<table>
<thead>
<tr>
<th>Measurement Type</th>
<th>Instrument Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement and Position Measurement</td>
<td>Gap Measurement</td>
</tr>
<tr>
<td>Thickness and Width Measurement</td>
<td>Profile Measurement</td>
</tr>
<tr>
<td>Outer Diameter and Profile Measurement</td>
<td>Level Measurement</td>
</tr>
<tr>
<td>Inner Diameter and Profile Measurement</td>
<td>2D Measurement</td>
</tr>
<tr>
<td>Vibration and Run-Out Measurement</td>
<td>3D Measurement</td>
</tr>
<tr>
<td>Straightness and Flatness Measurement</td>
<td>Machine Vision Systems</td>
</tr>
</tbody>
</table>

ISO 9001-2015

RIFTEK
Sensors & Instruments

Optoelectronic Instruments and Systems for Geometric Quantities Measurement

Product Catalog 2022
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-Systems» — 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 70 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, RF60x SERIES

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 µm accuracy
- Sampling rate up to 70 kHz
- RS232/RS485/Ethernet/CAN/CANopen +4...20 mA/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, MATLAB, LabVIEW

MODELS
RF603 — universal sensors
RF603HS — high speed sensors
RF600 / RF600HS — sensors with increased base distance and large measurement range. High speed sensors
RF605 — compact sensors
RF602 — super compact sensors
RF607 — high-precision high-speed sensors
RF609 / RF609RT / RF609WI-Fi — laser probes for inner surface control

PARAMETER | VALUE
---|---
Output interface | digital
Synchronization input | 2.4 – 5 V (CMOS, TTL)
Logic output | programmed functions, NPR, 100 mA max; 40 V max for output
Power supply, V | 9...36
Power consumption, W | 1.5..2
Enclosure rating | IP67 (for the sensors with cable connector only)
Vibration | 20g/10...1000Hz, 6 hours, for each of XYZ axes
Shock | 30 g / 6 ms
Operation temperature, °C | -10...+60, (-30...+60 for the sensors with built-in heater), (-30...+120 for the sensors with built-in heater and air cooling housing)
Permissible ambient light, lx | >30000
Relative humidity | 5-95% (no condensation)
Storage temperature, °C | -20...+70
Housing material | aluminum

liquid level | automotive | object | dimensions | thickness | profiling
measurement | industry tests | sorting | measurement | - | -
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 applications

LASER TRIANGULATION SENSORS, RF60x SERIES

RF603 Series

- Universal high-speed compact laser sensors
- Sampling rate up to 70 kHz
- Available with Red and Blue laser diodes
- Ideal for registration of high speed events and vibration measurement

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/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>25, 45</td>
<td>80</td>
<td>35, 55</td>
<td>95</td>
<td>45, 65</td>
<td>105</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>
</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>
</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>
</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>
</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>
</tr>
<tr>
<td>Light source</td>
<td>red semiconductor laser, 660 nm wavelength or UV semiconductor laser 405/450 nm wavelength (BLUE version)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Light source model
- RF603
  - output power ≤0.2 mW ≤3 mW
  - laser safety Class 1
  - RF603L
    - output power ≤0.95 mW
    - laser safety Class 2 (IEC60825-1)
- RF603P
  - output power ≤0.2 mW ≤0.3 mW
  - laser safety Class 3B (IEC60825-1)

Weight (without cable) 100

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

RF603HS Series

- Universal high-speed compact laser sensors
- Sampling rate up to 70 kHz
- Available with Red and Blue laser diodes
- Ideal for registration of high speed events and vibration measurement

www.riftek.com
## LASER TRIANGULATION SENSORS, RF60x SERIES

### RF603HS- Series

<table>
<thead>
<tr>
<th></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>
</tr>
</thead>
<tbody>
<tr>
<td>Base distance X, mm</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>55</td>
<td>65</td>
<td>80</td>
<td>90</td>
<td>105</td>
</tr>
<tr>
<td>Measurement range, mm</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>
</tr>
<tr>
<td>Max. measurement frequency, kHz</td>
<td>70</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, %</td>
<td>±0.1 (70 kHz)</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 (70 kHz)</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>
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<td></td>
<td></td>
</tr>
<tr>
<td>Light source</td>
<td>red semiconductor laser (660 nm wavelength) or blue semiconductor laser (405/450 nm wavelength)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<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>≤80 mW</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>110</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### RF600 Series

