The parent company, Scientific and Production Company «RIFTEK» was founded in 1993. The enterprise specializes in development and fabrication of optoelectronic instruments for measuring of geometrical quantities.

The group also includes:
Enterprise «RIFTEK TECHNO» — manufacturing of mechanical parts and components for the parent company, contract manufacturing;
Enterprise «RIFTEK-SMT» — automated assembling of printed circuit boards (PCB), contract manufacturing;
Enterprise «Riftek Russia» — assembly unit in Russia.

The basic product line includes:
- laser triangulation position sensors;
- 2D and 3D laser scanners;
- absolute linear encoders;
- optical micrometers;
- hardware and software system for welding robots;
- specialized systems for measuring dimensions, displacements and distances, thickness, diameter, etc.;
- measurement instruments for railway transport;
- video processing FPGA IP-cores and hardware;
- machine vision systems.

RIFTEK products are delivered in more than 60 countries. Company representative offices operate in 45 countries.

RIFTEK company is certified according to ISO 9001:2015 in the field of management of quality of design and manufacture of optoelectronic instrumentation.

We offer integrated solution to control and automation problems — from sensing devices to multifunctional measuring and control systems.
**LASER TRIANGULATION SENSORS**

**PURPOSE**
Contactless dimensions, surface profile, deformation, vibration measurement, sorting, sensing presence or absence, positional checking, bulk materials and liquids level measurement.

**OPERATION**
Sensor operation is based on the principle of optical triangulation.
Radiation of a semiconductor laser is focused by an objective on an object. The radiation scattered at the object is collected on the CMOS array by the input lens. Object motion causes a corresponding motion of the image. Built-in signal processor calculates the distance to the object according to the light spot image position on the CMOS array.

**MAIN FEATURES**
- Measuring ranges from 2 to 2500 mm
- ±1 um accuracy
- Sampling rate up to 180 kHz
- RS232/RS485/Ethernet/CAN/CANopen +4...-20mA/0...10V/ModbusRTU
- Binocular sensors for laser scanning
- Binary and ASCII data formats
- Sensors with BLUE lasers to control high temperature, mirrored and semitransparent objects
- Sensors with IR lasers
- Mutual synchronization of the sensors (master-slave) for multi-axis measurement tasks
- Service Software for parameter setting and results visualization
- Free SDK and examples for Windows, Linux, NET, MathLAB, LabView

**MODELS**
- RF603 — universal sensors
- RF603HS — high speed sensors
- RF600 / RF6001 — large-base and long range sensors
- RF605 — compact sensors
- RF602 — super compact sensors
- RF607 — high-precision high-speed sensors
- RF609 — laser probes for inner surface control
Sensors for special applications.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output interface</td>
<td>digital or analog</td>
</tr>
<tr>
<td>Synchronization input</td>
<td>2.4 – 5 V (CMOS, TTL)</td>
</tr>
<tr>
<td>Logic output</td>
<td>programmed functions, NPN: 100 mA max; 40 V max for output</td>
</tr>
<tr>
<td>Power supply, V</td>
<td>9 .. 36</td>
</tr>
<tr>
<td>Power consumption, W</td>
<td>1,5 .. 2</td>
</tr>
<tr>
<td>Enclosure rating</td>
<td>IP67 (for the sensors with cable connector only)</td>
</tr>
<tr>
<td>Vibration</td>
<td>20g/10...100Hz, 6 hours, for each of XYZ axes</td>
</tr>
<tr>
<td>Shock</td>
<td>30 g / 6 ms</td>
</tr>
<tr>
<td>Operation temperature, °C</td>
<td>-10...+60, (-30...+60 for the sensors with in-built heater), (-30...+120 for the sensors with in-built heater and air cooling housing)</td>
</tr>
<tr>
<td>Permissible ambient light, lx</td>
<td>&gt;30000</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>5-95% (no condensation)</td>
</tr>
<tr>
<td>Storage temperature, °C</td>
<td>-20...70</td>
</tr>
<tr>
<td>Housing material</td>
<td>aluminum</td>
</tr>
</tbody>
</table>
### SOFTWARE
- Setting sensor parameters
- Receiving, storage, visualization
- Speed and acceleration calculation

### OPTIONS
- Protective housing with air and water cooling
- Custom versions with non-standard base, range or housing shape
- Special version for use in high vibration conditions
- Special flexible cable for robotic applications
- Variants with round and elliptical spot

### LASER TRIANGULATION SENSORS

#### RF603 Series

**SOFTWARE**
- Setting sensor parameters
- Receiving, storage, visualization
- Speed and acceleration calculation

**OPTIONS**
- Protective housing with air and water cooling
- Custom versions with non-standard base, range or housing shape
- Special version for use in high vibration conditions
- Special flexible cable for robotic applications
- Variants with round and elliptical spot

**RF603 Series**

<table>
<thead>
<tr>
<th>RF603-</th>
<th>R·X/4</th>
<th>X/2</th>
<th>X/5</th>
<th>X/10</th>
<th>X/15</th>
<th>X/25</th>
<th>X/30</th>
<th>X/50</th>
<th>X/100</th>
<th>X/250</th>
<th>X/500</th>
<th>X/750</th>
<th>X/1000</th>
<th>X/1250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base distance X, mm</td>
<td>39</td>
<td>15</td>
<td>15</td>
<td>15,25</td>
<td>60</td>
<td>15,30</td>
<td>65</td>
<td>15,45</td>
<td>80</td>
<td>15,55</td>
<td>95</td>
<td>45,65</td>
<td>105</td>
<td>60,90</td>
</tr>
<tr>
<td>Measurement range, mm</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>25</td>
<td>30</td>
<td>50</td>
<td>100</td>
<td>250</td>
<td>500</td>
<td>750</td>
<td>1000</td>
<td>1250</td>
</tr>
<tr>
<td>Linearity, %</td>
<td>±0.05 of the range</td>
<td>±0.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution, %</td>
<td>0.01 of the range (for the digital output only)</td>
<td>0.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature drift</td>
<td>0.02% of the range°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. measurement frequency, Hz</td>
<td>9400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light source</td>
<td>red semiconductor laser, 660 nm wavelength or UV semiconductor laser 405 nm wavelength (BLUE version)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Light source**

<table>
<thead>
<tr>
<th>Light source</th>
<th>RF603</th>
<th>RF603L</th>
<th>RF603P</th>
</tr>
</thead>
<tbody>
<tr>
<td>model</td>
<td>RF603</td>
<td></td>
<td>RF603P</td>
</tr>
<tr>
<td>output power</td>
<td>≤0.2</td>
<td>≤0.95 mW</td>
<td>≤20 mW</td>
</tr>
<tr>
<td>laser safety Class</td>
<td>3B (IEC60825-1)</td>
<td>3B (IEC60825-1)</td>
<td></td>
</tr>
<tr>
<td>model</td>
<td>RF603L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>output power</td>
<td>≤0.95 mW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>laser safety Class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>model</td>
<td>RF603P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>output power</td>
<td>≤20 mW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>laser safety Class</td>
<td>3B (IEC60825-1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Weight (without cable)**

100 g

**Note 1:** RF603-R-39/4 sensor is designed to use with mirror surfaces and glass.

### RF603HS Series

**HIGH SPEED SENSORS**
- Universal high-speed compact laser sensors
- Sampling rate up to 180 kHz
- Available with Red and Blue laser diodes
- Ideal for fast event logging

**Light source**

<table>
<thead>
<tr>
<th>Light source</th>
<th>RF603</th>
<th>RF603L</th>
</tr>
</thead>
<tbody>
<tr>
<td>model</td>
<td>RF603</td>
<td></td>
</tr>
<tr>
<td>output power</td>
<td>≤0.2</td>
<td>≤0.95 mW</td>
</tr>
<tr>
<td>laser safety Class</td>
<td>3B (IEC60825-1)</td>
<td>3B (IEC60825-1)</td>
</tr>
</tbody>
</table>

**Weight (without cable)**

100 g

**Note 1:** RF603-R-39/4 sensor is designed to use with mirror surfaces and glass.
### LASER TRIANGULATION SENSORS

#### RF603HS-

<table>
<thead>
<tr>
<th>X/2</th>
<th>X/5</th>
<th>X/10</th>
<th>X/15</th>
<th>X/25</th>
<th>X/30</th>
<th>X/50</th>
<th>X/100</th>
<th>X/250</th>
<th>X/500</th>
<th>X/750</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>15</td>
<td>15</td>
<td>25</td>
<td>45</td>
<td>5</td>
<td>95</td>
<td>105</td>
<td>140</td>
<td>250</td>
<td>500</td>
</tr>
</tbody>
</table>

#### RF600 Series

- High-precision measurement of the position of remote objects
- High-speed (70 kHz) sensors

