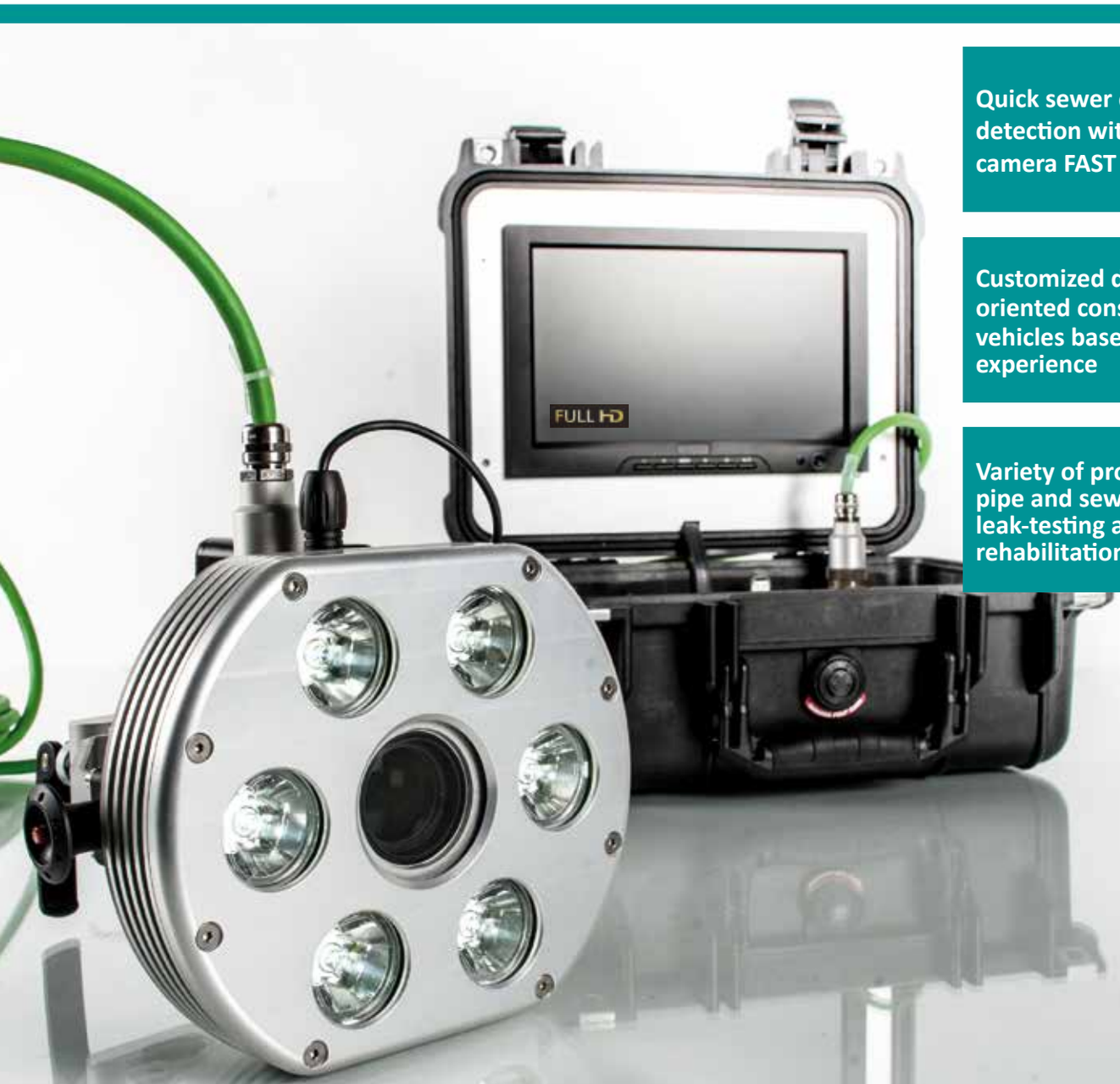
LINDAUER SCHERE -
Inspection system for operation in lateral sewer systems

Automated system for the 3D documentation of the pipe networks:
ASYS^{bop} and geoASYS^{bop}

INSPECTOR -
Software for the inspection and documentation of waste water systems

JT-Journal



Quick sewer check and status detection with the new camera FAST PICTURE

Customized design and user-oriented construction of vehicles based on long-term experience

Variety of products for optical pipe and sewer inspection, leak-testing and sewer rehabilitation

Complete solutions for pipe inspection and leak-testing

www.JT-elektronik.de

Preface

WORKING WITH US TO IMPLEMENT THE RIGHT STRATEGY

Dear Readers,

our new journal that you are now reading will provide detailed information about our products and services.
For more than 35 years now, we develop and produce systems for optical pipe and sewer inspection, leak-testing and sewer rehabilitation.

Our deep-seated technological expertise and practical proximity to the acute problems of our clients represent the seal of quality that makes us special as your technology partner. Many customers know exactly what we are talking about.

We would be pleased if you place your confidence in us.

We hope you enjoy reading our journal.

JT-elektronik GmbH

Ulrich Jöckel, Sonja Jöckel and Tobias Jöckel
General Managers of the company

JT-elektronik GmbH is renowned developer and manufacturer of TV inspection equipment and leak-testing systems.

Since its founding in 1980, a large variety of products for optical pipe and sewer inspection, as well as for leak-testing and sewer rehabilitation have been developed and manufactured.

The product portfolio ranges from smaller sewer inspection systems and semi-professional systems to large-scale comfort solutions for installation in inspection vehicles. We offer solutions for various fields of sewer inspection, ranging from main sewer inspection to estate drainage systems. We recently developed a number of innovative products focusing on lateral sewer systems and the inspection, detection and localisation of sewer routes.

With the „Lindauer Schere (LS)" camera system and the ASYS software solution, we are able to offer an ideal solution for the inspection and 3D documentation of branched sewers. The high usability of our systems is confirmed by numerous references from customers and contractors alike.

We are holding a large number of patents and utility models to protect our know-how and demonstrate our dedication, capacity for innovation, and practical expertise.

WORKING WITH YOU FOR MUTUAL SUCCESS!

