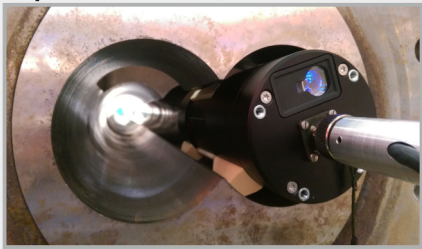
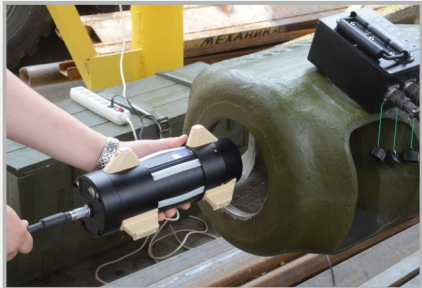




Pipes



Extruders



Barrels

# PROBIUS™

Barrel & Tube Laser Measurement Systems



**D-TEST (Optical Measurement Systems, LLC)** is a global manufacturer and developer of custom laser and optical measurement systems. By sourcing best components from reliable suppliers in USA, South Korea, Japan and Canada our team of professionals is able to manufacture a wide range of unique systems that do not compromise quality and usability over price of production.

Our products allow customers to safely, quickly and effectively analyze objects that were impossible to measure before, improving efficiency and reducing manufacturing costs. Effective production lines, experience engineers allow D-Test to present you a ready-to-use solution in less than 12 weeks!

Our strength lies in our experience and understanding of customer's needs – we are ready to provide a custom solution to the benefit of our clients by closely working together each step from initial idea to the final product.

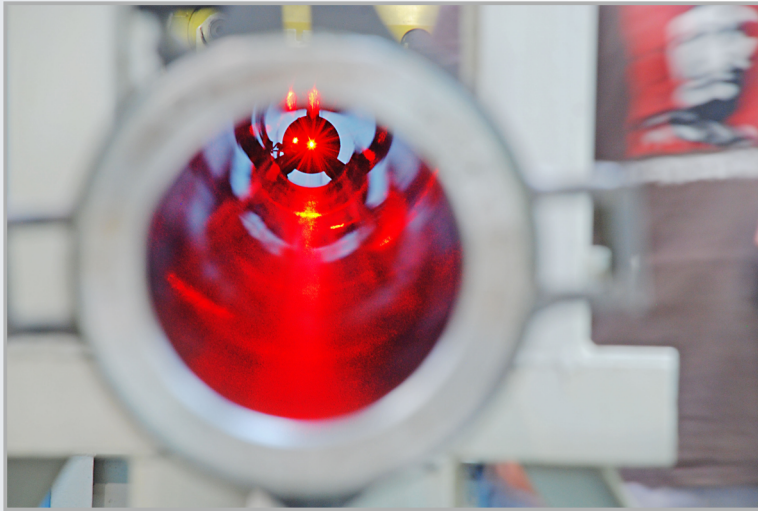
D-Test has a long-standing practice of innovative solutions in measuring equipment for dimensional measurement and inspection constantly researching and producing new hardware and software. Our optical measurement systems find applications in various situations such as: food and plastic extrusion, pipeline, barrel and tube maintenance, generator manufacturing.

Although our business began in Russia we are constantly growing and exporting to many countries. Interested in becoming a distributor in your region – contact us!

**Patent pending applies to all Probius™ products.** Please contact us for more information.

We are committed to best possible standards of quality – **all of our products are ISO 9001:2008 certified.**

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Laser alignment



Probius crawling inside a tube



Inserting Probius into a twin barrel extruder

Our devices are designed to measure inner geometrical dimensions of: tubes, barrels, siphon pipes, stators, bores of any shape etc.

**The Equipment allows to measure:**

- Inner Diameter
- Out-of-roundness
- Non-straightness (Laser bore alignment)
- Deviation of surface form
- Profile geometry
- Rifling profile geometry, angle, deviation and wear
- Condition of coatings, surface and roughness

**The equipment can be used to inspect objects with:**

- Internal diameter from 25 mm to 300 mm  
 Custom made versions for diameters from 7 mm to 25 mm; from 300mm to 6 m;
- Length up to 120 meters
- Any material, any form, any type and quality of surface

**Typical accuracy\***

- Diameter +/- 0.01 mm
- Out-of-roundness +/- 0.01 mm
- Length +/- 0.5 mm
- Profile geometry +/- 0.01 mm
- Non-Straightness (warpage) +/- 0.01 mm

\*) accuracy of standard systems

**Video inspection**

The equipment can include frontal and side video cameras for detection, registration and measuring superficial defects.