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

### RF600 Series

<table>
<thead>
<tr>
<th>RF600-</th>
<th>X/10</th>
<th>X/30</th>
<th>X/40</th>
<th>X/100</th>
<th>X/250</th>
<th>X/500</th>
<th>X/600</th>
<th>X/1000</th>
<th>X/1500</th>
<th>X/2000</th>
<th>X/2500</th>
<th>X/20</th>
<th>X/50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base distance X, mm</td>
<td>230</td>
<td>300</td>
<td>330</td>
<td>500</td>
<td>230</td>
<td>300</td>
<td>1000</td>
<td>230</td>
<td>1300</td>
<td>380</td>
<td>410</td>
<td>420</td>
<td>540</td>
</tr>
<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>1000</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
<td>2500</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Max. measurement frequency</td>
<td>9.4 kHz, 70 kHz</td>
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<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, %</td>
<td>±0.05</td>
<td>±0.1</td>
<td>±0.05</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Resolution, % of the range</td>
<td>0.01 of the range (digital output only)</td>
<td></td>
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</tr>
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<td>0.02% of the range/°C</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Light source</td>
<td>red semiconductor laser, 660 nm wavelength or UV semiconductor laser 405/450 nm wavelength (BLUE version)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output power</td>
<td>≤4.8 mW</td>
<td>≤80 mW</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>Laser safety Class</td>
<td>3R (IEC60825-1)</td>
<td>3B (IEC60825-1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (without cable)</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### RF605 Series

<table>
<thead>
<tr>
<th>RF605-</th>
<th>25/50</th>
<th>45/100</th>
<th>65/250</th>
<th>105/500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base distance X, mm</td>
<td>25</td>
<td>45</td>
<td>65</td>
<td>105</td>
</tr>
<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>±0.05</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>
LASER TRIANGULATION SENSORS, RF60x SERIES

SUPER COMPACT LASER SENSORS

RF602 Series

- Unique combination of dimensions, performance and operating ranges

<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, stable operation on wet surfaces</td>
<td>Pavement profile measurement</td>
</tr>
<tr>
<td>RF603P-245/1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RF607-195/500</td>
<td>70 kHz operating frequency, round laser spot, diameter &lt;1 mm</td>
<td>Pavement profile measurement</td>
</tr>
<tr>
<td>RF607-210/230</td>
<td>70 kHz operating frequency, round laser spot, diameter &lt;0.8 mm, accuracy ±0.03% of the range</td>
<td>Pavement roughness (texture) measurement</td>
</tr>
<tr>
<td>RF607-230/250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RF603Txt-30/30</td>
<td>reduced triangulation angle, round laser spot, diameter &lt;60 µm, simultaneously obtaining profile and image of the surface</td>
<td></td>
</tr>
</tbody>
</table>

RF60i Series

- 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, stable operation on wet surfaces</td>
<td>Pavement profile measurement</td>
</tr>
<tr>
<td>RF603P-245/1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RF607-195/500</td>
<td>70 kHz operating frequency, round laser spot, diameter &lt;1 mm</td>
<td>Pavement profile measurement</td>
</tr>
<tr>
<td>RF607-210/230</td>
<td>70 kHz operating frequency, round laser spot, diameter &lt;0.8 mm, accuracy ±0.03% of the range</td>
<td>Pavement roughness (texture) measurement</td>
</tr>
<tr>
<td>RF607-230/250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RF603Txt-30/30</td>
<td>reduced triangulation angle, round laser spot, diameter &lt;60 µm, simultaneously obtaining profile and image of the surface</td>
<td></td>
</tr>
</tbody>
</table>

www.riftek.com
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 built-in 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…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>4</td>
<td></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 or Wi-Fi</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

LASER TRIANGULATION PROBES, RF60x SERIES

RF609, RF609Rt and RF609Wi-Fi Series

- Smallest triangulation sensor on the market
- Probe diameter — from 8.5 mm
- Measured inner diameter - from 9 mm
- Accuracy - from ±2 µm
- Sampling rate - up to 9.4 kHz
- Probes with BLUE laser to control reflecting and semitransparent objects
- Probes with built-in slip ring
- Probes with Wi-Fi

inner diameter measurement
steps and hole alignment measurement
cavity measurement
taper measurement
coaxiality measurement
ovality measurement

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.