These are our qualities

- **Extensive product range for the sewage sector**
- **Innovative and sustainable solutions**
- **High product quality**
- **Many years of practical approach and experience**
- **Compatible and expandable inspection technology specially adapted to market requirements**
- **Customized design and user-oriented construction and modification of vehicles**
- **High degree of flexibility during the manufacturing of our products and processing repair jobs**
- **Comprehensive, flexible, reliable service to our customers**
- **Express rental products**
- **Special requests and constructions**
- **Training and further education**

Cleaning of sewer systems and simultaneous inspection with 3D horizontal survey

...the new technology from JT makes this possible. The results are outstanding: inspection output is increased and a means of monitoring the cleaning is implemented. The technology can be used from DN 150 to approx. DN 600 or, with additional equipment, even up to DN 1200. Images or documentation can be recorded using video or a PC. Post-processing in the office is easy and can be used for determining the structure of sewer cleaning when it becomes necessary. Technical setup is easy and user-friendly.

Function an design:
The camera (LMS or LIBI) is installed in the specially developed jetting sled. Using the 1" or 5/4" high-pressure nozzle, this sled is jetted through the duct and propelled forward. The connecting cable is wound by hand using a manual drum or electrically using a powered drum. Depending on the equipment configuration, the feed length can be up to 400 m.

Operation and documentation:
Using a command module, the operator controls all camera functions such as illumination +/-, camera pan left/right, rotate and focus adjustment. The jetting sled has a special quick adjustment feature so that the sled is preset to match the diameter of the pipe being examined. While the high-pressure hose is jetting in, the path of the duct and the position are surveyed using the XYZ sensor during the forward movement. If damage is found, the camera can be steered specifically to the damage site for observation. When the high-pressure hose is withdrawn, the cable also has to be wound at the same time. In the electrical cable drum, this is done by motor power in conjunction with a slip clutch. The high-pressure hose is withdrawn with the cleaning nozzle, thus sucking in the wastewater towards the rear, which in most cases allows absolutely water-free observation and documentation of the front area.
The status after cleaning is detected immediately. If necessary, the cleaning can be repeated, allowing even stubborn deposits to be eliminated.

Evaluation:
The still image and video sequences recorded when moving the camera back and forth through the ducts are now edited in the office. This information can also be used for more in-depth damage documentation or for the calculations for as-needed sewer duct cleaning.

Equipment:
The differing requirements result in a need for sophisticated equipment consisting of the jetting sled, auxiliary lighting, color camera with pan/tilt head and focus adjustment and position sensor, up to 400 m of cable with jet guard and cable drum, control panel and video documentation, video text generator with path length measurement and PC for 3D surveying. The entire system can be operated on 230 V/50 Hz or using a 24 V/230 V inverter.

Result:
This „fast" inspection technology can also be used for initial video documentation of the sewer system. The overall view during withdrawal is ideal, as the bottom of the pipe is free of wastewater and overall assessment is much improved over conventional inspection methods. You too will be surprised by the results.

Lindauer Schere

Ideal bendable camera system for operation in lateral sewer systems

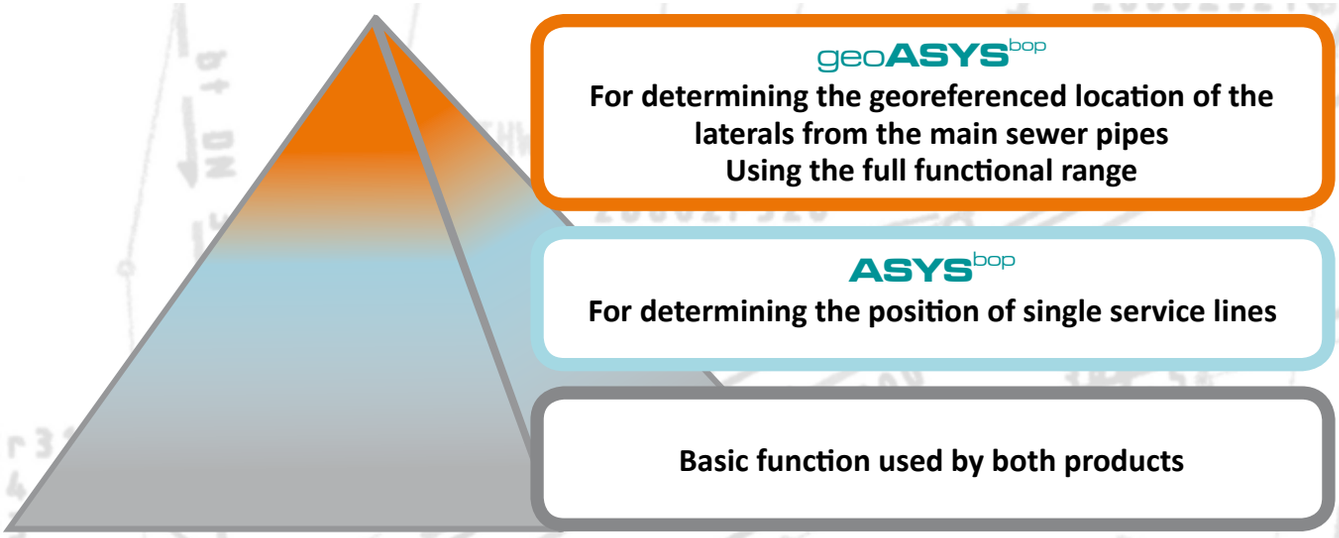
The “Lindauer Schere (LS)” is a patented (DE 101 02 056 B4) bendable pan and rotate colour camera for the holistic recording and documentation of lateral sewer systems with branches. The technology of the LS makes it possible, starting from revision openings and manholes as well as the satellite camera, to inspect and to document the entire ground drainage system with all pipes and ramifications from the main sewer. Additionally the LS measures them in connection with the 3D sewage measurement system ASYS.

Functional principle:
The camera is flushed in or pushed by different drive possibilities into the sewage lines and positioned in front of the branch to be examined. For the bending process, the special shear mechanics are activated. If the tip of the shear has found a skewback, the camera is moved into the connection whereby the pressure movement on the wall of the pipe is used. After successful turning, the shear mechanics that are necessary only for turning and overcoming the sockets, offset and barriers are completely retracted into the camera housing. Several branches can now be pushed through or flushed through by the same procedure. The principle of the retractable guide device allows always a free and clear camera image. One of the main criteria for the density of pipes are perfect pipe connections. With the LS, these can be completely panned by 90 degrees and circled by 360 degrees. Not easily accessible places can also be panned and inspected by using the retractable guide mechanics, which are unique on the market.