#### RF600- X/10 X/30 X/40 X/100 X/250 X/500 X/1000 X/1500 X/2000 X/2500 X/20 X/50

<table>
<thead>
<tr>
<th>Base distance X, mm</th>
<th>230</th>
<th>300</th>
<th>330</th>
<th>500</th>
<th>230</th>
<th>300</th>
<th>1000</th>
<th>230</th>
<th>1300</th>
<th>380</th>
<th>390</th>
<th>410</th>
<th>420</th>
<th>540</th>
<th>535</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range, mm</td>
<td>10</td>
<td>30</td>
<td>40</td>
<td>100</td>
<td>250</td>
<td>500</td>
<td>600</td>
<td>1000</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
<td>2500</td>
<td>20</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Max. measurement frequency</td>
<td>9.4 kHz, 70 kHz</td>
<td>60, 120, 160</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linearity, % of the range</td>
<td>±0.1</td>
<td>±0.2</td>
<td>±0.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution, % of the range</td>
<td>0.01 of the range (digital output only)</td>
<td>0.03</td>
<td>0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature drift</td>
<td>0.02% of the range/°C</td>
<td>0.02% of the range/°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light source</td>
<td>red semiconductor laser, 660 nm wavelength or UV semiconductor laser 405 nm wavelength (BLUE version)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output power</td>
<td>≤4.8 mW</td>
<td>≤20 mW</td>
<td>≤50 mW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (without cable)</td>
<td>350</td>
<td>2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### RF605 Series

- Compact laser sensors

#### RF605- 25/50 45/100 65/250 105/500

<table>
<thead>
<tr>
<th>Base distance X, mm</th>
<th>25</th>
<th>45</th>
<th>65</th>
<th>105</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range, mm</td>
<td>50</td>
<td>100</td>
<td>250</td>
<td>500</td>
</tr>
<tr>
<td>Max. measurement frequency</td>
<td>2000 Hz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linearity, % of the range</td>
<td>±0.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution, % of the range</td>
<td>0.01 (digital output only)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature drift</td>
<td>0.02% of the range/°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light source</td>
<td>red semiconductor laser, 660 nm wavelength</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output power</td>
<td>≤0.95 mW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laser safety Class</td>
<td>2 (IEC60825-1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (without cable)</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

www.riftek.com
SPECIALIZED LASER SENSORS
FOR PAVEMENT PROFILE AND TEXTURE MEASUREMENT

- Accuracy ±0.03% of working range
- Sampling rate up to 70 kHz

<table>
<thead>
<tr>
<th>MODEL</th>
<th>SPECIFIC FEATURES</th>
<th>ASSIGNMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF603P-125/500</td>
<td>high resistance to solar radiation</td>
<td>Pavement profile measurement</td>
</tr>
<tr>
<td>RF603P-245/1000</td>
<td>stable operation on wet surfaces</td>
<td></td>
</tr>
<tr>
<td></td>
<td>70 kHz operating frequency</td>
<td></td>
</tr>
<tr>
<td>RF607-195/500</td>
<td>70 kHz operating frequency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>round laser spot, diameter &lt;1 mm</td>
<td></td>
</tr>
<tr>
<td>RF607-210/230</td>
<td>70 kHz operating frequency</td>
<td></td>
</tr>
<tr>
<td>RF607-230/250</td>
<td>round laser spot, diameter &lt;0.8 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>accuracy ±0.03% of the range</td>
<td></td>
</tr>
<tr>
<td>RF603Ttxt-30/30</td>
<td>reduced triangulation angle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>round laser spot, diameter &lt;60 μm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>simultaneously obtaining profile and image of the surface</td>
<td></td>
</tr>
</tbody>
</table>
Contactless measurement of inner diameter, ovality, coaxiality, cylindricity and shape of holes, tubes, hosepipes, bushes, gun barrels, etc.

The probe is inserted into the hole and probe or sample is driven in rotation. Laser triangulation sensor built in the probe measures the distance to the hole wall synchronously with the rotation angle. The set of the polar surface coordinates allows to calculate the required parameters. Additional linear translation allows to build 3D model of the hole.

<table>
<thead>
<tr>
<th>Parameter (Rt version – sensor with in-built slip ring)</th>
<th>RF609 (609Rt)-9/19</th>
<th>RF609 (609Rt)-16/48</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured diameters, mm</td>
<td>9,2-19</td>
<td>16-48</td>
</tr>
<tr>
<td>Diameter measurement accuracy, µm</td>
<td>±2</td>
<td>±10</td>
</tr>
<tr>
<td>Sensor measurement frequency, Hz</td>
<td>9400</td>
<td></td>
</tr>
<tr>
<td>Rotational speed for Rt version, no more rps</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Laser safety Class</td>
<td>2 (IEC60825-1)</td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>RS232 or RS485 or Ethernet</td>
<td></td>
</tr>
<tr>
<td>Synchronization input: trigger, A-B encoder, V</td>
<td>2,4-24</td>
<td></td>
</tr>
<tr>
<td>Minimal distance to the hole bottom, mm</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Hole depth, mm</td>
<td>by request</td>
<td></td>
</tr>
<tr>
<td>Power supply, V</td>
<td>9-36</td>
<td></td>
</tr>
<tr>
<td>Power consumption, W</td>
<td>1,5-2</td>
<td></td>
</tr>
</tbody>
</table>

* for other measured diameters and hole depth ranges please consult factory

---

RF609-9/19

RF609Rt-9/19
Absolute linear encoders are designed for measuring and checking displacements, dimensions, run-outs, surface profiles and deformations of engineered objects.

- Innovative technology of absolute measurement
- Measuring ranges from 3 to 55 mm
- 0.1 um resolution
- Emulation of incremental encoder signals

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Thickness</th>
<th>Displacement</th>
<th>Runout</th>
<th>Flatness</th>
<th>Deformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>measurement</td>
<td>measurement</td>
<td>measurement</td>
<td>measurement</td>
<td>measurement</td>
<td>measurement</td>
</tr>
</tbody>
</table>

### RF25X Series

<table>
<thead>
<tr>
<th>Model</th>
<th>RF251-3</th>
<th>RF251-25</th>
<th>RF256-15</th>
<th>RF256-35</th>
<th>RF256-55</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range, mm</td>
<td>3</td>
<td>25</td>
<td>15</td>
<td>35</td>
<td>55</td>
</tr>
<tr>
<td>Accuracy (at T=20 °С), um</td>
<td>±2</td>
<td>±3</td>
<td>±3</td>
<td>±3</td>
<td>±3</td>
</tr>
<tr>
<td>Resolution, um</td>
<td>0.1 or 0.5 or 1 or 5 or 10</td>
<td>0...20 mA (&lt;500 Ohm load) or 0...10 V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output interface</td>
<td>digital</td>
<td>RS422</td>
<td>(RS485 or SEI or RS232) and (EncD5 or EncD10 – emulation of quadrature signals of incremental transducers)</td>
<td>digital</td>
<td>(RS485 or SEI or RS232) and (EncD5 or EncD10)</td>
</tr>
<tr>
<td>Synchronization input</td>
<td>no</td>
<td>opto-isolated</td>
<td>two outputs, NPN: 100 mA max; 40 V max</td>
<td>no</td>
<td>two-color LED (red/green)</td>
</tr>
<tr>
<td>Logical outputs</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Logical outputs</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Power supply, V</td>
<td>12 (without analogue output)</td>
<td>15 (with analogue output)</td>
<td>12 (without analogue output)</td>
<td>15 (with analogue output)</td>
<td>15 (with analogue output)</td>
</tr>
<tr>
<td>Power consumption, W</td>
<td>0,75</td>
<td>0,75</td>
<td>0,75</td>
<td>0,75</td>
<td>0,75</td>
</tr>
<tr>
<td>Enclosure rating</td>
<td>IP57</td>
<td>IP57</td>
<td>IP57</td>
<td>IP57</td>
<td>IP57</td>
</tr>
<tr>
<td>Operating temperature, °C</td>
<td>-40...+50</td>
<td>-40...+50</td>
<td>-40...+50</td>
<td>-40...+50</td>
<td>-40...+50</td>
</tr>
<tr>
<td>Weight (without cable), grams</td>
<td>70</td>
<td>110</td>
<td>110</td>
<td>150</td>
<td>180</td>
</tr>
</tbody>
</table>
PURPOSE
Contactless diameter, gaps and technological object position measurement.

WORKING PRINCIPLE
The micrometer operation is based on the so-called ‘shadow’ principle. The micrometer consists of two blocks – transmitter and receiver. Radiation of a semiconductor laser or LED is collimated by a lens. With an object placed in the collimated beam region, shadow image formed is scanned with a photo-detector array. A processor calculates the position (size) of the object from the position of shadow border (borders).