**Measurement result**

Measurement result may be presented as a table and a graph (the full 360° cross-sectional profile). The result is also exported in 3D CAD files in order to compare a real object with an ideal model.

**Additional features**

The measurement result can be used for special calculations such as:

- Statistical calculation to determine the trend of geometry changes.
- CNC program recalculation using the results of comparison of CAD model vs. real object

## Video Inspection

With our state of the art video inspection capabilities you can finally see each and every detail of inner surface of objects. Stock configuration of device can be retrofitted with a frontal video camera for a quick search and check of possible defects, and a side camera that allows to check found defects in detail.

Frontal camera is equipped with wide angle lens and resolution of 3-5 Mpix (exact resolution can be chosen as an option).

Custom software allows to output both spherical wide angle image and modified linear image. The latter provides exact dimensions of a defect without distortions caused by wide-angle lens geometry.

Additionally, one can improve the resolution of the picture in a defect area.



## Coating thickness control

Devices can be equipped with a special measuring sensor that allows to inspect the quality of polymer (and other) coatings. The sensor measures coating thickness of products made both from ferromagnetic and from non-ferromagnetic alloys.

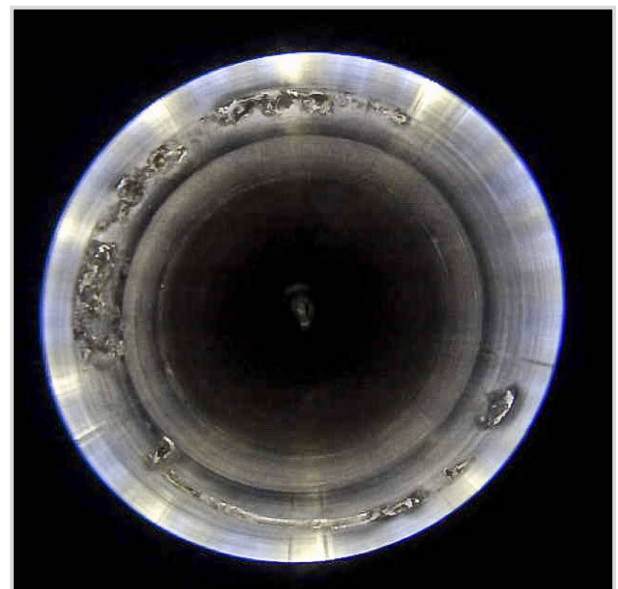
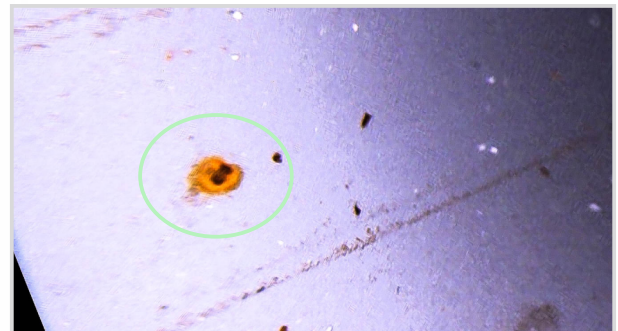
The sensor is built inside the rotating module of the laser scanner. During measuring, the sensor protrudes from the inside of the device towards an inspected surface, touches it and then retracts back.

**Captured images and movies, measured pipe dimensions including coating thickness are stored in a local database with binding to the exact angle and position of the probe.**

Side camera is positioned on the side of a rotating laser scanner and thus suited for better analysis of defects.

The entrance pupil of the side camera, laser scanner and thickness measurement sensor are in the same rotating section. Operating range of laser scanner and thickness measurement sensor is superimposed onto the video feed.

**Using the side camera one can adjust the position of the probe in such a way that the laser scanner and thickness measurement sensor will be located precisely above the discovered defect and then measure the profile of this defect.**





# PROBIUS™ Ultimate

for smooth, profiled and rifled pipes  
wide range of diameter

The instrument is designed for video inspection and laser non-contact measuring and scanning of internal surface of pipes, tubes and barrels.

