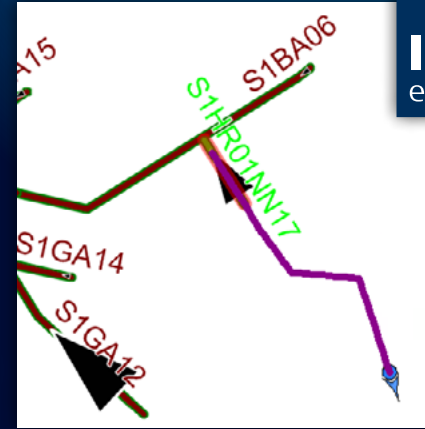


IKAS evolution



IKAS evolution
3D GeoSense,
pipe routing data

Configuration options



ORION 3 SD L 3D with PHOBOS 3D



MiniLite with extra counter
and NANO L 3D



Example for the configuration of 3D GeoSense with flushing:
Large-scale system with BS7, KW 505, LISY synchronous winch, LISY 3 with
ORION L 3D

IBAK

3D GeoSense

Hydrostatic
level
measurement



Special software tools are used to support the processing of the data captured by the camera.

IKAS evolution is capable of capturing the 3D sensor's measurement data (xyz coordinates) in a fully automated process. This is done simultaneously with the TV inspection.

IKAS evolution also allows displaying the measured course of the piping in real time while conducting a TV survey in a network diagram*. It is possible to import maps (such as a house's floor plan) to the software and to scale it to the required size to display the course of the piping which is generated in the process directly on the map. The pipe run is stored with three-dimensional coordinates and precise geographical information (geo-referencing) to allow tracing the exact physical location of the course of the pipes from above the ground at any time.

The site map created can easily be exported to every supported sewer inspection data format**. It is possible to subsequently adjust the data to precisely defined coordinates – fixed geographical reference points – using a wizard in the software*.

IKAS evolution also supports capturing the height measurement data which the hydrostatic height measurement determines in a semi-automatic process. Just like when using 3D GeoSense for surveying the course of the pipes, this data is captured in one single work step with the TV inspection. The analysis and adjustment of the height reference points is done using a wizard* in IKAS evolution.

3D GeoSense flushing:
Large-scale system:
Cameras ¹⁾ : ORION 3 SD (L) 3D, ORION 3 (L) 3D, NANO (L) 3D POLARIS 3D
Satellite-based inspection system: LISY 3 or LISY HD with control camera LISYCam 3, LISYCam 200, 3D funnel
Flushing nozzle: PHOBOS 3D
Operating system: BS7, BS5, BS 3.5
Cable winch: KW305 /KW505 with camera cable
Synchronous winch: LISY synchronous winch (with camera cable instead of push rod)
Camera cable PHOBOS 3D, 180m
Software: IKAS evolution
Optional: Measurement module system for hydrostatic level measurement