**CMOS sensor reads the signal from the scale**

**Quartz Glass Scale carries special positional pattern**

**LED forms parallel beam**

**Processor calculates scale position**

### Innovative technology of absolute measurement

- Measuring ranges from 3 to 55 mm
- 0.1 μm resolution
- Emulation of incremental encoder signals

### RF25X Series

- **RF251-3**
  - Measurement range, mm: 3
  - Accuracy (at T=20 °C), μm: ±2
  - Resolution, μm: 0.1 or 0.5 or 1 or 5 or 10
  - Output interface: digital (RS422) or analog (EncD5 or EncD10 – emulation of quadrature signals of incremental transducers)
  - Synchronization input: no or opto-isolated
  - Logical outputs: no or two outputs, NPN: 100 mA max; 40 V max
  - Indication: no or two-color LED (red/green)
  - Power supply, V: 12 (without analogue output) or 15 (with analogue output)
  - Power consumption, W: 0.75
  - Enclosure rating: IP57
  - Operating temperature, °C: -40…+50
  - Weight (without cable), gram: 70

- **RF251-25**
  - Measurement range, mm: 25
  - Accuracy (at T=20 °C), μm: ±3
  - Resolution, μm: 0.1 or 0.5 or 1 or 5 or 10
  - Output interface: digital (RS422) or analog (EncD5 or EncD10 – emulation of quadrature signals of incremental transducers)
  - Synchronization input: no or opto-isolated
  - Logical outputs: no or two outputs, NPN: 100 mA max; 40 V max
  - Indication: no or two-color LED (red/green)
  - Power supply, V: 12 (without analogue output) or 15 (with analogue output)
  - Power consumption, W: 0.75
  - Enclosure rating: IP57
  - Operating temperature, °C: -40…+50
  - Weight (without cable), gram: 110

- **RF256-15**
  - Measurement range, mm: 15
  - Accuracy (at T=20 °C), μm: ±3
  - Resolution, μm: 0.1 or 0.5 or 1 or 5 or 10
  - Output interface: digital (RS422) or analog (EncD5 or EncD10 – emulation of quadrature signals of incremental transducers)
  - Synchronization input: no or opto-isolated
  - Logical outputs: no or two outputs, NPN: 100 mA max; 40 V max
  - Indication: no or two-color LED (red/green)
  - Power supply, V: 12 (without analogue output) or 15 (with analogue output)
  - Power consumption, W: 0.75
  - Enclosure rating: IP50
  - Operating temperature, °C: -10…+50
  - Weight (without cable), gram: 110

- **RF256-35**
  - Measurement range, mm: 35
  - Accuracy (at T=20 °C), μm: ±3
  - Resolution, μm: 0.1 or 0.5 or 1 or 5 or 10
  - Output interface: digital (RS422) or analog (EncD5 or EncD10 – emulation of quadrature signals of incremental transducers)
  - Synchronization input: no or opto-isolated
  - Logical outputs: no or two outputs, NPN: 100 mA max; 40 V max
  - Indication: no or two-color LED (red/green)
  - Power supply, V: 12 (without analogue output) or 15 (with analogue output)
  - Power consumption, W: 0.75
  - Enclosure rating: IP50
  - Operating temperature, °C: -10…+50
  - Weight (without cable), gram: 150