MODELS
RF651 — universal micrometers
RF656 — high-precision micrometers with telecentric optics
RF656XY and RF656.3 — two and three axis micrometers
RF656.2D — 2D optical micrometers
RF659 — edge sensors

MAIN FEATURES
- Measurement range from 5 to 100 mm
- Up to ±0.3 um accuracy
- Up to 10 000 Hz sampling rate
- RS232/RS485/Ethernet/CAN +4...20 mA/0...10V
- Micrometers with telecentric lens
- Mutual synchronization of the sensors (master-slave) for multi-axis measurement tasks
- Service Software for micrometers parameterization
- Free SDK and examples for Windows, Linux, .NET, MathLAB, LabView
- Dual, three and multi axis Micrometers
- Air-knife window protection

RF65X Series
OPTICAL MICROMETERS
CMOS array scans the image
Processor calculates dimension according to shadow position
Laser of LED Class 1
Lens collimates the beam
Windows protection air knife system
Measuring Range
RF651 — universal micrometers
RF656 — high-precision micrometers with telecentric optics
RF656XY and RF656.3 — two and three axis micrometers
RF656.2D — 2D optical micrometers
RF659 — edge sensors

FREE SDK & EXEMPLARS FOR
w w w . r i f t e k . c o m
### OPTICAL MICROMETERS

#### RF651-25
- **A, mm**: 51
- **B, mm**: 139
- **C, mm**: 62
- **D, mm**: 25
- **E, mm**: 13
- **F, mm**: 28
- **G, mm**: 42.5
- **H, mm**: 30
- **N, mm**: 30

#### RF651-50
- **A, mm**: 91
- **B, mm**: 120
- **C, mm**: 134
- **D, mm**: 50
- **E, mm**: 20
- **F, mm**: 31
- **G, mm**: 45.5
- **H, mm**: 40
- **N, mm**: 80

#### RF651-75
- **A, mm**: 128
- **B, mm**: 132
- **C, mm**: 132
- **D, mm**: 75
- **E, mm**: 15
- **F, mm**: 31
- **G, mm**: 45.5
- **H, mm**: 40
- **N, mm**: 80

#### RF651-100
- **A, mm**: 165
- **B, mm**: 165
- **C, mm**: 150
- **D, mm**: 98
- **E, mm**: 20
- **F, mm**: 31
- **G, mm**: 45.5
- **H, mm**: 40
- **N, mm**: 80

#### RF656-5
- **A, mm**: 66
- **B, mm**: 50
- **C, mm**: 158
- **D, mm**: 5
- **E, mm**: 14
- **F, mm**: 28
- **G, mm**: 2
- **H, mm**: 30
- **N, mm**: 30

#### RF656-10
- **A, mm**: 72
- **B, mm**: 74
- **C, mm**: 106
- **D, mm**: 25
- **E, mm**: 73
- **F, mm**: 10
- **G, mm**: 63
- **H, mm**: 10
- **N, mm**: 30

#### RF656-50
- **A, mm**: 105
- **B, mm**: 134
- **C, mm**: 110
- **D, mm**: 50
- **E, mm**: 20
- **F, mm**: 150
- **G, mm**: 25
- **H, mm**: 30
- **N, mm**: 60

#### RF656-75
- **A, mm**: 135
- **B, mm**: 148
- **C, mm**: 125
- **D, mm**: 75
- **E, mm**: 17
- **F, mm**: 120
- **G, mm**: 40
- **H, mm**: 40
- **N, mm**: 80

#### RF656-100
- **A, mm**: 175
- **B, mm**: 170
- **C, mm**: 150
- **D, mm**: 98
- **E, mm**: 20
- **F, mm**: 300
- **G, mm**: 50
- **H, mm**: 40
- **N, mm**: 80

---

**RF65X-**

<table>
<thead>
<tr>
<th>Measurement range, mm</th>
<th>RF651-25</th>
<th>RF651-50</th>
<th>RF651-75</th>
<th>RF651-100</th>
<th>RF656-5</th>
<th>RF656-10</th>
<th>RF656-25</th>
<th>RF656-50</th>
<th>RF656-75</th>
<th>RF656-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>±1x5</td>
<td>±3x10</td>
<td>±5x25</td>
<td>±7x50</td>
<td>±10x100</td>
<td>±0.5</td>
<td>±1</td>
<td>±1.5</td>
<td>±2</td>
<td>±0.25</td>
<td>±0.5</td>
</tr>
<tr>
<td>Minimum size of the object, mm</td>
<td>0.5</td>
<td>1</td>
<td>1.5</td>
<td>2</td>
<td>0.05 (0.1)</td>
<td>0.1 (0.2)</td>
<td>0.25 (0.5)</td>
<td>0.5 (1)</td>
<td>0.75 (1.5)</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Accuracy, μm</td>
<td>±5</td>
<td>±10</td>
<td>±15</td>
<td>±20</td>
<td>±0.3</td>
<td>±0.5</td>
<td>±1</td>
<td>±2</td>
<td>±3</td>
<td>±5</td>
</tr>
<tr>
<td>Measurement frequency, Hz</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td></td>
</tr>
</tbody>
</table>

**RF656 TWO AND TREE AXIS MICROMETERS. TWIN MICROMETERS**

The parameters for each axis of the micrometer match to the parameters of the corresponding single-axis micrometer, see Table above.

**RF656XY-5**

**RF656XY-25**

**RF656XY-50**

---

1. Typical data obtained when a knife edge was used to interrupt the beam and distance between transmitter and receiver is equal of two measurement range.
OPTICAL MICROMETERS

RF656 TWO AND TREE AXIS MICROMETERS. TWIN MICROMETERS

RF656XY-75

RF656XY-100

RF656.3-25

RF656TWIN-75

The sensors are intended for non-contact measuring and monitoring the position of the edge (edges) of various objects, such as tapes, plates, substrates, etc.

Parameter | Value
--- | ---
Distance between transmitter and receiver | 30 mm
Measurement range | 7 mm
Accuracy | ±20 um

EDGE AND DIAMETER SENSORS RF659 Series

2D OPTICAL MICROMETERS RF656.2D Series

Measurement of geometrical parameters of complex objects.

SOFTWARE

RF659 Series

Available in 2019
PURPOSE
Non-contact measuring and checking of surface profile, dimensions, deformations, flatness, gaps, volume, 3D models construction.

WORKING PRINCIPLE
Scanner operation is based on the principle of optical triangulation.
Radiation of a semiconductor laser is formed by a lens in a line and projected to an object. Radiation scattered from the object is collected by the lens and directed to a two-dimensional CMOS image sensor. The image of object outline thus formed is analyzed by a signal processor, which calculates the distance to the object (Z-coordinate) for each point of the set along the laser line on the object (X-coordinate). Scanners are characterized by base distance (beginning of the range), SMR, for Z-coordinate, measuring range (MR) for Z-coordinate, measuring range for X-coordinate at the beginning of Z (Xsmr) and measuring range for X-coordinate at the end of Z (Xemr).

MODELS
- RF627 — universal high-speed scanners
- RF627Weld — scanners for welding robots
- RF627AVIKScan — weld inspections scanners
- RF627Smart — scanners with in-built measurement functions (from September 2019)
- RF629 — ultra-fast scanners, up to 50000 profiles/s (from September 2019)

MAIN FEATURES
- Measuring ranges from 10 to 1100 mm
- 0.05% linearity
- Sampling rate up to 6800 profiles/s
- Scanners with RED, BLUE and IR lasers
- Laser Safety Class 2M
- Binocular scanners
- Trigger and encoder synchronization, mutual synchronization
- WEB-interface
- Free SDK and examples for Windows, Linux, .NET, MathLAB, LabView
- Specialized scanners for hole control
OPTIONS

- Cooling plate with air-knife and air/water cooling
- Customized versions with non-standard base, range and housing shape
- Special version for use in vacuum conditions
- Special flexible cable for robotic applications

### RF627 Series

#### LASER SCANNERS

**Setting sensor parameters**

**Data receiving, storage, visualization**

**SOFTWARE OPTIONS**

- Cooling plate with air-knife and air/water cooling
- Customized versions with non-standard base, range and housing shape
- Special version for use in vacuum conditions
- Special flexible cable for robotic applications

<table>
<thead>
<tr>
<th>Model</th>
<th>MR, mm</th>
<th>SMR, mm</th>
<th>EMR, mm</th>
<th>Xsmr, mm</th>
<th>Xemr, mm</th>
<th>Size, mm</th>
<th>Weight, g</th>
</tr>
</thead>
<tbody>
<tr>
<td>25/10-8/11</td>
<td>10</td>
<td>25</td>
<td>35</td>
<td>8</td>
<td>11</td>
<td>Fig. 1</td>
<td>0.37</td>
</tr>
<tr>
<td>65/25-20/22</td>
<td>25</td>
<td>65</td>
<td>90</td>
<td>20</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75/50-30/41</td>
<td>50</td>
<td>75</td>
<td>125</td>
<td>30</td>
<td>41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70/100-48/82</td>
<td>100</td>
<td>70</td>
<td>170</td>
<td>48</td>
<td>82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70/70-58/122</td>
<td>150</td>
<td>70</td>
<td>220</td>
<td>58</td>
<td>122</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95/150-53/106</td>
<td>150</td>
<td>95</td>
<td>245</td>
<td>53</td>
<td>106</td>
<td></td>
<td></td>
</tr>
<tr>
<td>82/200-60/150</td>
<td>200</td>
<td>82</td>
<td>282</td>
<td>60</td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90/250-65/180</td>
<td>250</td>
<td>90</td>
<td>340</td>
<td>65</td>
<td>180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>180/250-170/278</td>
<td>250</td>
<td>180</td>
<td>430</td>
<td>170</td>
<td>278</td>
<td>L=326</td>
<td>2</td>
</tr>
<tr>
<td>190/300-160/350</td>
<td>300</td>
<td>190</td>
<td>490</td>
<td>160</td>
<td>300</td>
<td>L=283</td>
<td>1,9</td>
</tr>
<tr>
<td>220/300-203/330</td>
<td>300</td>
<td>220</td>
<td>520</td>
<td>203</td>
<td>330</td>
<td>L=374</td>
<td>2,1</td>
</tr>
<tr>
<td>260/400-210/400</td>
<td>400</td>
<td>260</td>
<td>660</td>
<td>210</td>
<td>400</td>
<td>L=350</td>
<td>2,2</td>
</tr>
<tr>
<td>325/500-268/500</td>
<td>500</td>
<td>325</td>
<td>825</td>
<td>268</td>
<td>500</td>
<td>L=415</td>
<td>2,3</td>
</tr>
<tr>
<td>400/600-320/600</td>
<td>600</td>
<td>400</td>
<td>1000</td>
<td>320</td>
<td>600</td>
<td>L=490</td>
<td>2,4</td>
</tr>
<tr>
<td>475/700-374/700</td>
<td>700</td>
<td>475</td>
<td>1175</td>
<td>374</td>
<td>700</td>
<td>L=558</td>
<td>2,5</td>
</tr>
<tr>
<td>545/800-425/800</td>
<td>800</td>
<td>545</td>
<td>1345</td>
<td>425</td>
<td>800</td>
<td>L=627</td>
<td>2,6</td>
</tr>
<tr>
<td>615/900-480/900</td>
<td>900</td>
<td>615</td>
<td>1515</td>
<td>480</td>
<td>900</td>
<td>L=696</td>
<td>2,7</td>
</tr>
<tr>
<td>690/1000-535/1000</td>
<td>1000</td>
<td>690</td>
<td>1690</td>
<td>535</td>
<td>1000</td>
<td>L=765</td>
<td>2,8</td>
</tr>
<tr>
<td>620/1165-430/1010</td>
<td>1165</td>
<td>620</td>
<td>1785</td>
<td>430</td>
<td>1010</td>
<td>L=554</td>
<td>2,5</td>
</tr>
</tbody>
</table>