TECHNICAL SPECIFICATION

- Inspection of branched pipe systems from DN 100 to DN 200
- Camera height: 71 mm, camera width: 60 mm / total: 375 mm
- Resolution: 752 (horizontal) x 582 (vertical)
- High intensity LED illumination
- Automatic iris control
- Manual focusing
- Pan range 250° horizontal / ∞ radial
- Fokus area: 1 cm - ∞
- Range to 40 m in the lateral pipe (pushing technology)
- Range up to 120 m in the lateral pipe (water high pressure technology)
- Optional pressure monitoring and explosion protection certificate

Different functionalities distinguish the two software modules ASYS^{bop} and geoASYS^{bop}



The software modules ASYS^{bop} and geoASYS^{bop} (bop = based on planet) are each based on the main system planet and have a consistent interface design.

- Automatic numbering depending on the main sewer network
- Using geospatial data
- Project Management to manage multiple databases and projects
- Measuring in a local coordinate system (depending stored on the card)
- Automatic object numbering
- Automatic ident number assignment
- Direct georeferenced determination of initial angles and laterals
- Scale adjustment of non-georeferenced images
- Transformation of the service line
- Artificial horizon, reflecting the position of the camera in the channel
- Print Manager to create and manage any print layouts
- Using georeferenced TIFF, BMP, PNG, JPG images as background maps
- Construction of the start angle and the starting point
- Resuming an aborted measurement
- Image scaling of not georeferenced raster data
- Underground measurement of the pipe geometry (3D)
- Different export formats
- Using of DXF, DWG, DGN, Shape as background maps
- GIS function for navigation and display of the background data
- Visualize your data in 3D

ASYS – Automated SYStem for the 3D documentation of the pipe networks

ASYS is a system designed to acquire and record the underground pipe networks. It has been developed by JT-elektronik GmbH in cooperation with partners University of the Bundeswehr Munich, PPMsys (Pipe Positioning System) UG and bluemetric GmbH. ASYS distinguishes itself from common systems based on the transmitter-receiver principle, which are subject to numerous external disturbances that cause large position errors.
The different sensors and complex processing algorithms integrated in the camera system „Lindauer Schere" enable ASYS to precisely register each horizontal and vertical change of the position in the course of the inspection. The camera movements in 3D space recorded by the sensors as well as the distance information are used as input data by the ASYS processor for computing the 3D (XYZ) coordinates. The recorded coordinates are used to build the pipe geometry and other objects of interest. ASYS does neither estimate the angles between pipes nor pipe bends. It is a measurement system.
The sensor calculates the angles based on the camera movements and the algorithms always output the exact course of the pipe. Also several pipe direction changes in the bends and height are ideally calculated and recorded in the flexible mode. Approx. 100 measurement values each second are guaranteed in real-time.
The measured pipe network can georeferenced in the given land or state coordinate system and therefore allowing direct transfer of the data into any compatible CAD or GIS software. Different data formats like ESRI Shape, DXF, ASCII, XML are supported.

Facts:

- Real-time locating and recording, as well as documentation of the entire drainage system in the property area
- Measuring – **NO ESTIMATING** – of bends and branching
- Lower time consumption and work expenses through the 3D recording of the pipe layout during the inspection
- Pipe documentation is a prerequisite for the quality maintenance of property drainage systems and the sanitation planning

Following is a brief description of two of the main ASYS products that are available in the market.

ASYS^{bop}

The software modules geo**ASYS**^{bop} and **ASYS**^{bop} (bop = based on planet) are based on the system basis planet and have a standardized user interface.
ASYS^{bop} is the continuation of the software version LP-ASYS with further additional features.

Additional to the LP-ASYS-features ASYSbop offers the following new features and enhancements:

- Implements a scalable and high-performance framework called planet
- Extended project management
  → Easy handling of several house connection pipes in a single project, etc.
- Improved support for integrating back ground maps
  → Extended to support several data formats
  → Efficient map data import and scaling, etc.
- Transformation of Measured Pipe Network after the measuring process
- Extended print layouts
  → Creation and management of print layouts using templates and print editor.
- Support common GIS Data Formats (e.g., ESRI Shape) and CAD Formats
- Extended Export Formats (e.g., JPEG, M150, ISYBAU XML)
- Possibility to break and continue a measurement process
- Improved visualization of data in the map window
- Automatic generation of identification numbers for measured objects

ASYS^{bop}/geoASYS^{bop}
GIS on the inspection vehicle for the underground position identification

geoASYS^{bop}

A professional version of the ASYS products. With geo**ASYS**^{bop}, the house or property connection pipes are automatically documented in a given land or state coordinate system of the main sewer network (e.g., Gauss-Krüger). This automatic georeferencing enables the acquired data (documented pipe network) to be directly transferred or exported into standard geodatabases or common Geographic Information Systems (GISs) for later use, for example sewer network analysis and planning. geoASYSbop offers the following features and functionality:

- Direct import of background maps for manholes and main sewer pipes
- Direct acquisition and georeferencing of connection pipes in 3D (XYZ) in the system of the main sewer network
- Automatic generation of identification numbers for measured objects (w.r.t the ID-system of the source GIS)
- Continuation of a measurement process at a revision manhole in an already documented network
- Uses **GEMAS**^{bop} for optimal data exchange
- Export the drainage network in several formats (M150, ISYBAU XML, DXF, Shape, JPEG, PDF)
- Support direct transfer of data in comment GIS
- Support considerable GIS – Functionality
- Extended project management
  → Import raster and vector data (e.g., DWG, orthophotos, cadastral maps)
- Customizable print layouts
- Support measurements direct from a manhole
- Support 3D Visualization
- Support generation of long-section profiles
- Editing functions

Two Partners – one common development

Through the joint venture between JT-elektronik GmbH and the bluemetric software GmbH the new TV Inspection Software INSPECTOR was developed. Extensive expertise, long-standing practical experience and a lot of know-how from both companies were incorporated in the development.