- **RF256-55**
  - Measurement range, mm: 55
  - Accuracy (at T=20 °C), μm: ±3
  - Resolution, μm: 0.1 or 0.5 or 1 or 5 or 10
  - Output interface: digital (RS422) or analog (EncD5 or EncD10 – emulation of quadrature signals of incremental transducers)
  - Synchronization input: no or opto-isolated
  - Logical outputs: no or two outputs, NPN: 100 mA max; 40 V max
  - Indication: no or two-color LED (red/green)
  - Power supply, V: 12 (without analogue output) or 15 (with analogue output)
  - Power consumption, W: 0.75
  - Enclosure rating: IP50
  - Operating temperature, °C: -10…+50
  - Weight (without cable), gram: 180
OPTICAL MICROMETERS, RF65x SERIES

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 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 µm accuracy
- Up to 10 000 Hz sampling rate
- RS232/RS485/Ethernet +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, MATLAB, LabVIEW
- Dual, three and multi axis Micrometers
- Air-knife window protection

RF65X Series
**OPTICAL MICROMETERS, RF65x SERIES**

<table>
<thead>
<tr>
<th>RF65X-</th>
<th>RF651-25</th>
<th>RF651-50</th>
<th>RF651-75</th>
<th>RF651-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range, mm</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</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>
</tr>
<tr>
<td>Accuracy, µm</td>
<td>±0.5</td>
<td>±1</td>
<td>±1.5</td>
<td>±2</td>
</tr>
<tr>
<td>Measurement frequency, Hz</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
</tbody>
</table>

**Light source**: LED

**Laser safety class**: 1 (IEC60825-1)

**Output interface**: digital, analog

**Synchronization input**: 2.4 – 5 V (CMOS, TTL)

**Logic output**: three outputs, NPN: 100 mA max, 40 V max

**Power supply, V**: 24 (9 ... 36)

**Power consumption, W**: 1.5 2

**Housing material**: aluminum

**Weight (without cable), gram**: 600 2000 2600 4000

---

**RF656 TWO AND THREE 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**
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 | ±0.20 µm
PURPOSE

Micrometers are designed for non-contact two-dimensional measurements of linear dimensions, diameters, angles, thread pitch, shape of parts, etc.

WORKING PRINCIPLE

The micrometer operation is based on the so-called shadow principle. The micrometer consists of two parts - an emitter and a receiver. The light from the LED is collimated by the lens. When placing an object in the area of the collimated beam, the resulting shadow image of the object is scanned by a 2D CMOS sensor. Based on the location of the shadow border, the computer calculates the dimensions of the object.

MAIN FEATURES

- Simultaneous measurement of multiple geometric parameters
- Measurement accuracy: ±1.5 um
- Measurement speed: 130 images/s

<table>
<thead>
<tr>
<th>PF656.2D</th>
<th>-8x10</th>
<th>-25x30</th>
<th>-30x40</th>
<th>-40x50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range, mm</td>
<td>8x10</td>
<td>25x30</td>
<td>30x40</td>
<td>40x50</td>
</tr>
<tr>
<td>Measurement accuracy, um</td>
<td>±1.5</td>
<td>±2.5</td>
<td>±3</td>
<td>±4.5</td>
</tr>
<tr>
<td>Smallest detectable object, mm</td>
<td>0.07</td>
<td>0.2</td>
<td>0.25</td>
<td>0.35</td>
</tr>
<tr>
<td>Measurement frequency, Hz</td>
<td>130 (50 with triggering)</td>
<td>20...100</td>
<td>20...259</td>
<td>20...250</td>
</tr>
<tr>
<td>Dimension B, see drawings below:</td>
<td>20...100</td>
<td>20...259</td>
<td>20...250</td>
<td>20...500</td>
</tr>
<tr>
<td>Controller</td>
<td>SmartUnit-M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight, not less, kg</td>
<td>1.1</td>
<td>2.3</td>
<td>2.8</td>
<td>5.6</td>
</tr>
</tbody>
</table>

RF656.2D-8x10

RF656.2D-25x30

RF656.2D-30x40

RF656.2D-40x50
LASER SCANNERS, RF62x SERIES

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).