**Overall specifications**

- **Sampling rate, Hz**: Full range: 485 or 938 (DS mode), 5096 or 6800 (DS mode)
- **Linearity Z, %FS**: 0.05 or 0.1 for DS mode
- **Linearity X, %FS**: 0.1
- **Resolution Z, %FS**: 0.01% or 0.02% (DS mode)
- **Resolution X**: 648 or 1296 (programmable value)
- **Environment resistance:**
  - Enclosure rating: IP67
  - Vibration: 20g/10...1000Hz, 6 hours, for each of XYZ axes
  - Shock: 30 g/6 ms
  - Ambient temperature, °C: 0...+40, (-20...+120 for the sensors with in-built heater)
  - Relative humidity: 5-95% (no condensation)
  - Storage temperature, °C: -20...+70
  - Housing/windows material: aluminum/glass

**FIG. 1**

**FIG. 2**

**FIG. 3**

**WEB-INTERFACE**

for scanner parameterization, image and profile visualization

**SOFTWARE**

- Setting sensor parameters
- Data receiving, storage, visualization
LASER SCANNERS

RF627 Series

Figure 1

Figure 2

Figure 3

SPECIALIZED SCANNERS

Rail profile control scanners with high-power (2W) IR laser

Ore volume control scanners with high-power (2W) IR laser

Internal thread control scanners
Laser Scanners RF627Weld Series. Working ranges

<table>
<thead>
<tr>
<th>Laser Scanners RF627Weld Series. Working ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
</tr>
<tr>
<td>65/25-21/25</td>
</tr>
<tr>
<td>70/130-35/86</td>
</tr>
<tr>
<td>90/250-65/180</td>
</tr>
</tbody>
</table>

For the rest parameters see "Overall specifications" in the previous page.

RF627Weld-65/25-21/25 and RF627Weld-90/250-65/180

RF627Weld-70/130-35/86

Connect equipment in accordance with functional diagram:

1. Connection between the scanner and Controller RIFTEK RF017 (or PC) with Riftek Lamia
2. Connection between Controller RIFTEK RF017 (or PC) with Riftek Lamia and the robot controller
3. Connection between the robot and the robot controller

Select Robot Exchange Protocol

<table>
<thead>
<tr>
<th>Srlk P1</th>
<th>Srlk USl</th>
<th>Srlk P2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor xid: 200162</td>
<td>Sensor xid: 200162</td>
<td>Sensor xid: 200162</td>
</tr>
<tr>
<td>Sensor target port: 6003</td>
<td>Sensor target port: 6003</td>
<td>Sensor target port: 6003</td>
</tr>
<tr>
<td>Sensor address: 127.0.0.1</td>
<td>Server port: 6020</td>
<td>Server port: 502</td>
</tr>
<tr>
<td>Sensor port: 204</td>
<td>Timeout, s: 50</td>
<td>Timeout, s: 60</td>
</tr>
<tr>
<td>[Debug log]</td>
<td>[State]</td>
<td>[Debug log]</td>
</tr>
<tr>
<td>[State]</td>
<td>[State]</td>
<td>[State]</td>
</tr>
</tbody>
</table>

Start Working
SPECIALIZED SCANNING SYSTEMS FOR WELDS, WELDED JOINTS AND EDGE PREPARATION

- Integrated in one system:
  - 2D scanner for measurement control automation
  - video camera for visual control automation
- Sampling rate — more than 2000 profiles/s
- Linear parameters measurement error — ±0.05 mm for 100 mm range
- Defect detection (porosity, cracks)
- Real time OK/NOK analysis
- Systems mounted on the robot
- Interchangeable measuring heads with different ranges

<table>
<thead>
<tr>
<th>2D scanner VOF, mm</th>
<th>Z - 120, X - 30...110</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling frequency, profiles/s</td>
<td>&gt;2000</td>
</tr>
<tr>
<td>Measurement accuracy, mm</td>
<td>±0.05</td>
</tr>
<tr>
<td>X resolution, mm</td>
<td>0.025...0.08</td>
</tr>
<tr>
<td>Color camera resolution</td>
<td>1296 х 976</td>
</tr>
<tr>
<td>Camera speed, frames/s</td>
<td>120</td>
</tr>
<tr>
<td>Laser</td>
<td>red (660 nm) or blue (405 нм), Class 2</td>
</tr>
<tr>
<td>Working temperature, °C</td>
<td>-40...50</td>
</tr>
<tr>
<td>Measured parameters</td>
<td>width, height, angles, mismatch, undercut and so on</td>
</tr>
</tbody>
</table>

EDGE PREPARATION CONTROL

MEASUREMENT OF OFFSET, JOINT ANGLE, GAP WIDTH AND ETC.

WELD CONTROL

MEASUREMENT OF WELD HEIGHT AND WIDTH, CUTTING DEPTH, CAMBER AND ETC.

DESIGN

3D VISUALIZATION SOFTWARE
3D Laser Scanning Kit is designed for mounting on any type of CNC machine and intended for non-contact scanning of products and obtaining 3D computer-simulated models.

In the scanning mode, the machine CNC system moves the sensor line-by-line over the item prototype. Thus, XYZ coordinate array for the surface is formed, i.e. a digital prototype model is created which is saved as a point cloud file as well as in a common STL format suitable for subsequent use in CNC.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials to be scanned</td>
<td>any material</td>
</tr>
<tr>
<td>Size of scanning area</td>
<td>arbitrary</td>
</tr>
<tr>
<td>Average scanning speed, points/s</td>
<td>up to 100 000</td>
</tr>
</tbody>
</table>

3D Laser Scanning Kit

3D measuring machine is designed for non-contact measurement of geometrical parameters of objects, specifically sunflower seeds. Laser scanner RF625 Series, that is installed in the machine, scans the objects and identifies it's geometry. As result of scanning we get the parameters of every sunflower seed and their total quantity.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal sampling rate, profiles/sec</td>
<td>250</td>
</tr>
<tr>
<td>Scanning speed, mm/s</td>
<td>100</td>
</tr>
<tr>
<td>Accuracy, um</td>
<td>±150</td>
</tr>
</tbody>
</table>

3D Measurement Machine

3D Measurement Machine was specially developed to measure suspension arm's parameters for automotive industry. Laser scanner RF625 Series, which is installed in the machine, scans the suspension arm, measures and controls its geometrical parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal sampling rate, profiles/sec</td>
<td>250</td>
</tr>
<tr>
<td>Scanning speed, mm/s</td>
<td>50</td>
</tr>
<tr>
<td>Accuracy, % of the range</td>
<td>±0,1</td>
</tr>
</tbody>
</table>

3D Laser Scanning Kit

3D Measurement Machine is specially designed for control of geometric parameters of large diameter pipes. The machine consists of 24 wide-range high speed synchronized laser scanners type RF625-650 located on the outer circumference of the pipe, which makes it possible to inspect full profile of the pipe in the course of manufacture.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipes diameter range, mm</td>
<td>500...1450</td>
</tr>
<tr>
<td>Accuracy, mm</td>
<td>±0,1</td>
</tr>
</tbody>
</table>

Developed together with MARVIE LLC
INNER DIAMETER MEASUREMENT SYSTEMS

Systems are intended for contactless measuring of inner diameter and profiles of gun barrels, cylindrical and taper pipes, progressive cavity stators, turbodrills and so on.

TWO WORKING PRINCIPLES
- Multisensor measurement by stationary laser sensors - RF040 Series
- Inner surface laser scanning by rotating sensors - RF096 Series

SYSTEMS PARAMETERS
- Measured ID – from 6 mm
- Up to several um accuracy
- Up to 32000 measured points on the surface in 2 seconds
- Calculation of ovality and roundness
- Surface defects detection and measurement
- 3D model of inner surface design

SYSTEM STRUCTURE
- Laser measurement module with
  - stationary sensors
  - rotating sensors
- Translation module intended for transportation of measurement module inside the pipe:
  - self propelled
  - any kind of pulling machine
- Software for PC
- Calibration rings

SYSTEM CAN CONTAIN
Centering frame to hold measurement module near pipe axis

OPTIONS
- Pipe straightness measurement module
- Video inspection module
- Wireless connection (Wi-Fi) module

MULTISENSOR MEASUREMENT HEAD

The Multisensor Measurement Module contains up to 6 laser triangulation sensors located circumferentially in one housing at known fixed angles.

