	yes
Explosion protection monitoring	in conjunction with the explosion protection camera

Combinable with	
IBAK cameras	all except PANORAMO
IBAK tractors	all
IBAK winches	KT 180, KW 180, KW 305
IBAK push systems	MiniLite (with extension kit)
IBAK coilers/winches	HSP 40, HSP 60
IBAK extension kit	yes

Accessories	
IBAK software	IKAS
SD-Option	MPEG/JPG-Recorder
PC-Module	Integrated PC Module with reporting software

1. Control buttons for the monitor, Y/C video output and composite colour video in/output on the inside of the lid
2. Card slot for video recording unit (optional)



Two USB ports (active only with PC module), LAN interface, audio out/in, RS 232 interface to connect the electronic data display generator (EDE) with an external PC, PA potential equalisation connection, PC switch on/off for optional PC module, coiler/coiler connection, mains connection cable



IBAK BS 3.5 / BS 7

Control system for IBAK inspection systems

Control slot BE 3.5, / BE 7

Control console/console combination BP 3.5
and keyboard



The IBAK BS 3.5 and BS 7 are operating systems for IBAK inspection equipment for fixed installation in an inspection vehicle. Both these central control and operating units consist of an ergonomically designed control console (BP 3.5), a 19" rack mount and a keyboard. All current IBAK tractors, winches and cameras can be operated with either system, the connected components are automatically identified by the system. This automatic identification turns the touch screen into a particularly user-friendly device that is instantly usable. The tractor and the camera are operated in a user-friendly manner with both joysticks.

The touch-screen also offers the user a wide variety of other possibilities, such as an information menu where all assembled components and components identified by the system are displayed on a colour display. In addition, various features can be controlled, such as light intensity, different functions of the camera and the tractor as well as further system-relevant options.

Damage descriptions, symbols or comments entered via the keyboard can be overlaid with the integrated data display generator into the video image.

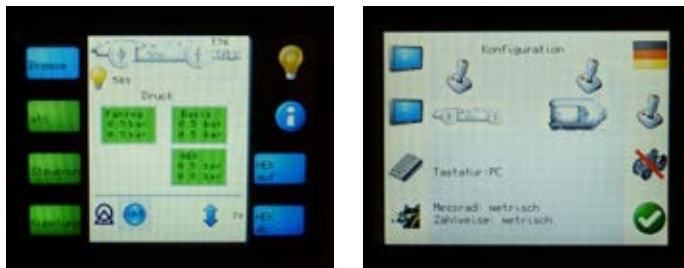
In addition, it is also possible to connect video recording devices. Spoken comments can be recorded using the integrated microphone in the control console; the audio output enables saving of these voice-overs synchronously to the inspection video.



Control slot BE 3.5

Technical system data	
Product classification	control system for operating IBAK cameras and camera tractors
Width x height x depth	BP 3.5: 770x100x390 mm BE 3.5: 483x178x298 (+200") mm BE 7: 483x266x358 (+200") mm
Weight	BE 3.5: approx. 7,6 kg BE 7: approx. 11 kg
Intercom loudspeaker, microphone	yes (gooseneck microphone, volume control in BP)
Camera cable length	BS 3.5: up to 300 m BS 7: up to 500 m
Data display generator, RS232 interface	yes (EDE 7)
Video input/output	yes, multiple
Keyboard	yes
TV standard	NTSC/PAL
Operating voltage	100-240 VAC, 50/60 Hz
Length measurement / display	yes
Autostop function	yes
Safety device	secondary circuit in the camera cable limited to 60 V (BS 3.5), 120 V (BS 7) with insulation monitor
Combinable with	
IBAK cameras	all (BS 3.5 no PANORAMO)
IBAK winches	BS 3.5: HSP, KT 180, KW 180, KW 305, LISY winches BS 7: KW 310, KW 505, LISY winches
IBAK tractors	all
IBAK extension kit	yes

* Installation space



The touch-screen integrated into the control console, with many options for controlling the IBAK system components.