MAIN FEATURES
- Measuring ranges from 10 to 1100 mm
- 0.05% linearity
- Sampling rate up to 6379 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, MATLAB, LabVIEW
- Specialized scanners for hole control

MODELS
RF627 — universal scanners
RF627Weld — scanners for welding robots
RF627Smart — scanners with built-in measurement functions
RF627Weld-Smart — scanners with built-in tracking functions
RF627AVIKScan — weld inspections scanners
RF629 — ultra-fast scanners, up to 50000 profiles/s

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LASER SCANNERS, RF62x SERIES

Laser Scanners, RF62x Series

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>RF627-</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>Fig. 2</td>
<td>0.6</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>70/150-58/122</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></td>
<td></td>
</tr>
<tr>
<td>190/300-160/300</td>
<td>300</td>
<td>190</td>
<td>490</td>
<td>160</td>
<td>300</td>
<td></td>
<td></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></td>
<td></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></td>
<td></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></td>
<td></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></td>
<td></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></td>
<td></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></td>
<td></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></td>
<td></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></td>
<td></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></td>
<td></td>
</tr>
</tbody>
</table>

Overall specifications
- Sampling rate, Hz: Full range: 485 or 921 (DS mode), ROI: 4884 or 6379 (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: 6...+40, (-20...+40 for the sensors with built-in heater), (-30...+120 for the sensors with built-in heater and water/air cooling housing)
- Relative humidity: 5-95% (no condensation)
- Storage temperature, °C: -20...+70
- Housing/windows material: aluminum/glass

Figures: 1, 2, 3
RF627Smart scanner makes it possible to measure geometric parameters of the object profile in real time directly in the scanner without connecting to a computer. Analysis, calculations, measurements, tolerance control are carried out according to the algorithm created by the user. To build an algorithm, a simple and intuitive tool is provided - a computation graph. The graph is formed from a library of ready-made blocks. Various combinations of blocks and connections between them allow the user to create an almost unlimited number of measuring functions, as well as to process profiles of any complexity. Measurement results can be transmitted via various protocols (Ethernet/IP, Modbus TCP, UDP), as well as to the logic outputs of the scanner in order to control the actuators and notify about product suitability.

### Parameter Table

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scan rate, Hz</td>
<td>4</td>
</tr>
<tr>
<td>Clearance distance, mm</td>
<td>250</td>
</tr>
<tr>
<td>Measurement Range, mm</td>
<td>120</td>
</tr>
<tr>
<td>FOV, mm</td>
<td>160 x 100 – 260 x 150</td>
</tr>
<tr>
<td>Accuracy (depth), mm</td>
<td>±0.05</td>
</tr>
<tr>
<td>Resolution XY, mm</td>
<td>0.08</td>
</tr>
<tr>
<td>Inputs</td>
<td>Differential Encoder, Trigger</td>
</tr>
<tr>
<td>Outputs</td>
<td>2x Digital Output, RS485 Serial (115 kbaud), 1x Analog Output (4 - 20 mA)</td>
</tr>
<tr>
<td>Interface</td>
<td>Gigabit Ethernet</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>1.8</td>
</tr>
</tbody>
</table>
MAIN FEATURES
■ Laser scanners and software for welding robots
■ Recognition, tracking and measuring in real time
■ Various protocols for communication with robots

LASER SCANNERS RF627WELD, RF627WELD-SMART

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

Connect equipment in accordance with functional diagram:
1. Connection between the RF627Weld scanner and the RIFTEK RF017 controller or between the RF627Weld-Smart scanner and the robot controller
2. Connection between the RIFTEK RF017 controller and the robot controller (for RF627Weld) or between the scanner and the robot controller (for RF627Weld-Smart)
3. Connection between the robot and the robot controller

Laser Scanners RF627Weld Series. Working ranges

<table>
<thead>
<tr>
<th>Range</th>
<th>SMR, mm</th>
<th>MR, mm</th>
<th>Xmr, mm</th>
<th>Xemr, mm</th>
<th>Laser</th>
</tr>
</thead>
<tbody>
<tr>
<td>65/25-21/25</td>
<td>65</td>
<td>25</td>
<td>21</td>
<td>25</td>
<td>Class 2M</td>
</tr>
<tr>
<td>70/130-35/86</td>
<td>70</td>
<td>130</td>
<td>35</td>
<td>86</td>
<td></td>
</tr>
<tr>
<td>90/250-65/180</td>
<td>90</td>
<td>250</td>
<td>65</td>
<td>180</td>
<td></td>
</tr>
</tbody>
</table>

For the rest parameters see “Overall specifications” in the previous page.