### The instrument allows to measure:

- Inner diameter;
- Ovality;
- Out-of-roundness;
- Non-straightness (warpage) option\*;
- Probe position in respect to the pipe end;
- Profiling and rifling geometrical dimensions (step, height, width, spherical radius, angles);
- Geometrical dimensions of visible superficial defects;
- **New!** Laser alignment is available as well.

### Accuracy

|                      |          |
|----------------------|----------|
| Inner diameter, mm   | +/- 0,01 |
| Out-of-roundness, mm | +/- 0,01 |
| Ovality, mm          | +/- 0,01 |
| Profile dimensions   |          |
| Profile height, mm   | +/- 0,01 |
| Profile width, mm    | +/- 0,05 |

### The probe consists of

- 3D laser rotating scanner;
- Frontal video channel for inner surface inspection;
- Side video channel for detailed inspection (integrated into the scanner module) (option);
- Laser distance meter which measures the distance from the probe to the pipe end to bind measured results;
- Inclinator;

### Specification

|                          |  |
|--------------------------|--|
| Pipe inner diameter, mm  | from 80 to 100<br>from 100 to 150<br>from 150 to 300 |
| Pipe length, m           | up to 100  |
| Video inspection channel | frontal side   |
| Angle of view            | 180° with distortion elimination                     |
| Scanning principle       | Rotating laser scanner                               |
| Moving principle         | Self-moving probe/telescopic rod                     |
| Data channel             | Wireless hi-speed                                    |
| Battery life, hours      | More than 8  |

Custom made revisions are available on demand.



# PROBIUS™ UNO

## for smooth round pipes



The instrument is designed for measuring of inner diameter (out-of-roundness) and non-straightness (warpage) of smooth round tube, barrels and bores with cylindrical form.

### The instrument allows to measure:

- Inner diameter
- Out-of-roundness
- Non-straightness (warpage)
- Laser bore alignment
- Probe position in respect to the pipe end

### Operating principle

In order to measure or align the pipe, a laser emitter should be placed on one end of the pipe or another object such as splined gear or motor shaft for reference.

A target for the laser beam is placed on the end of the pipe. Adjustment of laser emitter X-Y coordinates makes the laser dot centered on the target.

After that the probe is to be inserted into the tube. All the rest processes are handled automatically after pushing «Start» button. The status of measuring is displayed on the laptop/PC screen. The final report can be printed or stored in a database or in a memory card.

The probe houses:

- 6-channel module that measures inner diameter, out-of-roundness;
- non-straightness channel;
- laser distance channel which measures the distance from the probe to the pipe end to bind measured results.

The probe is wireless, has a battery and connected to a computer via WiFi. All movements of the probe are automatic and operate by software.

### Accuracy

- Non-straightness (warpage) +/- 0.01 mm.
- Diameter (out-of-roundness) +/- 0.01 mm.
- Distance +/- 0.5 mm.
- Non-straightness range +/- 4.5 mm (up to 20 mm).

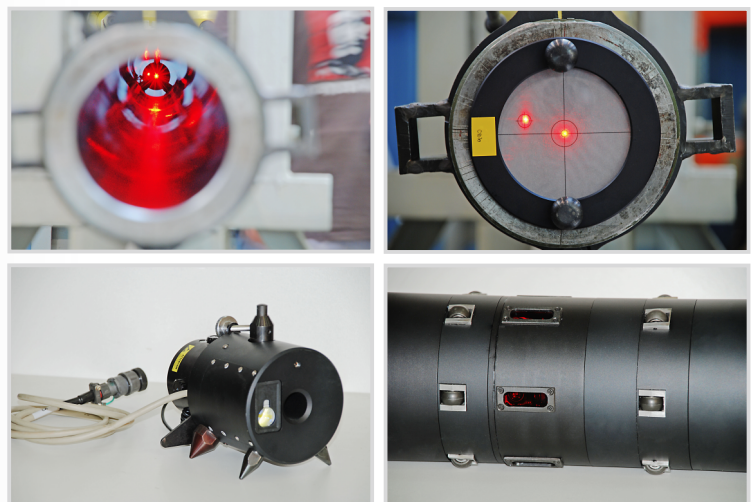
### The instrument contains

- Adjustable laser source;
- Self-moving wireless probe;
- Set of cables and connectors;
- Calibration unit (option);
- Calibration certificate;
- Software and User manual;

### Calibration

The first calibration is done by the manufacturer. All parts of the instrument contain special features for self-diagnostic. However, the operator should do a periodic calibration once a year or more often if it is required.