IBAK BS 5

Control system for IBAK inspection systems

Control console with 2 joysticks BC 5,
Control console with LCD display BP 5,
19" rack mount BE 5,
19" electricity distribution (battery) BEV 5B,
19" data display generator and
intercom plug with loudspeaker
and microphone BAV 5,
Alternating current distribution
BAC 5B



The **IBAK BS 5** is the central control and operating unit for permanently installed IBAK inspection systems. All current IBAK cameras and tractors can be operated using it. The camera tractor and the respective camera are controlled via the ergonomically-shaped console, with two joysticks, enclosing the PC keyboard.

With its high-tech microprocessor control, the intelligent IBAK BS 5 control system identifies the system components connected and status information, such as the internal pressure of camera and tractor, supply voltage, lighting intensity as well as the height of the electronic height adjustment as a percentage, is displayed on the graphics LCD for the user.

Seven of the 16 control keys have pre-defined functions by default, and nine further keys are automatically assigned with functions by the system depending on the system configuration.

The IBAK BS 5 also has an integrated autostop function, which, in combination with cable winches KW 310 and 505, causes the tractor to stop at pre-defined points when driving in the reverse direction. This makes it much easier, for example, to approach the entry man-hole correctly.

The polished, practical and energy-efficient design of the IBAK BS 5 guarantees efficient operation of IBAK inspection systems from every perspective.



Technical system data	
Product classification	control system for operating IBAK cameras and camera tractors
Width x height x depth	BP 5: 770 x 100 x 390 mm BE 5: 483 x 177 x 310 mm BEV5B: 483 x 177 x 310 mm BAV5: 483 x 88 x 265 mm
Weight	individual components between 2.7 kg and 12 kg; total weight approx. 32 kg
Intercom loudspeaker, microphone	signal processing audio for intercom and extension system; gooseneck microphone, internal loudspeaker, external loudspeaker, hands-free talking for extension system
Camera cable length	up to 600 m
Data display generator, RS232 interface	yes (EDE 7)
Video input/output	yes
Keyboard	yes
TV standard	NTSC/PAL
Operating voltage	110-240 VAC, 50/60 Hz
Length measurement / display	yes
Autostop function	yes
Safety device	secondary circuits; monitored by insulation monitor

Combinable with	
IBAK cameras	all
IBAK winches	KW 310, KW 505, LISY winches
IBAK camera systems	all
IBAK tractors	all
IBAK extension kit	yes



IBAK PHOBOS

Flushing nozzles

Inspection range DN 100 and up



IBAK PHOBOS 3D with ORION L and POLARIS for pipe run measurement

IBAK PHOBOS flushing nozzles offer the possibility of achieving maximum propelling force and range with push rod systems. Furthermore, they provide a cleaning performance that (depending on the degree of fouling) permits house drains and connection pipes to be inspected and cleaned in a single operation.

A proven, efficient solution for this is the combination of an ORION L with one of the four PHOBOS flushing nozzles running from a high pressure flushing unit. The system is operated with a LISY 3, together with an IBAK TV and flushing vehicle. Alternatively, IBAK push rod systems that are connected to a flushing vehicle can be used. IBAK flushing nozzles can be attached to the camera push rod in just a few movements.

Very high propelling force for the inspection camera and in addition a good cleaning performance are ensured with all PHOBOS models. This is achieved by the special design of the interior of the nozzle that reduces turbulence and the resulting loss of performance inside the nozzle to a minimum.

PHOBOS 2 and **PHOBOS 4** in particular were designed for maximum propelling force and range.

In combination with the steerable camera ORION L, this means that even the most heavily branched networks and great distances can be cleaned and inspected comfortably.

With PHOBOS 4, two forward-facing jets of water can be addition-

ally operated. The two forward-facing water jets can loosen the dirt in front of the camera so that the camera can pass over it. As the camera passes, the loosened material is flushed out of the pipe. If the forward-facing water jet is switched on, the system can also be retracted more easily during flushing operation.