During development of the state detection software INSPECTOR a high value was set on the intuitive handling. The User Interface provides the user during the state detecting with all central functions on the main view. There are no hidden menus or functions. All functions are accessible by the mouse or keyboard.

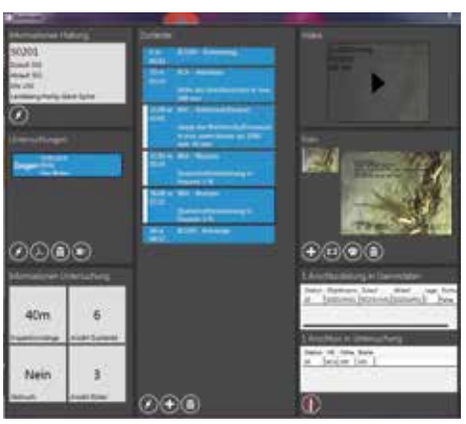
To ease the daily work, each section of the software was intensively thought through. Examples are:

User interface

Inspection of sewer pipes and shafts

Project-Explorer
Export of all formats and reports with a click of a button

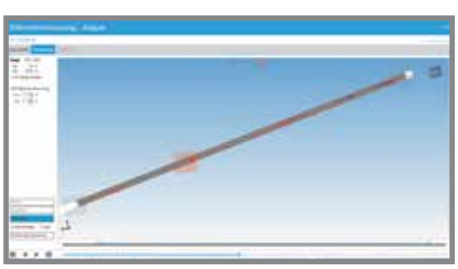
Dashboard
A compact overview of the project status and details of the inspected object



Dashboard

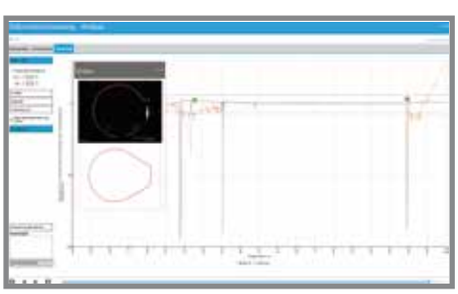
Code Cube
Fast input of every detection

Measurement functions in the digital video image.
This way you can find the values for the quantification directly in the video. For each state, the appropriate measurement function is triggered.



Deformation measurement with laser circuit and image processing method for calculating the quantification of corresponding states.

Generating a 3D model
Representation of the diameter and damage
Perfect harmony with ASYS & geoASYS

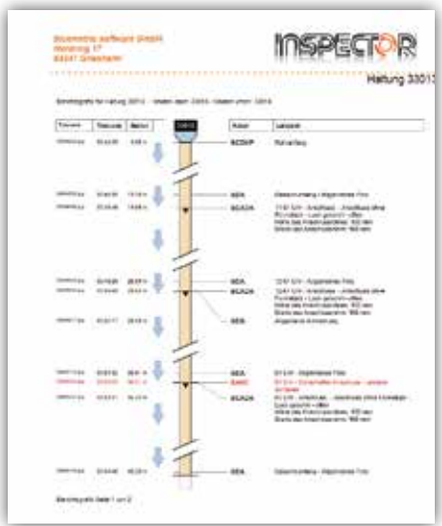


Evaluation of deformation measurement

INSPECTOR

INSPECTOR does not reinvent the process of state detection; it does however facilitate it greatly. We are taking new approaches with our inspection software, to make your job easier. Test the INSPECTOR free!
You will be convinced.

The most important functions at a glance:



Damage coding as well as import/export in the following formats:
• DWA-M 149-2 (2007, 2009, 2010, 2013) • DWA-M 150 (2010)
• Arbeitshilfen Abwasser 2006/2013 (ISYBAU.XML)
• Arbeitshilfen Abwasser 96 (Typ H, Typ LH und Typ ZF)

Better documentation with any number of images per determination

Interactive view version with 3D graphics and accurate controlling of videos

Innovative and intuitive operating concept

3D graphics during acquisition and available for customers on royalty free distribution

CAD-Files as background maps

Using project-specific reference tables

I.V.E PRO - a readable form of XML files

I.V.E PRO gives you readable and editable access to the base data and findings in the formats M150, ISYBAU 2006 and ISYBAU 96. Additionally included is a content and schema validation, a 3D map and access to photos and videos.

Free trial

Test I.V.E PRO for free: You can download the full version from our webpage:
bluemetric.de/produkte-loesungen/i-v-epro.html

Motor vehicle 3,5/5,0/7,2 t „TV-EX / SAT-Synchron“

Compact motor vehicle with perfectly-designed ergonomics and optimal distribution of load:

Bad weather and sun protection roof with integrated lightning

Jet hose reel with roll up control and 120 m specialflushing hose 1/2“ for external high pressure

Gallow construction with electrical chain hoist and working lights. Eyebolt for the fall protection technology

2 x rear room monitors for ideal working

Rear view camera with monitor in the operation cabin/ driver`s cab

2 x foot switch for gallow and high pressure jet hose reel

Tool cabinet, towel dispenser, soap and disinfectant dispenser, spray nozzle with pump

Passage to the storage space with tool cabinet, storage compartments, cable rerouting, nitrogen, maintenance access

TV-cable drum with up to 600 m cable length, inspection DN 100 – 2000 mm

Safety technology integrated in the swing doors

Synchronic cable drum for lateral inspection (pushing technology) DN 200 – 1600 mm

Manual or electrical cable drum for „Lindauer Schere“

Heavy-duty pull-out drawer for tools, tractors and accessories

Motor vehicle with the permittable total weight of 5.0 to, with co-driver rotating seat and swing doors 270°

Operation cabin

The operation cabin meets the demands of a modern workplace, the practical application, and last but not least, the work protection regulations. It is designed individually according to the customer's wishes and with our years of experience, realized through our own joiner's workshop and metal processing department. We ensure the inspectors a perfect and coveted working room equipped with the needed electronic technology and in compliance with special wishes like in-built air conditioner, refrigerator, microwave etc.

Rear Room

The JT rear room design is characterized by an ergonomic and individual allocation of devices, tractor drawers, cables and accessories. Each piece has its place, and thus, it is possible to work orderly and safely. Not only the safety technology like fall protection and manhole grid, but also tool cabinets, further storage spaces and optimal view on the screens etc. distinguish the rear room. Depending on the customer's wishes, here the allocation of the technology can also vary. However, decades of experience in the area of vehicle design have been proven, and the application has been optimized.