RF627Weld-70/130-35/86

Robot Exchange Protocols

<table>
<thead>
<tr>
<th>Robot</th>
<th>Protocol</th>
<th>RIFTEK</th>
<th>Server port</th>
<th>Server address</th>
<th>Sensor port</th>
<th>Server address</th>
<th>Sensor port</th>
<th>Server port</th>
<th>Server address</th>
<th>Sensor port</th>
<th>Server address</th>
<th>Sensor port</th>
<th>Server port</th>
<th>Server address</th>
<th>Sensor port</th>
<th>Server address</th>
<th>Sensor port</th>
<th>Server port</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>R91 USI</td>
<td>200162</td>
<td>6033</td>
<td>127.03.1</td>
<td>562</td>
<td>200162</td>
<td>6033</td>
<td>5632</td>
<td>200162</td>
<td>6033</td>
<td>562</td>
<td>200162</td>
<td>6033</td>
<td>562</td>
<td>200162</td>
<td>6033</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td>R91 USI</td>
<td>200162</td>
<td>6033</td>
<td>127.03.1</td>
<td>562</td>
<td>200162</td>
<td>6033</td>
<td>5632</td>
<td>200162</td>
<td>6033</td>
<td>562</td>
<td>200162</td>
<td>6033</td>
<td>562</td>
<td>200162</td>
<td>6033</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How it works

STEP 1

STEP 2

Select Template

STEP 3

STEP 4

START WORKING

www.riftek.com
SPECIALIZED SCANNING SYSTEMS FOR WELDS, WELDED JOINTS AND EDGE PREPARATION

RF627AVIKScan

■ 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>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D scanner VOF, mm</td>
<td>Z - 120, X - 30...110</td>
</tr>
<tr>
<td>Sampling frequency, profiles/s</td>
<td>&gt;2000</td>
</tr>
<tr>
<td>Measurement error, 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 x 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 nm), 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 Measurement Machine: RF1010SS

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 its 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, µm</td>
<td>±150</td>
</tr>
</tbody>
</table>

### 3D Laser Measurement Machine: RF1010SL

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>

### RF1240TB Series

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 µm 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

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.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter of the module, mm</td>
<td>70</td>
</tr>
<tr>
<td>Diameter range, mm</td>
<td>95...195 mm (main range) 160...300 mm (extended range)</td>
</tr>
<tr>
<td>Accuracy, mm</td>
<td>±0.05 (main range) ±0.2 mm (extended range)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID measurement range, mm</td>
<td>100...150</td>
</tr>
<tr>
<td>Accuracy, mm</td>
<td>±0.05</td>
</tr>
<tr>
<td>Measurement speed, ID /s</td>
<td>500</td>
</tr>
<tr>
<td>Light source</td>
<td>Red laser, 660 nm</td>
</tr>
<tr>
<td>Laser output power, mW</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Laser safety Class</td>
<td>2 (IEC60825-1)</td>
</tr>
<tr>
<td>Interface</td>
<td>Wi-Fi, USB</td>
</tr>
<tr>
<td>Time of continuous work, hour</td>
<td>4</td>
</tr>
</tbody>
</table>

MULTISENSOR MEASUREMENT HEAD
RF040 Series

MULTISENSOR MEASUREMENT SYSTEMS WITH WI-FI MODULE
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
built-in 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-Clb
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, µm</td>
<td>±5</td>
</tr>
<tr>
<td>Depth of measurement, mm</td>
<td>200</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, µm</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, µm</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>

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, µm</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>

PIES ID 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>Accuracy, mm</td>
<td>±5</td>
</tr>
<tr>
<td>Pipe length, mm</td>
<td>Up to 800</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>Accuracy, mm</td>
<td>±5</td>
</tr>
<tr>
<td>Pipe length, mm</td>
<td>Up to 100</td>
</tr>
</tbody>
</table>
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, µm</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>

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, µm</td>
<td>±50</td>
</tr>
<tr>
<td>Minimum size of defects controlled, mm</td>
<td>0.1</td>
</tr>
</tbody>
</table>

RF096-100/250-87-HH Series

- Measured parameters:
  - inner diameter;
  - ovality;
  - roundness.