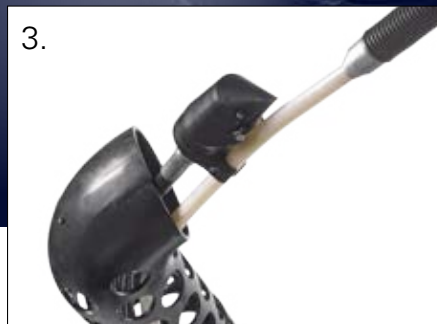
The key area of operation of **PHOBOS 1** is pipe cleaning. Thanks to the arrangement of its 5 nozzle attachments and a flat angle of radiation of 30°, it achieves the best cleaning results.

The **PHOBOS 3D** flushing nozzle has a special status. Unlike the other flushing nozzles, it forms a firm unit with the camera cable. It is connected directly to the flushing hose and is operated from this. In combination with an ORION camera, it provides good propelling force and maximum bend capability. Due to its special design, it can be aligned most precisely and ensures smooth camera movement, so that the camera follows the exact run of the pipe. PHOBOS 3D is used for 3D pipe run measurement and hydrostatic height measurement.

IBAK flushing vehicles with integrated high pressure flushing equipment and IBAK flushing nozzles enable the inspector to implement highly efficient working procedures: flushing and the TV inspection can be performed from the mainline sewer in a single operation so that there is no need to depend on inspection chambers or connection manholes.



Technical data	PHOBOS 1	PHOBOS 2 u. 3D	PHOBOS 4
Deployment range	≥ DN 100	≥ DN 100	≥ DN 100
Nozzle flow rate	45 l/min.*	50 l/min.*	60 l/min.*
Combinable with			
IBAK cameras	HYDRUS, JUNO, ORION, ORION L		
IBAK coilers	HSP 40, 60, MiniLite		
IBAK winches	KW LISY Synchron, KT 220		



*the specified nozzle flow rate is achieved with an operating pressure of 120 bar and a flushing hose combination of: 30 m NW 10 special hose, adapted to 80 m 1/2" hose (NW 12.7).

1. IBAK PHOBOS 1
2. IBAK PHOBOS 2, rear view
3. IBAK PHOBOS 4
4. IBAK PHOBOS 1 in action

IBAK ILP

Laser Profiler

Deformation measurement in sewer pipes



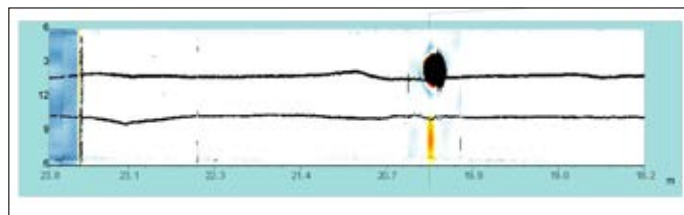
The **IBAK ILP** (Laser Profiler) reliably locates and measures sewer pipe deformations. The deformation measurement is carried out by a laser diode mounted on a pipe camera (TRITON, JUNO, ORION, ORPHEUS, ARGUS 5, PANORAMO). Depending on pipe diameter and camera type, the laser extension and support may vary.

The laser profiler mode of operation is based on a laser ring, which is projected onto the pipe wall and subsequently recorded by the connected camera. The software calculates the data received and creates a 3D model of the pipe geometry. It is also possible to generate two-dimensional illustrations and graphics.

With these graphic illustrations all requisite information regarding the diameter, ovality, deformation, corrosion, percentage of full capacity, minimum/maximum diameter as well as horizontal and vertical diameter (X and Y) in mm can be deduced.

The data collected by the whole recording can be viewed and shared using our licence-free viewer at any time.

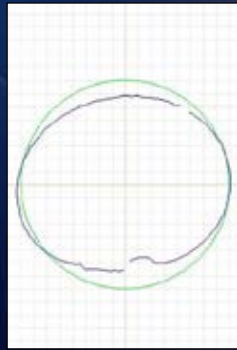
This system provides for a high level of accuracy (tolerance $\pm 0.5\%$ in relation to pipe diameter). The IBAK Laser Profiler is an international measuring instrument recognised by the WRC (Water Research Council) in England and the Department of Transportation USA.