The measurement module is inserted into the pipe and moved by translation module to the definite position. Calibrated laser sensors measure distances to the inner surface. Software calculates diameter of the pipe.

Parameter | Value
---|---
6 laser triangulation sensors | 65...115 or by request
Diameter range, mm | 95...195 mm (main range)
160...300 mm (extended range)
Accuracy, % of range | ±0.1

Parameter | Value
---|---
Diameter of the module, mm | 70
Diameter range, mm | 125...132
Accuracy, um | ±2

Developed together with D-Test Company

Parameter | Value
---|---
Six triangulation sensors inside | 65...115 or by request
Barrels straightness measurement accuracy, um | ±5
Self-propelled system for device translation | 125...132
Accuracy, um | ±2
INNER DIAMETER MEASUREMENT SYSTEMS

MULTISENSOR MEASUREMENT MODULE CONTAINS

Laser triangulation sensor 1 (one or several with different measurement range and stand-off distance), mounted on rotating platform 2, which contains motor 3 with electronic driver 4, and rotary encoder 5 coupled to the motor 3. The system also includes a tilt sensor 6, intended for control of inclination of rotating platform during measurement.

OPTIONS

In-built Wi-Fi module 7 is used for communication between the system and PC; the system can be powered from internal batteries 8.

2D laser scanner can be installed instead of points sensor.

The measurement module is inserted into the pipe and moved by pulling machine to the definite position.

Rotating laser sensor scans inner surface of the pipe and the module transmits polar coordinates of the surface (distance from rotation axis, measured by triangulation sensor and a corresponding angle, measured by encoder).

Software uses the set of transmitted coordinates:

- to calculate:
  - ID of measured pipe
  - ovality and roundness
- to find:
  - surface defects
- to design:
  - Full profile in definite section
  - 3D model of the pipe inner surface

WHEEL CENTER BORE INNER DIAMETER MEASURING GAUGE

MODEL RF096-50/70-200-CIb

Non-contact scanning and inner surface geometry measurement of wheel center bore.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotating measurement head with 2 sensors</td>
<td></td>
</tr>
<tr>
<td>ID range, mm</td>
<td>50...70</td>
</tr>
<tr>
<td>ID measurement accuracy, um</td>
<td>±5</td>
</tr>
<tr>
<td>Depth of measurement, mm</td>
<td>200</td>
</tr>
<tr>
<td>Autocalibration</td>
<td></td>
</tr>
</tbody>
</table>

MOBILE LASER SCANNING SYSTEM FOR PIPE DIAMETER CONTROL

- Rotating measurement head with 2 sensors
- Linear scanning along the tube

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID range, mm</td>
<td>146...176</td>
</tr>
<tr>
<td>ID measurement accuracy, um</td>
<td>±10</td>
</tr>
<tr>
<td>Depth of measurement, mm</td>
<td>programmable, up to 70</td>
</tr>
<tr>
<td>Battery power supply</td>
<td></td>
</tr>
<tr>
<td>Built-in Wi-Fi module</td>
<td></td>
</tr>
</tbody>
</table>

LASER SCANNING SYSTEMS FOR PIPE DIAMETER CONTROL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID range, mm</td>
<td>45...55 or by request</td>
</tr>
<tr>
<td>ID measurement accuracy, um</td>
<td>±2</td>
</tr>
</tbody>
</table>
INNER DIAMETER MEASUREMENT SYSTEMS

LEAF SPRING HOLE INNER DIAMETER MEASUREMENT MACHINE

RF096-30/75-120
The machine is designed for contactless scanning and geometrical parameters measurement of the leaf springs holes.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured diameters, mm</td>
<td>30-75</td>
</tr>
<tr>
<td>ID measurement accuracy, mm</td>
<td>±0,04</td>
</tr>
<tr>
<td>Depth of measured hole, mm</td>
<td>120</td>
</tr>
<tr>
<td>Measured parameters</td>
<td>diameter, roundness, conicity, cylindricity</td>
</tr>
</tbody>
</table>

LEAF SPRING HOLE INNER DIAMETER MEASUREMENT MACHINE

RF096-9/16-800
The machine is designed for contactless scanning and geometrical parameters measurement of small diameter pipes.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID measurement range, mm</td>
<td>±5</td>
</tr>
<tr>
<td>Pipe length, mm</td>
<td>Up to 800</td>
</tr>
</tbody>
</table>

LASER DEBRIS INSPECTION SYSTEM

RF096-Insp
The system is intended for non-contact detection of the debris inside the circular grooves of different technological items, for example brake calipers and so on.
The system can be used also for groove seal profiling (seal deformation inspection).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspected grooves diameter range, mm</td>
<td>35-53</td>
</tr>
<tr>
<td>Minimal size of detected debris, mm</td>
<td>0,1x0,1x0,1</td>
</tr>
<tr>
<td>Laser sensor linearity, um</td>
<td>±10</td>
</tr>
<tr>
<td>Depth of measured hole, mm</td>
<td>120</td>
</tr>
<tr>
<td>Inspection time, s</td>
<td>1,2</td>
</tr>
</tbody>
</table>

RF096-35/50-100
The machine is designed for in-line contactless scanning and geometrical parameters measurement of small diameter pipes.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID measurement range, mm</td>
<td>±5</td>
</tr>
<tr>
<td>Pipe length, mm</td>
<td>Up to 100</td>
</tr>
</tbody>
</table>
INNER DIAMETER MEASUREMENT SYSTEMS

PIPE INNER DIAMETER MEASUREMENT MACHINE

MODEL RF096-32/42-100
The machine is designed for contactless scanning and geometrical parameters measurement of inner diameter of pipes, bushes, holes, tubes, and so on.
Application of the machine - large-scale production.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured diameters, mm</td>
<td>32..42</td>
</tr>
<tr>
<td>ID measurement accuracy, um</td>
<td>±5</td>
</tr>
<tr>
<td>Depth of measured hole, mm</td>
<td>≤80</td>
</tr>
<tr>
<td>Measurement cycle (5 sections), s</td>
<td>13</td>
</tr>
</tbody>
</table>

LASER SCANNING SYSTEM FOR METALLURGICAL NOZZLE INNER DIAMETER CONTROL

MODEL RF096_Insp2D-50/140-1000-A
■ 2D rotating laser scanner
■ synchronous linear translation
■ air cooling system
■ generating of 3D model of inner surface
■ surface defects detection

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured diameters, mm</td>
<td>50...140</td>
</tr>
<tr>
<td>ID measurement accuracy, um</td>
<td>±50</td>
</tr>
<tr>
<td>Minimum size of defects controlled, mm</td>
<td>0,1</td>
</tr>
</tbody>
</table>

ROTATING LASERS SYSTEM FOR GUN BARRELS CONTROL

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

The instrument allows to measure:
■ inner diameter;
■ ovality;
■ out-of-roundness;
■ 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).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
</table>
| Accuracy of:
  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 |
SPECIAL MEASUREMENT SYSTEMS

LAMINATED TUBES GEOMETRY MEASUREMENT SYSTEM

The system is designed for contactless scanning and geometrical parameters (outer and inner diameter, foil thickness, weld width, tube length) measurement of laminated tubes, made of PBL and ABL foil.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured diameters, mm</td>
<td>13...50</td>
</tr>
<tr>
<td>Diameter measurement accuracy, um</td>
<td>±10</td>
</tr>
<tr>
<td>Foil thickness range, mm</td>
<td>0,05...0,5</td>
</tr>
<tr>
<td>Foil and weld thickness measurement accuracy, um</td>
<td>±5</td>
</tr>
<tr>
<td>Tube length measurement accuracy, mm</td>
<td>±0,1</td>
</tr>
<tr>
<td>Interface to PC</td>
<td>Ethernet</td>
</tr>
<tr>
<td>Power supply</td>
<td>220</td>
</tr>
</tbody>
</table>

LASER SYSTEMS FOR SHEET MATERIALS THICKNESS CONTROL

The systems are intended for in-process contactless measurements of thickness of various sheet materials (plastic, metal, rubber).

ADVANTAGES
- Manufacturing process optimization
- Continuous quality monitoring

OPTIONS
- Based on laser triangulation sensors
- Based on laser scanners
- Based on optical micrometers
- Based on laser absolute linear sensors

ONLINE SYSTEMS FOR CONTROL AND REGULATION OF DIAMETER

The systems are designed for non-contact measurement, control and regulation of diameter of technological objects (wire, fiber, hoses, tubes, rods, sausage casings) during their production.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured diameters, mm</td>
<td>0,3...100</td>
</tr>
<tr>
<td>Accuracy, um</td>
<td>±1</td>
</tr>
<tr>
<td>Number controlled sections</td>
<td>up to 6</td>
</tr>
</tbody>
</table>

AUTOMATED SYSTEM FOR MOTOR SHAFTS MEASUREMENT

The system is designed for motor shafts measurement and control.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured diameters, mm</td>
<td>0,1...25</td>
</tr>
<tr>
<td>Accuracy, um</td>
<td>±1</td>
</tr>
<tr>
<td>Carriage movement range, mm</td>
<td>200</td>
</tr>
<tr>
<td>Scanning speed, mm/s</td>
<td>50</td>
</tr>
</tbody>
</table>

WORKING PRINCIPLE
SPEED AND DISTANCE SENSORS

The sensors are intended for automotive and industrial application for precise contactless measurement of speed and length of nearly any moving object.