The device is designed for ID measurement of pipes, channels and so on.

The Specification can be changed on request.

Parameter | Value
---|---
ID range, mm | 100...250
Accuracy, mm | ±0.03
Number of laser sensors | 2
Depth of measurement | on request
Measurement time, s | 1
Resolution for cross-section, points | 3200
Laser safety Class | 2
Display | LED 4.3"
Power supply | Li-ion battery, 5400 mAh
Number of measurements before recharging the battery, not less | 3000

The Specification can be changed on request.
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, µm</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, µm</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

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, µm</td>
<td>from ±1</td>
</tr>
<tr>
<td>Number of controlled sections</td>
<td>up to 6</td>
</tr>
</tbody>
</table>

AUTOMATED SYSTEMS FOR MOTOR SHAFTS MEASUREMENT

The systems are designed for the measurement and control of motor shafts.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured diameters, mm</td>
<td>0.1...100 (or on request)</td>
</tr>
<tr>
<td>Measurement error, µm</td>
<td>±2</td>
</tr>
<tr>
<td>Length</td>
<td>on request</td>
</tr>
</tbody>
</table>
The sensors are intended for automotive and industrial application for precise contactless measurement of speed and length of nearly any moving object.

The sensors are 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 Table

<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 TTLout 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>Measuring frequency, Hz</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Nominal distance to the road and tolerance</td>
<td>280 ± 140 (140 – 420)</td>
<td>Up to 800 mm on request</td>
</tr>
<tr>
<td>System power supply (tolerance)</td>
<td>12 V nominal (11 – 14.5V)</td>
<td></td>
</tr>
<tr>
<td>Sensor head operation temperature range, °C</td>
<td>-20...+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>1200x100x35</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)</td>
<td>Others on request</td>
</tr>
</tbody>
</table>

### ISD-5 Table

<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</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>±20-25% of nominal</td>
<td></td>
<td>Depends on the surface (on the edge of the range signal decreased)</td>
</tr>
<tr>
<td>Power supply, V</td>
<td>12 (8 - 14)</td>
<td></td>
<td>Internal linear voltage regulators +5V in sensor and controller unit</td>
</tr>
<tr>
<td>Power consumption, Wt</td>
<td>0.5 - 2</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Temperature working range, °C</td>
<td>+15...+50</td>
<td>±10...+50</td>
<td>-10...+50 – with active thermostabilization option:</td>
</tr>
<tr>
<td>Sensor weight, g</td>
<td>320</td>
<td>70</td>
<td>-50...+80°C with protect air cooling housing (option)</td>
</tr>
<tr>
<td>Sensor size, mm</td>
<td>85x79x46</td>
<td>58x43x30</td>
<td>Without connector, blend and fixing holes</td>
</tr>
<tr>
<td>Cable length from sensor to controller unit, m</td>
<td>1.8 or 3</td>
<td></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>Controller unit:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions, mm</td>
<td>120x100x35</td>
<td></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>Typical values, user adjustable (see software description below)</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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical data latency at measurement freq, ms</td>
<td>54 Hz</td>
<td>Stable, =½ of measuring time, without averaging</td>
<td></td>
</tr>
<tr>
<td>16 Hz</td>
<td>9</td>
<td>31</td>
<td></td>
</tr>
</tbody>
</table>

**Base Software**
- 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

Custom software by request are possible
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>± 0.15</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>± 0.1</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>
</tbody>
</table>

The laser module battery life time
5 million measurement cycles

Power supply (laser scanning module)
3,7V, Li-ion rechargeable battery 5400mAh for standard IKP and 2400mAh for Short and SShort

The number of measurements that can be taken before battery recharge is not less than
5000 for standard IKP and 2200 for Short and Super-short

Laser module battery life time
5 million measurement cycles

Power supply (PDA)
3,7V
Li-polymer battery 3300mAh

PDA memory capacity
100 000 measurements

Interface between laser scanning module and PDA
Bluetooth

Working temperature range, °C
-20...+50

Enclosure rating
IP42 or IP64

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</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>Weigh, 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>
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</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>
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.