The instrument includes a special calibration block, which allows to check instrument's accuracy anytime and fixing calibration table if it is necessary. The calibration takes 10-15 minutes. All calibration processes are automatic.





# PROBIUS™ mini

## for small diameter

Stocked version of Probius mini can be used with diameters of 55 mm. Custom version in some cases can be used with 9 mm diameters.

### The instrument allows to measure:

- Inner diameter;
- Ovality;
- Out-of-roundness;
- Non-straightness (warpage) option\*;
- Laser alignment option\*;
- Distance from the pipe end to the instrument inside the pipe;
- Profiling and rifling geometrical dimensions (step, height, width, spherical radius, angles);
- Geometrical dimensions of visible superficial defects;

### Accuracy

|                                |          |
|--------------------------------|----------|
| Non-straightness (warpage), mm | +/- 0,01 |
| Inner diameter, mm             | +/- 0,01 |
| Ovality, mm                    | +/- 0,01 |
| Out-of-roundness, mm           | +/- 0,01 |
| Profile dimensions             |          |
| Profile height                 | +/- 0,01 |
| Profile width                  | +/- 0,05 |

### The probe consists of

- 3D laser rotating scanner;
- Frontal video channel;
- Side video channel for detailed inspection (integrated into the scanner module) (option);
- Non-straightness (warpage) channel (option)\*;
- Laser distance meter which measures the distance from the probe to the pipe end to bind measured results;
- Inclinator;

Alignment and frontal video channel cannot be operated simultaneously. When both options are combined into one device alignment is mounted stationary and frontal video is shipped as a removable module. When both options are required, alignment should be performed first with video module switched afterwards for video feed and data recording.

### Specification

|                          |  |
|--------------------------|--|
| Pipe inner diameter, mm  | from 40 to 80<br>*from 20 available by a request |
| Pipe length, m           | Up to 100  |
| Non-Straightness channel | Frontal  |
| Video inspection channel | Frontal, Side (Option)                           |
| Scanning method          | Rotating laser scanner                           |
| Moving method            | Self-moving probe/telescopic rod                 |
| Data channel             | Wireless hi-speed                                |
| Battery life, hours      | More than 8                                      |





## PROBIUS™ unique Multipurpose custom-made systems

The multipurpose instrument is designed to measure smooth and profiled pipes with various diameters, including conical and multi-conical tubes.

The design of this device has been specially developed in order to cover a wide range of diameters using only one instrument. For this purpose, the centering module has been merged with the movement module and located in the center of the probe.

All measuring sensors, cameras and lights are connected to the movement module. As a result, the instrument measures the whole surface of pipes from the very edge (no need for a pipe-extender or loader).

The quality and functionality of the sensors in this device has been considerably improved and extended in comparison with classic product lineup.

The instrument is built as an interchangeable module kit that can be quickly equipped by any modules and assembled to perform any measurement tasks.

The instrument allows to measure:

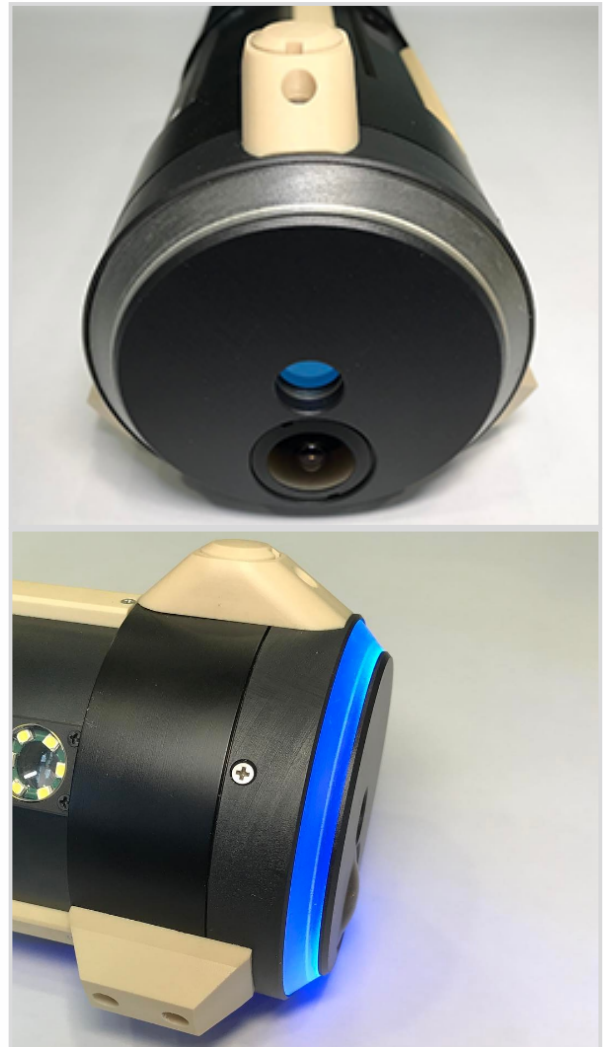
- Inner diameter;
- Ovality;
- Out-of-roundness;
- Non-straightness (warpage) option;
- Laser alignment;
- Probe position in respect to the pipe end;
- Profiling and rifling geometrical dimensions (step, height, width, spherical radius, angles);
- Geometrical dimensions of visible superficial defects;