Designed for use in automobile and railway transport, metallurgy, cable, chemical, pulp and paper, textile and wood industries, in automated control systems, cutting and accounting systems.

**ISD-3 & ISD-5 Series**

**ISD-3**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed range, km/h</td>
<td>0,4 – 200</td>
<td>At TTL out 400 Hz per m/s. Others on request</td>
</tr>
<tr>
<td>Speed accuracy</td>
<td>±0,2 % RMS</td>
<td>Determined on test bench (treadmill) at 18,38 km/h</td>
</tr>
<tr>
<td>Absolute distance accuracy²</td>
<td>±0,2 % RMS</td>
<td>After calibration at ≤ 100 m</td>
</tr>
<tr>
<td>Measuring frequency, Hz</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Nominal distance to the object (tolerance), mm</td>
<td>280 ± 140 (140 – 420) Up to 800 mm on request</td>
<td></td>
</tr>
<tr>
<td>System power supply (tolerance)</td>
<td>12 V nominal (11 – 14,5V)</td>
<td></td>
</tr>
<tr>
<td>System power consumption, Wt</td>
<td>Sensor head: 10 W Processor unit: 5 W</td>
<td></td>
</tr>
<tr>
<td>Sensor head operation temperature range, °C</td>
<td>-20 to +50</td>
<td></td>
</tr>
<tr>
<td>Weight of the sensor + mounting bracket, g</td>
<td>280 + 120</td>
<td>Without cable</td>
</tr>
<tr>
<td>Weight of the processor unit, g</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Sensor dimensions, mm</td>
<td>Ø55 x 205 + illuminator</td>
<td></td>
</tr>
<tr>
<td>Processor unit dimensions, mm</td>
<td>120x100x35</td>
<td></td>
</tr>
<tr>
<td>Sensor cable length, m</td>
<td>2,5</td>
<td>Up to 10 m on request</td>
</tr>
<tr>
<td>System power cable length, m</td>
<td>2</td>
<td>Up to 10 m on request</td>
</tr>
<tr>
<td>Environmental sensor head protection</td>
<td>IP67</td>
<td></td>
</tr>
<tr>
<td>Magnetic fixing tool</td>
<td>4 magnets x 16 kg strength</td>
<td></td>
</tr>
<tr>
<td>Output signal</td>
<td>TTL (SMOS) 0 – 5 V, meander type, 400 Hz per m/s (=400 pulses/m) Others on request</td>
<td></td>
</tr>
</tbody>
</table>

**ISD-5**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>ISD-5 Standard</th>
<th>ISD-5 Mini</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed range, m/s</td>
<td>0,02 - 20</td>
<td>0,005 - 5</td>
<td>Typical values. The less nominal working distance the less min and max speed range</td>
</tr>
<tr>
<td>Speed accuracy*, % RMS</td>
<td>±0,07 ±0,02</td>
<td>±0,15 ±0,05</td>
<td>No signal averaging. With averaging 0,2 - 0,3 s, at V &gt; 1 m/s</td>
</tr>
<tr>
<td>Length accuracy*, % RMS</td>
<td>&lt;±0,05</td>
<td>&lt;±0,1</td>
<td>While pre-calibration for path lengths &gt; 2 m</td>
</tr>
<tr>
<td>Measuring frequency, Hz</td>
<td>16 - 54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal distance to the object (tolerance), cm</td>
<td>10, 20, 30, 50, 75, 100</td>
<td>10, 15, 20</td>
<td>Could be noted at ordering</td>
</tr>
<tr>
<td>Distance tolerance</td>
<td>±0,20-25% of nominal</td>
<td></td>
<td>Depends on the surface (on the edge of the range signal decreased)</td>
</tr>
<tr>
<td>Emitter type, mW</td>
<td>Visible or IR c.v. lasers 5 – 120</td>
<td>Visible c.v. lasers &lt;5</td>
<td>class 3B – 3R</td>
</tr>
<tr>
<td>Power supply, V</td>
<td>12 (8 – 14)</td>
<td>70</td>
<td>Internal linear voltage regulators +5 V in sensor and controller unit</td>
</tr>
<tr>
<td>Power consumption, Wt: Sensor</td>
<td>0,5 - 2</td>
<td>0,5</td>
<td></td>
</tr>
<tr>
<td>Controller unit</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature working range, °C</td>
<td>+15…+50</td>
<td></td>
<td>-10…+50 – with active thermostabilization option): -50…+80°C with protective air cooling housing (option)</td>
</tr>
<tr>
<td>Sensor weight, g</td>
<td>320</td>
<td>70</td>
<td>Without connector, blend and fixing holes</td>
</tr>
<tr>
<td>Sensor size, mm</td>
<td>85x79x46</td>
<td>58x43x30</td>
<td>Standard cable RS-232 or VGA with DB9 connectors are used. To extend a length it is possible to connect cables sequential</td>
</tr>
<tr>
<td>Cable length from sensor to controller unit, V</td>
<td>1,8 or 3</td>
<td>1,8 or 3</td>
<td></td>
</tr>
<tr>
<td>Sensor environmental protection</td>
<td>IP67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controller unit:</td>
<td>Dimenssions, mm</td>
<td>120x100x35</td>
<td></td>
</tr>
<tr>
<td>Weight, g</td>
<td>350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog out:</td>
<td>Length, 2000 pulses/m (=speed 2000 Hz/m/s), meander 0 – 3 V, TTL compatible, up to 200 KHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency out:</td>
<td>Ethernet (UDP protocol)</td>
<td>Others on request</td>
<td></td>
</tr>
<tr>
<td>Digital out:</td>
<td>Stable, =½ of measuring time, without averaging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical data latency at measurement freq, ms</td>
<td>54 Hz 16 Hz</td>
<td>9 31</td>
<td>Custom software by request are possible</td>
</tr>
<tr>
<td><strong>Base Software</strong></td>
<td>- Program to read data via Ethernet, visualization and saving data, - Program for sensor diagnostics, - Read data example (LabVIEW 8.2.1 and higher), - Dynamic library (DLL) to read data via Ethernet, - Sensor parameters configuration via any Internet browser</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MEASUREMENT INSTRUMENTS FOR RAILWAY TRANSPORT

RAILWAY WHEEL PROFILE GAUGE

IKP Series

The laser profilometer is designed for measuring

- flange thickness, slope and height, rim/tire thickness,
- full profile scanning and analyze of wheel rolling surface,
- maintaining of electronic wear data base,
- control of tolerances and sorting in the course of checkup, examination, repair and formation of railway wheel sets.

The device is supplied with database and software package for wheel sets wear data storage and processing.

Measurements are made directly on rolling stock without wheel set roll-out.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range flange height, mm</td>
<td>20…45</td>
</tr>
<tr>
<td>- flange thickness, mm</td>
<td>20…50</td>
</tr>
<tr>
<td>- flange slope, mm</td>
<td>1…15</td>
</tr>
<tr>
<td>- rim thickness, mm</td>
<td>36…100 (30…90)</td>
</tr>
<tr>
<td>- diameter (calculation method), mm</td>
<td>400…1400</td>
</tr>
<tr>
<td>Measurement error flange height, mm</td>
<td>± 0,03</td>
</tr>
<tr>
<td>- flange thickness, mm</td>
<td>± 0,03</td>
</tr>
<tr>
<td>- flange slope, mm</td>
<td>± 0,1</td>
</tr>
<tr>
<td>- rim thickness, mm</td>
<td>± 0,1</td>
</tr>
<tr>
<td>- diameter, mm</td>
<td>± 0,3</td>
</tr>
<tr>
<td>Discreteness of indication all parameters, mm</td>
<td>0,01</td>
</tr>
<tr>
<td>Profile measurement range, mm</td>
<td>145</td>
</tr>
<tr>
<td>Discreteness of the profile formation, not worse than, mm</td>
<td>0,025 (5800 points for profile)</td>
</tr>
<tr>
<td>Measurement time, s</td>
<td>adaptive, depending on surface quality, 4 average</td>
</tr>
<tr>
<td>Power supply (laser scanning module)</td>
<td>3,7V, Li-ion rechargeable battery 5400mAh for standard IKP and 2400mAh for Short and SShort</td>
</tr>
<tr>
<td>The number of measurements that can be taken before battery recharge is not less than</td>
<td>5000 for standard IKP and 2200 for Short and Super-short</td>
</tr>
<tr>
<td>Laser module battery life time</td>
<td>5 million measurement cycles</td>
</tr>
<tr>
<td>Power supply (PDA)</td>
<td>3,7V Li-polymer battery 3300mAh</td>
</tr>
<tr>
<td>PDA memory capacity</td>
<td>100 000 measurements</td>
</tr>
<tr>
<td>Interface between laser scanning module and PDA</td>
<td>Bluetooth</td>
</tr>
<tr>
<td>Working temperature range, °C</td>
<td>-20...+50</td>
</tr>
<tr>
<td>Enclosure rating</td>
<td>IP42 or IP64</td>
</tr>
</tbody>
</table>

PDA is intended for control of the laser scanning module, data reception from the scanning module, indication of measurement result, parameter input and data storage.

Operator mounts the laser scanning module onto the wheel to be measured. Having received a command from PDA or PC, the laser module performs non-contact scanning of the wheel surface.