Two-dimensional profile report, laterals with position details



Video recording of the laser ring



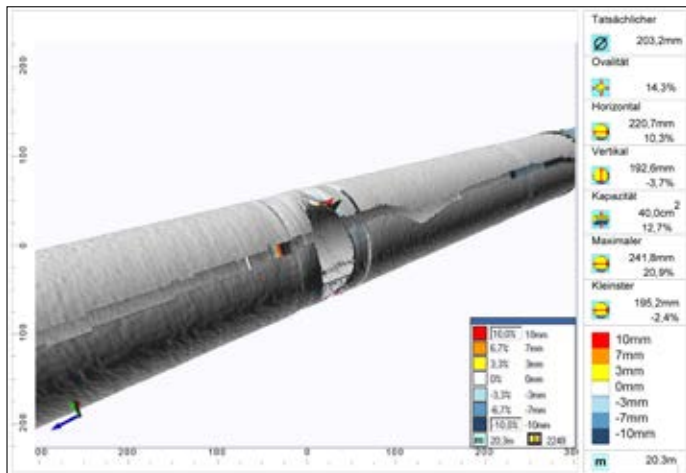
Graphically illustrated ovality measuring

Technical system data

Product classification	laser measurement device for deformation measurement in sewers
Inspection range	DN 150 and up - DN 1050*

Identification of

	reduction of cross-section
	deformation
	pipe capacity
	minimum/maximum diameter
	drainage obstacles
	unevenness



Three dimensional profile report

*This will depend on the camera being used.

ARGO 2

Camera raft

DN 400 and up



The **IBAK ARGO 2** camera raft was specially developed for pipes of larger dimensions that are partially filled with water. The floating body is secured by means of a pull rope. That makes it possible to inspect either with or against the current in the pipeline.

You can mount any of IBAK's cameras using the appropriate adapters. It is also possible to achieve the correct centre of gravity by placing a variety of counterweights.



Technical system data

Product classification	Camera raft
Inspection range	DN 400 and up
Width x height x depth	370 x 160 x 850 mm
Weight	approx. 7 kg
Superstructure	Raft adapter box with camera base (when using an ancillary light) or camera adapter with fastener

Combinable with

IBAK cameras	all except HYDRUS, POLARIS, CERBERUS and PANORAMO-systems
IBAK winches	all
IBAK control systems	all

Accessories (optional)

Safety device	Anti-roll bar
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Vehicles: Outfitting Options

Classic Line

Aisle-type-outfitting

Sewer cleaner

Electric Cutting and Grinding with IBAK Robotics Products



AlliGator



MicroGator

Gefördert durch:



Bundesministerium
für Wirtschaft
und Energie

aufgrund eines Beschlusses
des Deutschen Bundestages



Lateraldetector

IBAK

robotics

IBAK Robotics products run on electricity. This makes them lightweight, low-noise and powerful. This high-quality, innovative technology is unrivalled as compared to pneumatic and hydraulic motors and offers numerous advantages.

IBAK Robotics products are:

- efficient and rugged
- an independent system without additional equipment
- present on the market world-wide

IBAK Robotics products have:

- lower operating costs as compared to hydraulic and pneumatic systems
- a very good cost-performance ratio
- a high degree of efficiency
- a low total system weight, installation in a 3.5 t van is possible

IBAK Robotics products enable:

- a high operating speed
- cutting and grinding under water and in extreme temperatures
- simple handling
- almost noiseless cutting and grinding
- environmentally friendly working

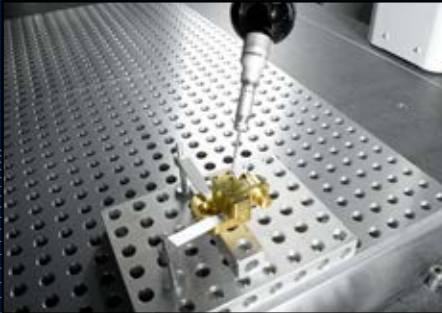


IBAK – Made in Germany

All IBAK products have one thing in common: they provide 'Made in Germany' quality. All system components are developed, produced, assembled and tested by IBAK.

Thanks to their high quality standard, IBAK products have been a benchmark in efficiency and return on investment for more than 70 years.

IBAK



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