The probe may consist of

- 2D laser rotating scanner (one or two);
- Six-beam laser diameter sensor (one or two);
- Front channel for non-straightness (warpage) measuring;
- Laser distance meter which measures the distance from the probe to the pipe end to bind measured results;
- Inclinometer
- Front/side video inspection channel (one or two)

### Accuracy

|                                |          |
|--------------------------------|----------|
| Inner diameter, mm             | +/- 0,01 |
| Ovality, mm                    | +/- 0,01 |
| Out-of-roundness, mm           | +/- 0,01 |
| Non-straightness (warpage), mm | +/- 0,01 |
| Profile height, mm             | +/- 0,01 |
| Profile width, mm              | +/- 0,05 |







## PROBIUS™ video simply for video inspection

Stand-alone wireless instrument for video inspection of pipe inner surface and other cylindrical bores and objects.

### The instrument allows to perform:

- Automatic video inspection of pipe inner surface;
- Online HD streaming to the computer/laptop;
- Surface lighting by adjustable LEDs placed under various angles;
- Moving along the pipe autonomously, according to the chosen macro or manually;

### The instrument consists of

- Stand-alone wireless autonomous probe with a frontal camera;
- Detachable battery;
- Battery maintenance module;
- Software;
- Possible options and add-ons:
  - Rotating side video inspection channel;
  - Laser distance meter which measures the distance from the probe to the pipe end to bind photographs (video stream);
  - Inclinator;
  - Extra battery;
  - Video sharing server;

### Specification

|                         |  |
|-------------------------|--|
| Pipe inner diameter, mm | From 40 to 300<br>Or custom made on demand |
| Pipe length, m          | up to 100                                  |
| Straightness channel    | Frontal                                    |
| Viewing angle           | 180° with distortion elimination           |
| Moving method           | Self-moving probe/telescopic rod           |
| Data channel            | Wireless hi-speed                          |
| Battery life, hours     | More than 8                                |

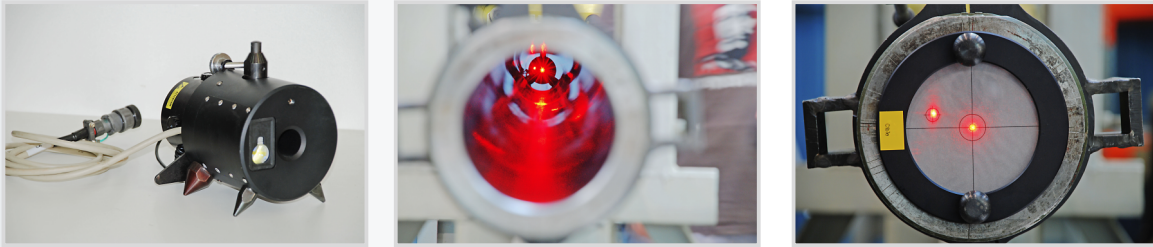
Custom made revisions are available on demand.



## Available options and features

### Non-Straightness channel - Dynamic Form Alignment

The channel allows to measure non-straightness of an object (pipe) at a chosen length (several sections) or along the full length. It consists of highly stable laser source radiated the beam which specifies reference axis, the temporary laser target for rough aiming and high accuracy optical receiver integrated into the probe. By moving through the measured object, the probe copies the geometry of the object and measures at every moment of time the deviation between the reference axis and the inner surface of the object.