MAIN FEATURES

- User-Friendly Interface;
- Flexible setting of measured Parameters of the Wheel Flange;
- The list of Calculated Parameters:
  - Flange Height, Thickness and Slope,
  - Wear parameters (Vertical, Horizontal and Angular Wear, Hollow, Difference of Diameters, Even/Uneven Wear),
  - Angular Profile Parameters,
  - Rim Width and Thickness,
  - Wheel Diameter,
  - Wheel Defects (Slides and Cavities),
  - Special Flange Parameters of the Tram Wheel and etc.;
- Setting of displayed Identification Parameters of the Wheelset. I.e., you can select only required parameters (number, series, operator, mileage, and etc.) for displaying on the screen;
- Simple Calibration Procedure: it performs automatically by clicking one button;
- The possibility to compare several Saved Profiles;
- The possibility to align Measured Profile manually (by buttons) relative to the reference with saving;
- Possibility to save several Bluetooth-devices in the PDA memory and then to select the required one from the list. I.e. You save addresses of several IKP and after that you need only to select the required one from the list without a necessity of searching procedure (the same is for IMR and IDK);
- Possibility to connect PDA to PC as an External Storage Device (alternative of ActiveSync).
Electronic gauge is designed for measuring wheel rolling circle diameter. Measurements are made directly on rolling stock without wheel set roll-out. The measurement of the diameter is performed according to the “three points” technique, without the complete wheel coverage.

The gauge contains numeric display to show the value of the wheel diameter. IDK-BT gauge contains Bluetooth interface for transfer results into wheel-set wear database management system.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range, mm</td>
<td>400…1400 or on request</td>
</tr>
<tr>
<td>Measurement error, mm</td>
<td>±0.2</td>
</tr>
<tr>
<td>Indication discreteness, mm</td>
<td>0.1mm, 0.01mm * or 0.01 inch **</td>
</tr>
<tr>
<td>Position of measurement, S, mm</td>
<td>On request</td>
</tr>
<tr>
<td>Distance between axes of ball bearings (base), mm and diameters measurement range, mm</td>
<td>122±0.5 (400…750 mm) or 200±0.5 (400…950 mm) or 250±0.5 (600…1400 mm) or 300±0.5 (720…1400 mm)</td>
</tr>
<tr>
<td>Display</td>
<td>build-in, LED</td>
</tr>
<tr>
<td>Operating temperature, °C</td>
<td>-15…+55</td>
</tr>
<tr>
<td>Power supply</td>
<td>rechargeable battery 2 x AAA 1.2V</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>0.5</td>
</tr>
<tr>
<td>The number of measurements that can be taken before battery recharge is not less than</td>
<td>1000</td>
</tr>
</tbody>
</table>

Special models of IKP-5 and IDK are designed especially for measurement of wheels with restricted space for device placement (tramway wheels):

- Laser Wheel Profile Gauge model **IKP-5-short** (Fig. A) with a shortened handle,
- Laser Wheel Profile Gauge model **IKP-5-Super short** (Fig. B) version for Ansaldo Breda low floor trams,
- Wheel Diameter Measurement Gauge model **IDK-compact** (Fig. C) with the measurement base (distance between ball supports) of the gauge 122 mm and diameter measurement range - 400…750 mm.

The device consists of frame for device placement on the rails and laser measurement head placed with possibility of linear translation. The measurements are carried out automatically. The measurement result is rails transfer profile.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range, mm</td>
<td>600</td>
</tr>
<tr>
<td>Measurement error, mm</td>
<td>±0.1</td>
</tr>
</tbody>
</table>

**LASER PROFILOMETER FOR RAILROAD RAILS AND SWITCHERS**
Electronic gauge is designed for measuring back-to-back distance of railway, metro and tram wheels in the course of checkup, examination, repair and formation of wheel sets. The method of measurement is based on direct measurement the distance by contactless laser sensor. Measurements are made directly on rolling stock without wheel set roll-out.

**Back-to-back Distance Measuring Gauges**

**IMR Series**

- **Parameter**: Measurement range, mm  
  - Value: \( \pm 25 (L - \text{nominal distance}) \)
- **Parameter**: Measurement error, mm  
  - Value: \( \pm 0.1 \)
- **Parameter**: Indication discreteness  
  - Value: 0.1 mm, or 0.01 inch **
- **Parameter**: Display  
  - Value: build-in, LED
- **Parameter**: Operating temperature, °C  
  - Value: -15...+50
- **Parameter**: Weigh, kg  
  - Value: 1
- **Parameter**: Dimensions, mm  
  - Value: D+137х30х124
- **Parameter**: Power supply  
  - Value: rechargeable batteries 2хAAA, 1.2V

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range, mm</td>
<td>( \pm 25 (L - \text{nominal distance}) )</td>
</tr>
<tr>
<td>Measurement error, mm</td>
<td>( \pm 0.1 )</td>
</tr>
<tr>
<td>Indication discreteness</td>
<td>0.1 mm, or 0.01 inch **</td>
</tr>
<tr>
<td>Display</td>
<td>build-in, LED</td>
</tr>
<tr>
<td>Operating temperature, °C</td>
<td>-15...+50</td>
</tr>
<tr>
<td>Weigh, kg</td>
<td>1</td>
</tr>
<tr>
<td>Dimensions, mm</td>
<td>D+137х30х124</td>
</tr>
<tr>
<td>Power supply</td>
<td>rechargeable batteries 2хAAA, 1.2V</td>
</tr>
</tbody>
</table>

**IMR-L Series**

- **Parameter**: Measurement range, mm  
  - Value: \( 1360...1440 \) or on request \((\text{nominal distance} \pm 15\text{mm})\)
- **Parameter**: Measurement error, mm  
  - Value: \( \pm 0.3 \)
- **Parameter**: Indication discreteness  
  - Value: 0.1 mm, 0.01 mm * or 0.01 inch
- **Parameter**: Display  
  - Value: build-in, LED
- **Parameter**: Operating temperature, °C  
  - Value: -15...+50
- **Parameter**: Weigh, kg  
  - Value: 0.85
- **Parameter**: Dimensions, mm  
  - Value: 234,2x87,7x32
- **Parameter**: Power supply  
  - Value: rechargeable batteries 4 х AA 1.2V
- **Parameter**: Connection to PC  
  - Value: Bluetooth

**Disk Brakes Profile Gauge**

- **Parameter**: Measurement range, mm  
  - Value: 30
- **Parameter**: Profile measurement range, mm  
  - Value: 150
- **Parameter**: Measurement error  
  - Value: \( \pm 0.03 \)
- **Parameter**: Discreteness of indication, mm  
  - Value: 0.01
- **Parameter**: Discreteness of the profile formation, not worse than, mm  
  - Value: 0.1
- **Parameter**: Power supply, laser module  
  - Value: 3,7 Li-ion rechargeable battery 6800 mAh
- **Parameter**: Power supply, PDA  
  - Value: 3,7 Li-polymer battery 3300 mAh
- **Parameter**: The number of measurements that can be taken before battery recharge is not less than  
  - Value: 1000
- **Parameter**: PDA memory capacity  
  - Value: 100 000 measurements
- **Parameter**: Interface between laser scanning module and PDA  
  - Value: Bluetooth
- **Parameter**: Working temperature range, °C  
  - Value: -15...+35
- **Parameter**: Enclosure rating  
  - Value: IP42

Profilometer uses non-contact method of registration with a laser sensor and a scanning device.

**Main Functionality**

- obtaining data on the parameters of railway wheel disk brakes working surface;
- full profile scanning and analysis of the working surface of disk brakes;
- visualization of combined graphic images of the actual and new profiles of the wheel brake disks;
- support of the electronic database of profiles.

**IKD Series**

Profilometer for measuring parameters of the disc brakes installed on the wheel.

Profilometer with a bracket for measuring parameters of the disk brakes installed on the wheelset axle.
Portable laser rail profilometer (PRP) is designed for non-contact registration of cross-section of the railhead acting face.

The profilometer uses non-contact method of registration with a laser sensor and a scanning device.

**MAIN FUNCTIONALITY**
- obtaining the information on the cross-section profile of the working railhead surface;
- full profile scanning and analyze of the railhead acting face;
- visualization of the combined graphical images of actual and new crosssection.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railhead vertical wear, mm</td>
<td>-15,0 ... +20,0</td>
</tr>
<tr>
<td>Lateral railhead wear, mm</td>
<td>-15,0 ... +20,0</td>
</tr>
<tr>
<td>Reduced railhead wear, mm</td>
<td>Up to 20,0</td>
</tr>
<tr>
<td>Scanning angle inside the rail track, degrees</td>
<td>108</td>
</tr>
<tr>
<td>Scanning angle outside the rail track, degrees</td>
<td>108</td>
</tr>
<tr>
<td>Measurement error, not more than, mm</td>
<td>±0.03</td>
</tr>
<tr>
<td>Scanning time, sec</td>
<td>10-12</td>
</tr>
<tr>
<td>Digital readout device (PDA) dimensions, mm</td>
<td>112,5x55,5x22,7</td>
</tr>
<tr>
<td>Laser module dimensions, mm</td>
<td>293x230x230</td>
</tr>
<tr>
<td>Power supply, laser module</td>
<td>3,7V, Li-ion battery, 6800mAh</td>
</tr>
<tr>
<td>Power supply, PDA</td>
<td>3,7V, Li-polymer battery, 3300mAh</td>
</tr>
<tr>
<td>The number of measurements that can be taken before battery recharge is not less</td>
<td>500</td>
</tr>
<tr>
<td>PDA memory capacity, no less</td>
<td>100 000 measurements</td>
</tr>
<tr>
<td>Interface to PC</td>
<td>Bluetooth</td>
</tr>
</tbody>
</table>

**AUTOMATIC REAL-TIME SYSTEM FOR MEASUREMENT OF WHEELSETS GEOMETRICAL PARAMETERS**

The system is intended for contactless automatic real-time measurement of geometrical parameters of railway vehicles (locomotives, railcars, subway, trams) and uses combination of 2D laser scanners mounted wayside in the track area and calibrated into one common coordinate system.