Motor vehicle 3,5/5,0/7,2 t „HD-Quickborn“

The 5 t. Mercedes-Sprinter is sufficient concerning the weight. The vehicle‘s auxiliary drive system runs not so quietly like a truck engine due to high speeds.

Jet hose reel with roll up control and 120 m special flushing hose 1/2“ for external high pressure

Bad weather and sun protection roof with integrated lightning

Gallow construction with electrical chain hoist and working lights. Eyebolt for the fall protection technology

2 x rear room monitors for ideal working

Rear view camera with monitor in the operation cabin/ driver`s cab

2 x foot switch for gallow and high pressure jet hose reel

Tool cabinet, towel dispenser, soap and disinfectant dispenser, spray nozzle with pump

Second sliding door with storage compartments for accessories and traffic safety systems

Perfect access to high pressure pump, filter etc. facilitating maintenance and service

Safety technology integrated in the swing doors

Heavy-duty pull-out drawer for tools, tractors and accessories

High pressure flushing device with 1000 l water tank, rear room operation high pressure and wireless remote control

Manual or electrical cable drum for „Lindauer Schere“

Motor vehicle with the permittable total weight of 5.0 to, with co-driver rotating seat and swing doors 270°

The operation cabin meets the demands of a modern workplace, the practical application, and last but not least, the work protection regulations. It is designed individually according to the customer's wishes.

If the customer wishes, JT will construct inspection vehicles with two sliding doors instead of just one, e.g. for safety technology, storage compartments for accessories, traffic safety systems etc.

Motor vehicle 7,5/12/15 t „TV-EX HD-SAT“

Weight is a primary consideration from the very beginning of the investment and design process for tv inspection vehicles. A 12-tonnes chassis with dual rear wheels makes the motor vehicle moveable and guarantees the maneuverability of the truck, especially when performing a turning manoeuvre.

Bad weather and sun protection roof with integrated lightning

Jet hose reel with roll up control and 120 m special flushing hose 1/2“ for external high pressure

Gallow construction with electrical chain hoist and working lights. Eyebolt for the fall protection technology

2 x rear room monitors for ideal working

Opt. 2 x rear view camera inside/outside with monitor in the operation cabin/ driver`s cab

2 x foot switch for gallow and high pressure jet hose reel

Tool cabinet, towel dispenser, soap and disinfectant dispenser, spray nozzle with pump

TV-cable drum with up to 600 m cable length, inspection DN 100 – 2000 mm

Optional synchronic cable drum for lateral inspection (pushing technology) DN 200 – 1600 mm

High pressure flushing device with 3000 l water tank, rear room operation high pressure and wireless remote control

Manual or electrical cable drum for „Lindauer Schere“

Heavy-duty pull-out drawer for tools, tractors and accessories

Perfect access to high pressure pump, filter etc. facilitating maintenance and service

Motor vehicle with the permittable total weight of 12.0 to, with 3-person drivers cab and swing doors 180/270°

The operation cabin /rear room/ tool shed meets the demands of a modern workplace. It is designed individually according to the customer's wishes and with our years of experience, realized through our own joiner's workshop and metal processing department.

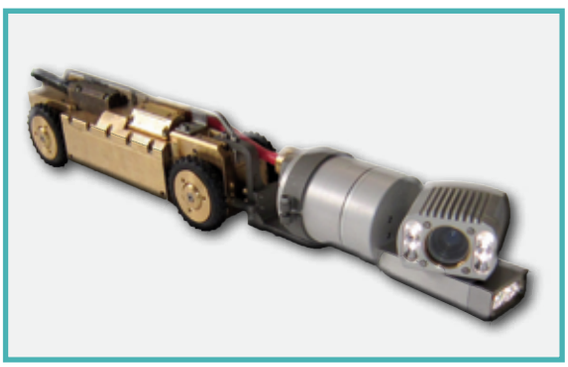
Generous access to the high pressure technology. Storage room, electrical filling reel, safety technology and accessories.

Mainpipe tv-inspection-systems with pan and rotate colour cameras

**Our hardware is permanently updated with extremly strong drive units and perfect practibility.
All JT-tractors have a fold-away and adjustable camera mounting bracket, a bolted cable plug, as well as strain relief. The camera tractors are robust, low in maintenance and repair, waterproof with rubber gasket (o-ring, no silicone) that makes them extremely easy to maintain.**

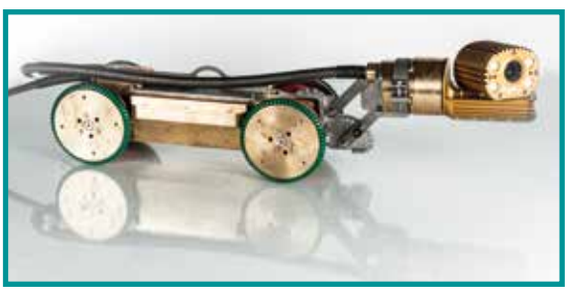
CAMERA SYSTEM „MICRO-ROTA“ WITH CAMERA TRACTOR „TURBO 100-EX“

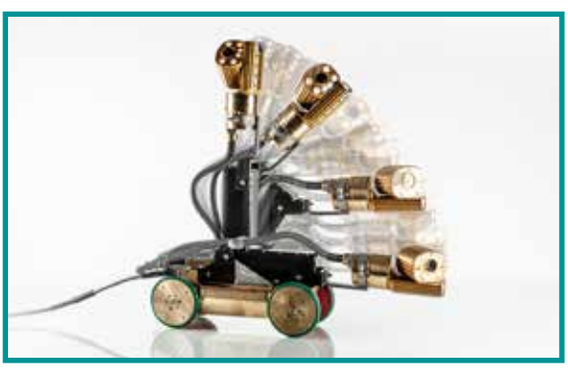
- Operating range: DN 100 to DN 600
- Lens: 6 mm / F 1.4 (iris), Focus area: 1cm -∞
- Manual focusing and iris control
- Integrated illumination: 20 W
- Pan range: 270° horizontal, rotate range: 380° radial
- Resolution: 752 (horizontal) x 576 (vertical)
- Track crawler, additional wheels available up to DN 600