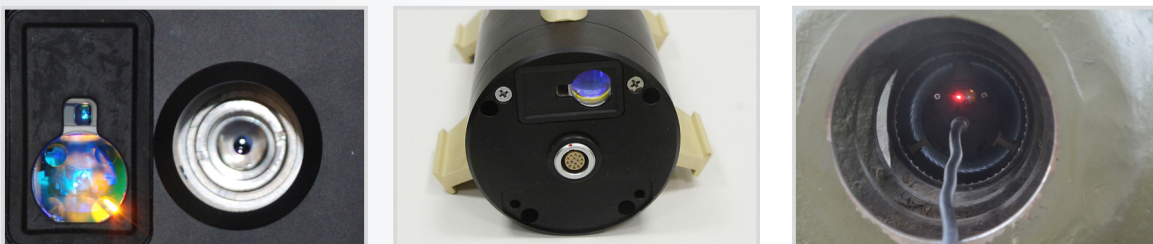
### Video inspection

An instrument can be equipped with one or two video inspection channels: front and/or side channel, installed on a rotating laser-scanning module. The front channel hosts a HD high dynamic range camera with paramorphous ultra wide-angle lens. Integrated software transforms a source image into a linear one, removing all distortions cause by wide-angle optic. Side channel hosts a miniature camera. Each video channel has a multi-section LED lighting. Light intensity can be adjusted in each separate section providing a high quality image in any area and any conditions.



### Pipe length measurement channel

The length (distance) measurement channel is integrated into the back end of a device and allows to measure the distance between the probe and one of the pipe ends. This option is intended to bind all received measurement results to the defined OZ axis with a 0,5 mm precision. An operator can get an exact position of a defect defined with a distance and angle. Additionally, this option allows to measure a pipe length, a length of parts with variable diameter and tapered parts. Also it ensures a possibility to create scenarios for auto inspection and data analysis.



## **Available options and features**

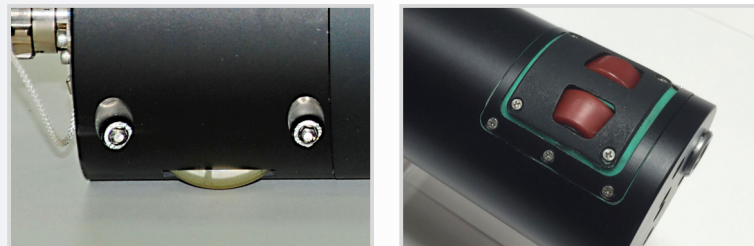
### **Centering modules**

The instrument can use various methods of centering depending on particular application, type of measuring object, quality and profile of surface. As a rule, the probe that measures non-straightness requires more precise centering. In this case, the system of interconnected push-out rolls (wheels) is used. The devices which do not have non-straightness channel are usually equipped with interchangeable polymer sliders that have low friction properties.



### **Probe movement**

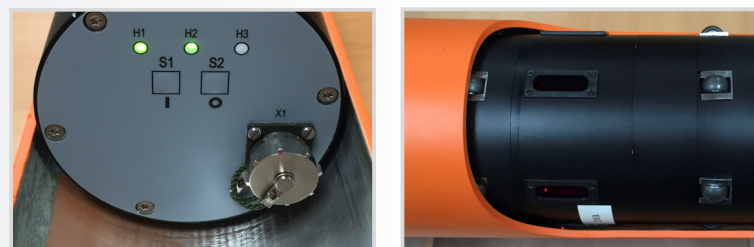
Probes can be equipped with automatic movement modules that include one or more motors with polyurethane-covered rollers (wheels) or can be made for manual movement via a telescopic rod and a semi-hard bearing cable (covered in rigid sheath to prevent damage from friction and bending).



### **Pipe extender (Feeder)**

The design of each device does not allow to measure pipe ends (one or both). The length of immeasurable segments are from 100 to 300 mm. The length of “dead” segments is equal to the distance between the laser scanner and one of the centering modules. The pipe extender is used to cover the unchecked segments and designed as a loading device that is attached to a pipe end allowing to measure from the very edge.

Another solution for covering immeasurable segments is manufacturing of device with a special design where a centering module is placed in the center of the probe and two dual measuring scanners are placed on the sides. Contact your manager to get more information about this solution – we will help to find the best solution for you.



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