Measurement cycle starts when an inductive sensor detects a wheel.

While the wheel passes through the system of synchronized 2D laser scanners its profile is taken at many sections.

All measurement readings for all the wheels are sent through Ethernet to control computer for profiles reconstruction and dimensions calculations.

Finally, all the data are collected in the host depot computer in wheel sets wear database.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel profiles</td>
<td>± 0,1 mm</td>
</tr>
<tr>
<td>Flange height</td>
<td>± 0,1 mm</td>
</tr>
<tr>
<td>Flange width</td>
<td>± 0,1 mm</td>
</tr>
<tr>
<td>Flange angle</td>
<td>± 0,1 mm</td>
</tr>
<tr>
<td>Rim thickness</td>
<td>± 0,1 mm</td>
</tr>
<tr>
<td>Tread width</td>
<td>± 0,1 mm</td>
</tr>
<tr>
<td>Back to back gauge</td>
<td>± 0,05 mm</td>
</tr>
<tr>
<td>Wheel diameter</td>
<td>± 0,2 mm</td>
</tr>
</tbody>
</table>
INDIA  
Paragon Instrumentation Engineers Pvt. Ltd.  
**RAILWAY INSTRUMENTS ONLY**  
200,Station Road,  
Roorkee, 247 667, India  
Tel: +91-1332-272394  
tanuj@paragoninstruments.com  
www.paragoninstruments.com

INDONESIA  
PT. DHAYA BASWARA SANIYASA  
Botanic Junction Blok H-9 NO. 7  
Mega Kebon Jeruk, Joglo  
Jakarta,11610, Indonesia  
Tel: +62 21 29325859  
management@ptdbs.co.id

IRAN  
Novin Industrial Development Grp.  
Tel: +98 21 44022093-6  
Fax: +98 21 43858794  
Mobile: +98 9123207518  
info@novinid.com  
www.novinid.com

ISRAEL  
Nisso Dekalo Import Export LTD  
1 David Hamelech Street  
Herzlia 46661 Israel  
Tel: +972-99577888  
Fax: +972-99568860  
eli@fly-supply.net  
www.fly-supply.net  
www.aircraft-partsupply.com

ITALY  
FAE s.r.l.  
Via Tertulliano, 41  
20137 Milano, Italy  
Tel: +39-02-55187133  
Fax: +39-02-55187399  
fae@fae.it  
www.fae.it

JAPAN  
Tokyo Instruments, Inc.  
6-18-14 Nishikasai, Edogawa-ku,  
Tokyo, 134-0088 Japan  
Tel: +81 3 3686 4711  
Fax: +81 3 3686 0831  
f_kuribayashi@tokyoinst.co.jp  
www.tokyoinst.co.jp

LATVIA  
SIA “SOLARTEX”  
RAILWAY INSTRUMENTS ONLY  
Terbatas street, 5, Riga, Latvia  
Tel: +371 26578640  
solartex@inbox.lv

LUXEMBOURG  
Althen Sensors & Controls BV  
Vlietweg 17a  
2266KA Leidschendam  
The Netherlands  
Tel: 0031-(0)70 392 44 21  
Fax: 0031-(0)70 364 42 49  
sales@althen.nl / info@althen.nl  
www.althensensors.com  
www.althencontrols.com

MALAYSIA  
OptoCom InstruVentures  
H-49-2, Jalan 5, Cosmoplex  
Industrial Park, Bandar Baru Salak Tinggi, Sepang, Malaysia  
Tel: 603 8706 6806  
Fax: 603 8706 6809  
optocom@tm.net.my  
www.optocom.com.my

MONTENEGRO  
RMT Ltd.  
Zahradni 224, 739 21 Paskov  
Tel: +420 558640211  
Fax: +420 558640218  
rmt@rmt.cz  
www.rmt.cz

NETHERLANDS  
Althen Sensors & Controls BV  
Vlietweg 17a  
2266KA Leidschendam  
The Netherlands  
Tel: 0031-(0)70 392 44 21  
Fax: 0031-(0)70 364 42 49  
sales@althen.nl / info@althen.nl  
www.althensensors.com  
www.althencontrols.com

NORWAY  
BLConsult  
Ryssbält 294, 95 291 KALIX, Sweden  
Contactperson: Berndt Lundström  
Tel.: +46 70 663 19 25  
info@blconsult.se  
www.blconsult.se

NORWAY  
Salitec AS  
PB 468,  
N-1327 Lysaker  
Tel.: +47 23 891015  
Fax: +47 92101005  
mail@salitec.no  
www.salitec.no

RUSSIA  
Sensorika-M LLC  
Dmitrovskoe highway 64-4  
127474, Moscow, Russia  
Tel: +7 499 487 0363  
Tel: +7 499 753 3990  
Fax: +7 499 487 7460  
info@sensorika.com  
www.sensorika.com

RUSSIA  
Diesel-test-Komplekt LLC  
Karjennaya St, 16,  
Yekaterinburg, Russia  
Tel: +7 (343) 2227565  
Fax: +7 (343) 2227370  
mail@d-test.net  
www.ru.d-test.ru

RUSSIA  
Холдинг СпецАвтоИнжиниринг  
Electrozavodskaya St, 27  
107023, Moscow, Russia  
Tel: +7 485 225 75 57  
Tel/Fax: +7 495 782 14 21  
mail@sai-holding.ru  
www.sai-holding.ru  
www.spektrksk.ru

RUSSIA  
LLC "ALIANCE"  
Plekhanova St, 4A  
111123, Moscow, Russia  
Tel/Fax: +7 495 741 5915  
info@stankialiance.ru  
www.stankialiance.ru

SOUTH KOREA  
PROSEN. CO., LTD  
M-1001, Songdo techno park IT center, 32, Songdo-gu, Yeonsu-gu, Incheon, 21984,  
Republic of Korea  
Tel: +82-32-811-3457  
Fax: +82-32-745-7248  
trade@prosen.co.kr  
www.prosen.co.kr
SOUTH KOREA
BS Holdings
B-201, Wonpogongwon 1ro,
59 Danwon-gu, Ansan-si, Gyeonggi-do,
15455, Republic of Korea
Tel: +82-31-411-5011
Fax: +82-31-411-5015
bsh5011@hanmail.net
www.lasersolution.co.kr

SPAIN
IBERFLUID Instruments S.A.
C/ Botanica, 122,
08908 L’Hospitalet de Llobregat, Barcelona, Spain
Tel: +34 93 447 10 65
Fax: +34 93 334 05 24
myct@iberfluid.com
www.iberfluid.com

SWITZERLAND
ID&T GmbH
Gewerbestrasse 12/a,
8132 Egg (Zurich), Switzerland
Tel: +41 44 994 92 32
Fax: +41 44 994 92 34
info@idtlaser.com
www.idtlaser.com

SWEDEN
Latronix AB
Propellervagen 10,
183 62 Täby, Sweden
Tel: +46 08-446 48 30
Fax: +46 08-446 48 39
sales@latronix.se
www.latronix.se

THAILAND
Advantech Solution Co., Ltd.
20/170 Motorway Rd.,
Kwang Pravet, Khet Pravet,
Bangkok, Thailand 10250
Tel: +662-1848705
Fax: +662-1848708
sales@advantechsolution.com
bundit.s@advantechsolution.com
www.advantechsolution.com

TURKEY
TEKMA Mühendislik A.Ş.
Cevizli Mh. M. Kemal Cd.,
Hukukçular Towers, A-Blok, No: 66-A/39
Kartal – Istanbul
Tel: +90 216 970 1318
Tel: +90 850 840 2334
info@tekma.eu
www.tekma.eu

UNITED KINGDOM, IRELAND
Ixthus Instrumentation Ltd
The Stables, Williams’ Barns
Tifffield road, Towcester, Northants, UK
Tel: +44 1327 353437
Fax: +44 1327 353564
www.ixthus.co.uk
info@ixthus.co.uk

USA, CANADA, MEXICO
International Electronic Machines Corporation
RAILWAY INSTRUMENTS ONLY
850 River Street
Troy, NY 12180, USA
Tel: +1 518 268 1636
Fax: +1 518 268 1639
railway_marketing@iem.net
www.iem.net

USA, CANADA, MEXICO
Acuity Products of Schmitt Industries, Inc.
2765 NW Nicolai Street
Portland, OR, 97210, USA
Tel: +1-503 227 7908
Fax: +1 503 223 1258
sales@acuitylaser.com
www.acuitylaser.com

SWEDEN
BLConsult
Ryssbalt 294,
95 291 Kalix, Sweden
Mobile: +46 70 663 19 25
info@blconsult.se
www.blconsult.se

UKRAINE
KODA
Frunze st, 22
61002, Harkov, Ukraine
Tel/Fax: +38 057 714 26 54
mail@koda.com.ua
www.koda.com.ua