CAMERA SYSTEM „MINI-ROTA-ZOOM“ WITH CAMERA TRACTOR „TURBO I-EX“

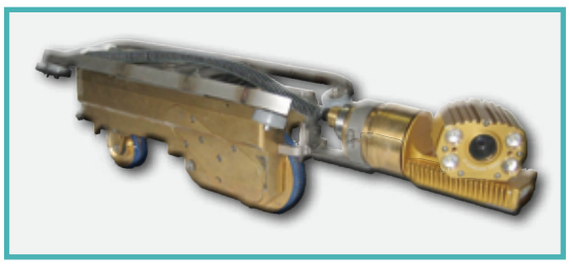
- Operating range: DN 150 to DN 600
- Lens: 10x optical, 4x digital zoom, 6 mm – 48 mm/ F 1.4 (iris)
- Manual and automatic focusing; iris control
- Integrated power LED illumination
- Pan range: approx. 270° horizontal, rotate range: 400° radial
- Resolution: 752 (horizontal) x 576 (vertical)
- Angel of view: horizontal (270°+23°), radial (400°+18°)
- Optional laser for measurement
- Camera tractor from DN 150, additional wheels available up to DN 600
- Optional inclinometer system and temperature measurement





CAMERA SYSTEM „ROTA-RZL“ WITH CAMERA TRACTOR „TURBO II-EX“

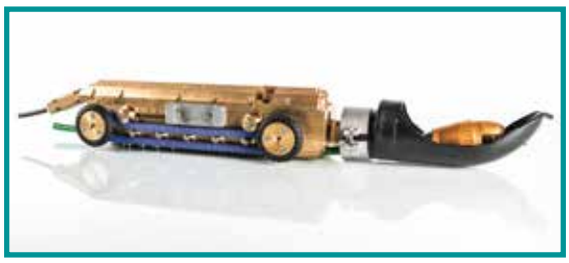
- Operating range: DN 200 to DN 2000
- Lens: 10x optical, 4x digital zoom
- Camera inclinometer
- Manual and automatic focusing; iris control
- Ex approval – zone I
- Resolution: 752 (horizontal) x 576 (vertical)
- Pan range: approx. 270° horizontal, rotate range: 400° radial
- Automatic zero position and automatic bushing function
- High power LED illumination with additional bushing LEDs
- With 2 powered axes
- Waterproof up to 2 bar
- Electronic height adjustment from DN 350, laser for damage measurement
- Inclinometer system and temperature measurement
- Electronic pressure monitoring



CAMERA SYSTEM „ROTA-RZL“ WITH CAMERA I-PROFILE TRACTOR „TURBO E“

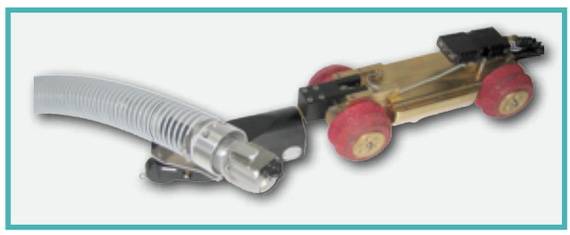
- Operating range: from DN 200/300 upwards
- With SPE also suitable as lateral inspection system
- Waterproof till 2 bar
- With all JT-mainpipe cameras applicable
- Strong propulsion with two drive wheels

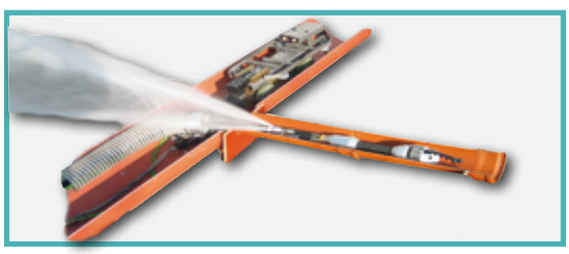
Lateral inspection system with integrated monitoring camera for “LRB”, “Lindauer Birne (LB)”, and “Lindauer Schere (LS)” camera system



CAMERA TRACTOR „SKI V“ and „SKI II“

- Operating range: DN 150 /200 to DN 1400 /1600 for ring, box and I-profile
- Waterproof till 2 bar
- Electronic height adjustment for guide tube
- Can be positioned freely with circle and height adjustment
- Connections visitable from 04 to 08 in one work process
- Integrated monitoring camera for optimal positioning
- Strong propulsion (55 kg) for lateral pushrod





CAMERA TRACTOR „SKI III“ and „TURBO II“ WITH SIDE-POSITIONING-UNIT (SPE)

- Operating range: DN 250 to DN 800
- Can be positioned freely with circling and pivoting transmission
- Monitoring camera for optimal positioning
- No hydraulic disturbance of sewage flow
- Special nozzle with high driving and cleaning power
- Switchable to front jet for perfect inspection results

JT-Satellite cameras for all areas:

„LINDAUER SCHERE“

- Pan and rotate colour camera with high power LED illumination
- Inspection of branched pipe systems from DN 100 to DN 200
- Camera height: 71 mm, Camera width: 60 mm, camera lengt 375 mm
- Resolution: 752 (horizontal) x 582 (vertical)
- Range to 40 m in the lateral pipe (pushing technology)
- Range up to 120 m in the lateral pipe (water high pressure technology)
- Optional explosion protection certificate
- Manuelle focusing / Fokus area: 1 cm - ∞
- Optional pressure monitoring and location transmitter integrated in the camera

„LINDAUER BIRNE“

- Pan and rotate colour camera with high power LED illumination
- Inspection of branched pipe systems from DN 80 to DN 300
- Camera width 63 mm; camera length 100 mm
- Resolution: 500 (horizontal) x 576 (vertical)
- Lens: 1:1,8
- Automatic iris control
- Manuelle focusing / Fokus area 2 cm - ∞
- Pan range 270° horizontal; Rotate range ∞
- Optional pressure monitoring and location transmitter integrated in the camera

„FHAK TYP „LRB“

- Operating range DN 70 to DN 300
- Camera width 60 mm
- Automatic white balance
- Automatic iris control
- Connection to the tractor is possible
- Axial camera with upright picture control

Further mini cameras with high-resolution electronics as of DN 40 to DN 200 with integrated push rod or cable models upon request.