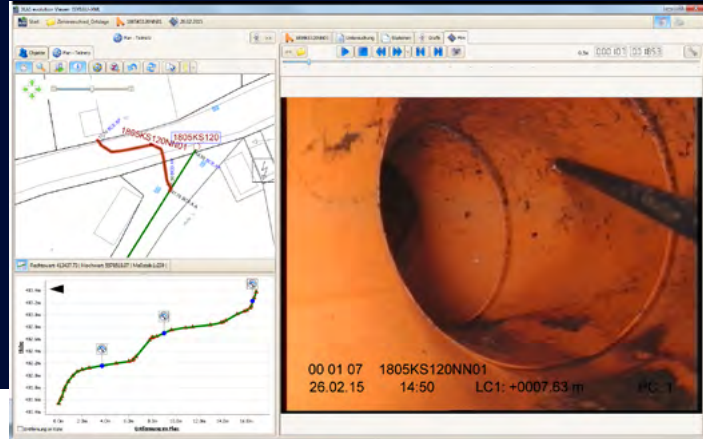
LISY HD with ORION 3

3D GeoSense without flushing:
Large-scale system:
ORION 3 SD (L) 3D, ORION 3 (L) 3D, NANO (L) 3D POLARIS 3D, ORPHEUS 2 3D ²⁾ , ORPHEUS 3 3D ²⁾ ORPHEUS 2 HD 3D ²⁾ , ARGUS 6 ²⁾
Satellite-based inspection system: LISY 3 or LISY HD with control camera LISYCam 3, LISYCam 200, 3D funnel
Camera guide unit DEIMOS 3D
Operating system: BS7, BS5, BS 3.5
KW305 /KW505 with camera cable
Synchronous winch: LISY synchronous winch with camera cable plus Perfect Push Rod
Software: IKAS evolution
Compact system:
MiniLite
Cameras ¹⁾ : ORION 3 SD (L) 3D, ORION 3 (L) 3D, NANO (L) 3D POLARIS 3D
Camera guide unit DEIMOS 3D
Control console: BP2, BP100
Software: IKAS evolution

1) Cameras must be pre-calibrated once by IBAK before carrying out a pipe run survey. Without calibration, the specified cameras can be used as conventional cameras.
2) For pipe run surveying in the main pipe

* IKAS evolution MAP Route Assistant required for this function!
** Depends on the IKAS evolution channel interface that is used
For further information on IKAS evolution, refer to the "IKAS evolution"

Inspection and pipe run surveying in one work step



In the field, one important factor is to determine and to document the condition of the sewage pipes. However, inspection teams are often equally interested in plotting the exact position of the pipes in the ground.

Pipe run surveying and hydrostatic level measurement are means which can contribute significantly to the inspection quality of drainage lines on the property which is inspected.

Both methods help the inspection personnel to complete the information on the piping system and allow them to generate site maps of complex connection networks.

Such maps provide a detailed plan of the course of the piping in addition to determining the current inspection result (documentation of damages, etc.) with only very little extra effort since the measurement is recorded automatically while the piping is inspected.

A pipe run survey with 3D GeoSense produces xyz coordinates of the pipes which are then merged into a 3D map. This facilitates the location of these pipes when the system requires rehabilitation or for other constructional projects (e.g. complementing the existing system with additional lines).

In addition to a 3D GeoSense pipe run survey, the user can conduct a hydrostatic height measurement which allows to determine the altitude (z coordinate) with centimetre-level accuracy.

Apart from measuring the course of the pipes of the lateral, it is also possible to measure the course of the main sewer.

3D GeoSense

3D GeoSense pipe run surveying with the MiniLite



When using an IBAK LISY 3 satellite system for lateral inspection, the course of the piping is inspected and recorded at the same time. All calibrated 3D-enabled IBAK push cameras can be connected. The LISY system allows inspecting connected lines with a minimum diameter of DN 100. The user can select between propulsion via flushing or using the push rod of the LISY system.

When opting for the flushing method, the system must be equipped with the PHOBOS 3D flushing nozzle which allows flushing the light-weight camera far into the piping system without consuming a lot of water.

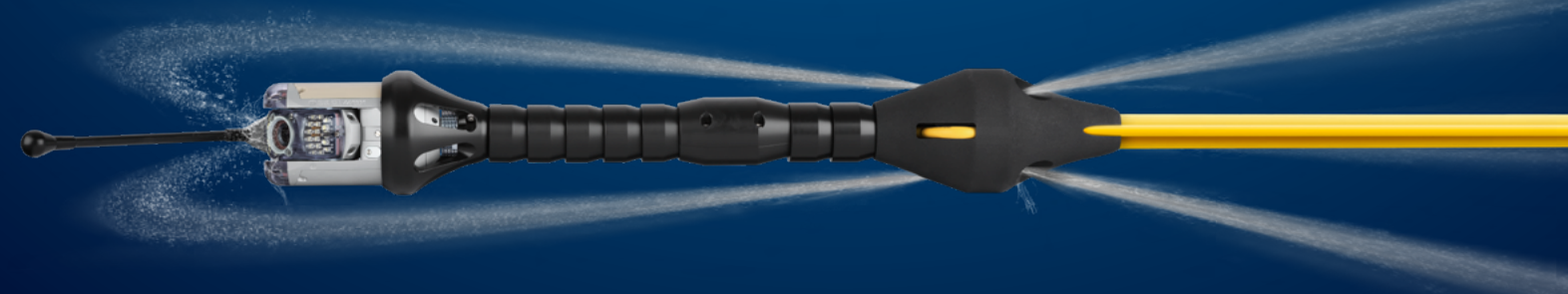
Apart from that, there is the option to use a conventional satellite system without flushing unit or the compact push system MiniLite to carry out measurements efficiently. A 3D GeoSense pipe run survey without flushing unit requires mounting the DEIMOS 3D camera guide unit which keeps the camera parallel to the pipe axis of the inspected pipe while measuring the course of the pipe.