**IMR SERIES**

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.

**Parameter** | **Value**
--- | ---
Measurement range, mm | Li±25 (L – nominal distance)
Measurement error, mm | ±0.1
Indication discreteness | 0.1mm, or 0.01 inch **
Display | built-in, LED
Operating temperature, °C | -15...+50
Weigh, kg | 1
Dimensions, mm | D+137x30x124
Power supply | rechargeable batteries 2xAAA, 1.2V

**IMR-L 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.

**Parameter** | **Value**
--- | ---
Measurement range, mm | 1360...1440 or on request (nominal distance ± 15mm)
Measurement error, mm | ±0.3
Indication discreteness | 0.1mm, 0.01mm * or 0.01 inch
Display | built-in, LED
Operating temperature, °C | -15...+50
Weigh, kg | 0.85
Dimensions, mm | 234.2x87.7x32
Power supply | rechargeable batteries 4 x AA 1.2V
Connection to PC | Bluetooth

**DISK BRAKES PROFILE GAUGE**

**IKD Series**

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

**Parameter** | **Value**
--- | ---
Measurement range, mm | 30
Profile measurement range, mm | 150
Measurement error | ± 0.03
Discreteness of indication, mm | 0.01
Discreteness of the profile formation, not worse than, mm | 0.1
Power supply, laser module | 3.7 Li-ion rechargeable battery 6800 mAh
Power supply, PDA | 3.7 Li-polymer battery 3300 mAh
The number of measurements that can be taken before battery recharge is not less than | 1000
PDA memory capacity | 100 000 measurements
Interface between laser scanning module and PDA | Bluetooth
Working temperature range, °C | -15...+35
Enclosure rating | IP42
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>
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</thead>
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<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>Redused 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>112.5x95.5x22.7</td>
</tr>
<tr>
<td>Laser module dimensions, mm</td>
<td>293x238x230</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, 13900mAh</td>
</tr>
<tr>
<td>The number of measurements that can be taken before battery recharge is not less than</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>

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.
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UKRAINE
Noteblok
(Not applicable for this page)
<table>
<thead>
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<th>Phone</th>
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<th>Email</th>
<th>Website</th>
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<td>SOUTH KOREA</td>
<td>BS Holdings</td>
<td>B-201, Wonpogongwon 1-ro, 59 Danwon-gu, Ansan-si, Republic of Korea</td>
<td>+82 31 411 5011</td>
<td>+82 31 411 5015</td>
<td><a href="mailto:bsh5011@hanmail.net">bsh5011@hanmail.net</a></td>
<td><a href="http://www.lasersolution.co.kr">www.lasersolution.co.kr</a></td>
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<tr>
<td>SWITZERLAND</td>
<td>ID&amp;T GmbH</td>
<td>Gewerbestrasse 12/a, 8132 Egg (Zurich), Switzerland</td>
<td>+41 44 994 9232</td>
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<td><a href="mailto:info@idtlaser.com">info@idtlaser.com</a></td>
<td><a href="http://www.idtlaser.com">www.idtlaser.com</a></td>
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<td>SWEDEN</td>
<td>BLConsult</td>
<td>Ryssbält 294, 95 291 Kalix, Sweden</td>
<td>+46 70 663 1925</td>
<td></td>
<td><a href="mailto:info@blconsult.se">info@blconsult.se</a></td>
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</tr>
<tr>
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<td></td>
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</tr>
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<td>UKRAINE</td>
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</tr>
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<tr>
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<td>Acuity Products of Schmitt Industries, Inc.</td>
<td>2765 NW Nicolai Street, Portland, OR, 97210, USA</td>
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<td></td>
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<td><a href="http://www.acuitylaser.com">www.acuitylaser.com</a></td>
</tr>
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</table>
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