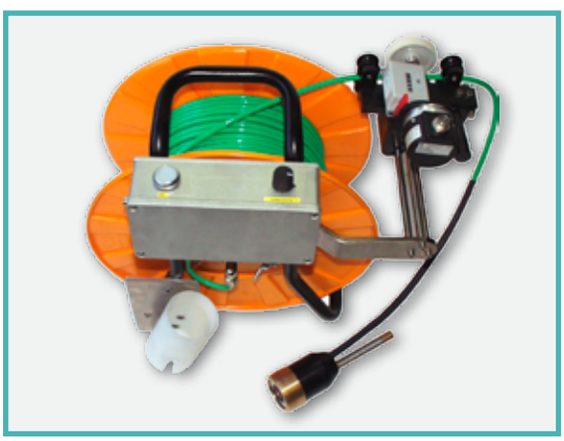
Portabele JT-camera systems for the house and property area:

PORTABLE CAMERA SYSTEM „LINDAUER BIRNE (LB)“ WITH CAMERA TRACTOR „ TURBO 0“

- Operating range: DN 100 to DN 500 with camera cable of 80 to 120 meter
- Applicable with pushing technology and water high pressure technology from DN 80
- Ideal lightning due to high intensity LED illumination
- Automatic iris control; manual focusing
- Focus area: 2 cm - ∞
- Pan range: 270° horizontal and ∞ rotate range
- Optional pressure monitoring and location transmitter integrated in the camera
- Track crawler
- Electronic and manual meter counter
- Camera and tractor control integrated in robust case
- Light intense TFT-monitor
- Additional inspection software for damage registration and documentation

PORTABLE SYSTEM „LINDAUER SCHERE“ WITH ELECTRIC PUSH UNIT OR WITH HIGH PRESSURE CLEANING NOZZLE AND INTEGRATED INSPEC-TION SOFTWARE

- Operating range: DN 100 - bendable up to DN 200
- Inspection up to DN 300
- Ideal lightning, due to high intensity LED illumination
- Automatic iris control; manual focusing
- Focus area: 2 cm - ∞
- Pan range:220° horizontal und ∞ rotade range
- Optional pressure monitoring and location transmitter integrated in the camera
- Electronic and manual meter counter
- Camera and tractor control integrated in robust case
- Light intense TFT-monitor
- Additional inspection software for damage registration and documentation



PORTABLE SYSTEM „LRB“ WITH CABLE DRUM AND POWER SUPPLY

- Connectable monitor and digital recording
- CCD-SMD-technology, upright picture
- Automatic white balance with backlight compensation
- Integrated power supply (230 V), video-out socket
- Lightning control
- Camera Ø 60 mm, camera length approx. 105 mm
- Additional inspection software for damage registration and documentation
- Propulsion with water high pressure or push rods
- Electronic and manual meter counter
- Varying camera housing dimensions, also with positioning option
- Extremely robust, ideal to control the cleaning process

MOBILE PUSHABLE CABLEDRUM „LINDAUER SCHERE“ WITH PUSHING ROD UP TO 50 METERS

- Coiler for push rod with slip rings and connector
- For transportable solution push rod System
- Inclusive path counter and 5 meter connecting cable between control case and coil
- 5,6“ Monitor integrated with 3D-hinged bracket for an additional television picture
- With connector on both sides
- Integrated trip dray
- It is possible to operate in the laydown position in difficult terrain

... SMALL INNOVATIONS AND NEW FEATURES FROM JT

CAMERA FASTENER FOR THE MAINPIPE TRACTOR

- Quick and easy quick release high adjustment
- Massive clamp construction for presetting with quick adjustment for DN 200 to DN 500
- High corrosion resistance due to stainless steel
- Existing JT-systems can be exchanged at any time

CAMERA FASTENER FOR TRACTOR TYP „TURBO 0“

- Quick and easy quick release high adjustment
- Massive clamp construction for presetting with quick adjustment for DN 200 to DN 500
- High corrosion resistance due to stainless steel
- Existing JT-systems can be exchanged at any time
- Pressure monitoring camera

JT-LASER-CIRCULER-PROFILER

- Ideal tool for measuring deformations by using the inspection software
- Operating range DN 200 up to DN 1000 mm
- Mounted on camera JT-RZL-D with integrated spring for optimal insertion into the sewer
- Application in different pipe diameters with screw-CFK-extensions

HAND-HELD CAMERA FOR MANHOLE SEWER

- Hand-held camera with high-resolution objective
- With 3,5“ observer monitor
- Shoulder strap for the comfortable inspection
- Resolution: 650 lines / Picture elements: 570 000 Pixel
- Zoom: 40 x optical/ 12 x digital
- High intensity LED illumination
- Sensivity 0,6 lx
- Automatic iris control; automatic focusing, image stabilizer
- Including headset as voice communication through camera cable between operation cabin and operating personnel
- Adaptable to JT-camera-equipped vehicles with explosion protection certificate
- Inspection depth up to 600 m

PRESSURE CONTROL „LINDAUER SCHERE“

- Upgrade the camera „Lindauer Schere“ with pressure monitoring
- Existing JT-systems can be exchanged at any time
- Visual and acoustical warning device in the operation cabin in case of falling internal pressure
- Improved camera electronics & lightning for perfect inspection results

LEAK-TESTING:

- **Manhole**
- **Separators**
- **Pipe ends**
- **Connections**
- **Sockets**
- **Supply**

ACCORDING TO:

- **DIN EN 1610**
- **DWA-M 143/6**
- **DWA-A 139**
- **DIN EN 805**
- **DIN 1999-100/4040-100**
- **LfW-data sheet 4.3/6**

SETTLING INSPECTION ACCORDING TO DIN 1999-100/4040-100

The high-precision technology for the settling inspection. With the special differential pressure measurement devices the requested exactness will fallen short of 60 % ; i.e. instead of 0,5 mm we measure with a resolution of 0,2 mm (i.e. 0,1 mm for the LSB). Understandably more and more participants in the market decide themselves for this simple and ingenious technology.