The user can gradually follow the composition of the piping network in real time on the monitor and choose whether the measurement shall take place while the camera is moving forwards or backwards.

POLARIS 3D with PHOBOS 3D

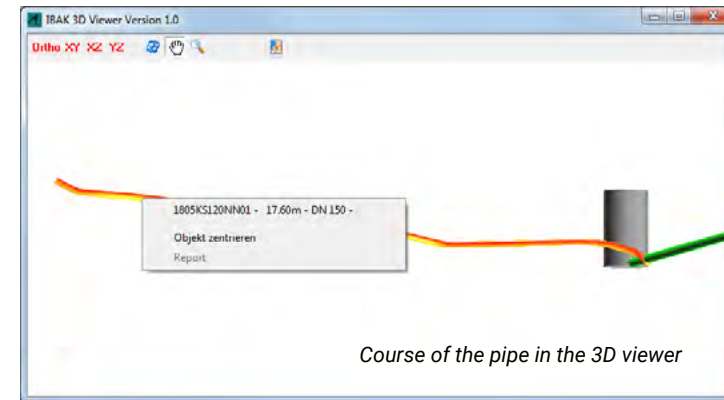


Hydrostatic level measurement



ORION 3 SD L 3D with PHOBOS 3D including lens cleaning function

The pipe run survey uses a small precisely calibrated sensor which is installed in all cameras enabled for 3D GeoSense (such as ORION 3 SD 3D). This sensor provides the angle data while the counter of the LISY or the MiniLite provides the distance information. The software uses this data to calculate the xyz coordinates and superimposes them with any mapping data which were loaded before. The actual course of the piping is then generated in the map.



Course of the pipe in the 3D viewer

3D GeoSense measurement is supported by the hydrostatic height measurement developed by IBAK for complex piping networks. It is used to accurately determine height differences and/or to determine base altitudes in main and secondary pipes.

This method allows measuring the altitude of pipe networks (z axis) with an accuracy of ± 1 cm.

For the hydrostatic height measurement, the system will first carry out a reference measurement to produce a reference pressure for all subsequent measurements. A pressure sensor measures the water column in the flushing hose.

After this initial measurement, the camera is flushed to the next required measuring point. There, the flushing process is interrupted and the measurement of the water column is repeated by clicking a button.

Determining the change in pressure allows calculating the altitude of the pipe at the measuring point with centimetre-level precision.

Supplementing 3D GeoSense with a hydrostatic height measurement is always recommended when the altitude at which the pipe runs is crucial for the inspection results.

NANO L 3D with PHOBOS 3D



IBAK – Made in Germany

All IBAK products have one thing in common: They are "Made in Germany". All system components are developed, produced, fitted and tested by IBAK. With their high quality standards IBAK products are a benchmark for investment security and economy – since 75 years.



IBAK

IBAK Helmut Hunger GmbH & Co. KG
 Wehdenweg 122 | 24148 Kiel | Germany
 Tel. +49 (0) 431 7270-0
 Fax +49 (0) 431 7270-270