CONTROL CASE IN COMPACT QUALITY

- Portable system
- Compact system / clearly arranged
- Compatible with packers of various manufacturers
- Valves for inflation- and test pressure
- Inflation- and test pressure specification
- Measurement electronics with LCD-display
- Pressure sensor also for overpressure test/ vacuum test

TRUCK WITH LEAK-TESTING

- Leak-testing Installed in a truck
- Compact system
- Manual and automatic functions
- Expandable system
- Operation cabin and rear room are optionally designed
- Compatible with packers of various manufacturers

JT-SOFTWARE FOR LEAK-TESTING „DMP 2014“

Our leak-testing software meets all requirements of the current legislation and inspection regulations for testing of sewers, pipes, joints, sockets, sectors and sewer shafts.

- Clear and uncomplicated software structure
- Easy operation, predefined mandatory fields, self-explanatory
- Coloured graphic representation with phases of filling, stabilization, testing and venting

TWINBOND LINER (TbL) SYSTEM– NEW SEWER REPAIR PROCESS

It is an ideal new method to renovate pipes from 100 mm up to 400 mm in diameter. With this system defects such as broken pipes, leaking pipe-joints, root-intrusions as well as defective sideducts can be repaired quickly and cost-effectively.
In contrast to conventional short liner systems the new twinbond liner system uses two different kind of carrier materials. The additional aramid fiber mat is the wearing course layer, the glass fiber mat stabilises and seales the damaged area, which can measure a length up to 250 cm. It is assumed that the examination in accordance with the definitions of the German Institute for Building Technology (Deutsches Institut für Bautechnik - DIBt) will shortly be completed.

ROBOT FOR INSTALLING OPTICAL FIBER CABLE AND CABLE DUCTS IN SEWAGE PIPES

This robot is suitable for all pipe materials. A special drilling tool is cutting a hole with a diameter of 6 mm and a depth of 15 mm into the pipe wall. Afterwards the anchor will be lifted and stuck into the drill hole and the cable will be simultaneously fixed in the top of the sewer pipe.
With a special designed welding tool the anchors and the cable can also be fixed in polyethylene materials.

FastPicture

Control and documentation case

The FastPicture in use

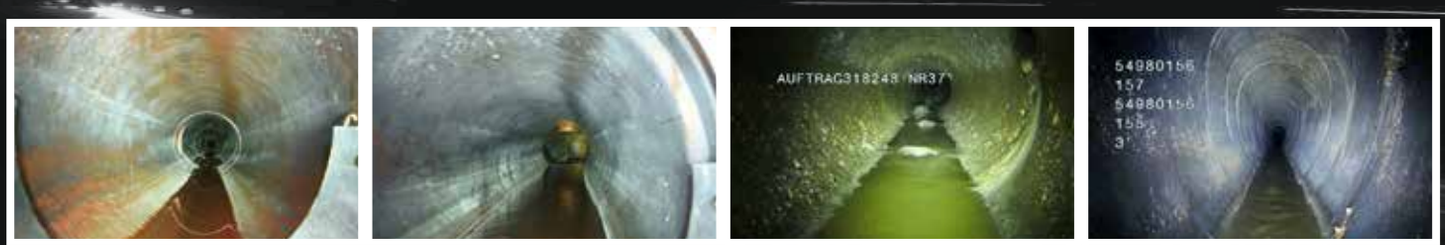
The new FastPicture camera was developed to quickly monitor the condition of the sewer.
Its wide zoom range and high resolution (Full-HD 1920x1080) makes inspection easy. Its efficient LED illumination with a special optical device provides ideal illumination for over 100 m.
The images can be viewed via a high-resolution monitor and saved to an SD card (H.264 compressed) using the optimal recording device.
The camera is installed on a telescopic handle. Its length of up to 8 m allows it to reach very deep sewers. An electric tilting mechanism allows you to configure the position of the camera perfectly.
This camera is the ideal tool to simplify the work of cleaning staff and monitoring before and after cleaning the sewer and make these tasks more efficient.

Arrange a demonstration with no obligation and we will show you our sensational technology.

TECHNISCHE EIGENSCHAFTEN

- FULL HD - camera
- 360 x zoom (30 x optical / 12 x digital)
- Resolution 1920 x 1080
- Sensitivity 1,4 lx
- Manual and automatic focus
- Battery and mains operation power supply
- Integrated power supply and charging device (max. charging time 80 min.)
- Battery life approx. 3 h (changeable battery)
- 10“ Full-HD LCD monitor
- Recording with optional digital recorder (H.264)
- Protection class IP 67
- Telescopic handle 1,95 m - 8,40 m length
- Controlling with keyboard / teleguidance
- Low cross weight
- Optional gas measuring module
- Further equipment and special-purpose solutions

This is what the photo sequence documentation of the handle looks like:

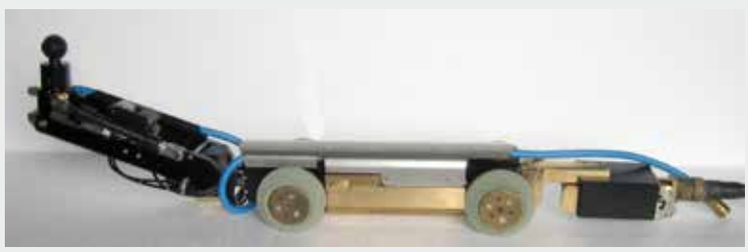


JT-rehabilitation-motor vehicle
7,5 - 26 t

JT-rehabilitation-motor vehicle double-van body with the following options:

- Camera system DN 100 up to DN 2000 mm
- Cutting robot connectable with CCTV control unit
- High pressure water jet with ½“ and ¾“ jet hose
- Compressor and generator
- Large work area for the renovation
- Diverse storage room
- Sanitary installations
- Comfortable common room
- Cable laying robot
- etc.

F130 and F170 Cutter



F130 - Technical Specification

- Dimension 950 x 125 x 125 mm (LxWxH)
- Weight ca. 25 kg
- Operating range DN 150 - DN 300

F170 - Technical Specification

- Dimension 1100 x 130 x 140 mm (LxWxH)
- Weight ca. 35 kg
- Operating range DN 200 (with Inliner) - DN 600

For further information: www.JT-elektronik.de
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