



RIFTEK

Sensors & Instruments



WHEEL DIAMETER MEASURING GAUGE

IDK Series

User's manual

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1. Safety precautions and measurement conditions

- The metering accuracy depends greatly on the wheel surface quality. Therefore it is necessary to carry out the check and presorting of the wheel surface roughness and flaws before measuring the diameter.
- Prior to place the gauge onto the wheel there is a need to clean the wheel parts that contact with gauge ball bearings, side supports and measuring tip, of the mud.
- At arranging the gauge, do not allow hitting its supports on the wheel and any measuring tip side hitting.
- At arranging the gauge, do not apply strong forcing in the direction of the measuring tip movement. It can result in the gauge sag, that will bring about the uncertain metering result.
- It is necessary to inspect the gauge supports periodically and to cleanse them.
- To save the battery power, the display extinguishes if there were no buttons pressings for 60 seconds, at that only blinking dot is shown. Pressing any button just turns on the display and does not act in any other way in this case.

2. CE compliance

The gauge has been developed for use in industry and meets the requirements of the following Directives:

- EU directive 2014/30/EU. Electromagnetic compatibility (EMC).
- EU directive 2011/65/EU, "RoHS" category 9.

3. General information

The electronic gauge is designed to measure the wheel rolling circle diameter (amount of wear) of railway, metro and trams in the course of checkup, examination, repair and formation of wheelsets. Measurements are made directly on the rolling stock without rolling out the wheelset.

4. Basic technical data

Parameter	Value
Measurement range, mm	400...1400 or on request
Measurement error, mm	±0,2
Indication discreteness	0.1 mm, 0.01 mm or 0.01 inch
Measurement position, S, mm	On request
Distance between axes of ball bearings (base), mm and measurement range, mm	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)
Display	build-in, LED
Operating temperature, °C	-15...+55
Power supply	rechargeable batteries 2xAAA 1.2 V
Weigh, kg	0.5
Number of measurements without recharging, not less than	1000

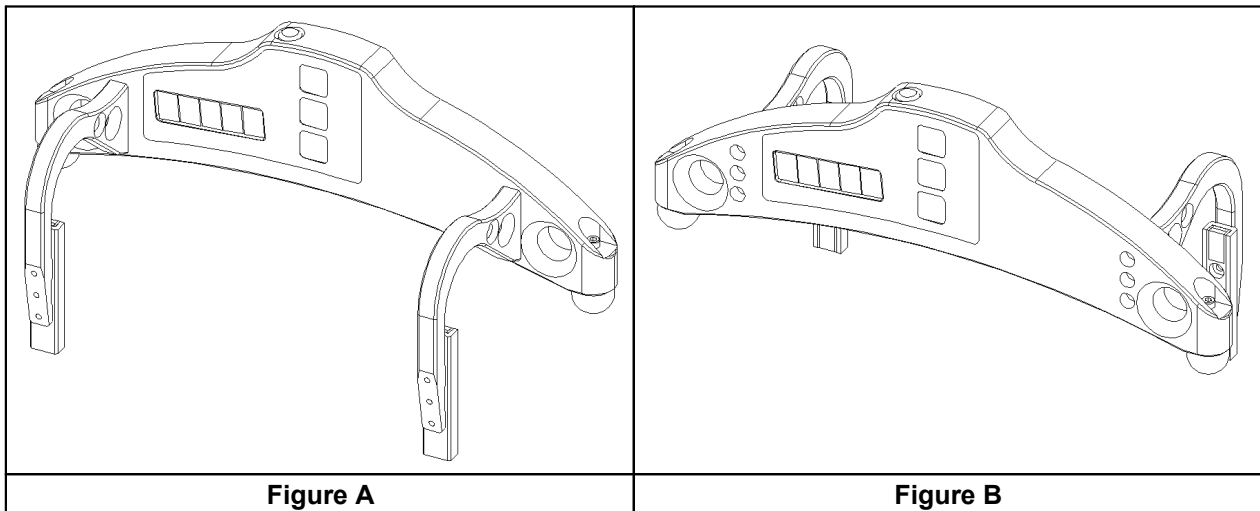
5. Example of item designation when ordering

IDK-S/B-MIN/MAX-X

Symbol	Description
S	Measurement position, mm.
B	Base, mm.
MIN	Lower limit of the measurement range, mm.
MAX	Upper limit of the measurement range, mm.
X	Indication position. A - Indication is on the side of side supports (Figure A), B – Indication is on the opposite side (Figure B).

Example: IDK-70/250-850/1260-A. Measurement position – 70 mm; base – 250 mm; lower limit of the measurement range – 850 mm; upper limit of the measurement range – 1260 mm; indication position – A.

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6. Complete set to be supplied

Name	Quantity
Wheel diameter measuring gauge IDK series	1 piece
Charger	1 piece
Manual	1 piece
Case	1 piece
Calibration tools (option):	on request
- Flat block RF510.11.000	-
- Reference wheel block RF510.11.850	-

7. Design

The design of the gauge with a base of 200, 250 and 300 mm is shown in Figure 1, and with a base of 122 mm - in Figure 1.1. The electronic gauge contains two ball supports to place the gauge onto the roll surface, two side supports to base the gauge to the wheel edge and a measuring tip. There are a digital numeric display and control buttons on the front panel of the gauge. The “Charge” connector for connecting the charging device is located on the top panel of the gauge.

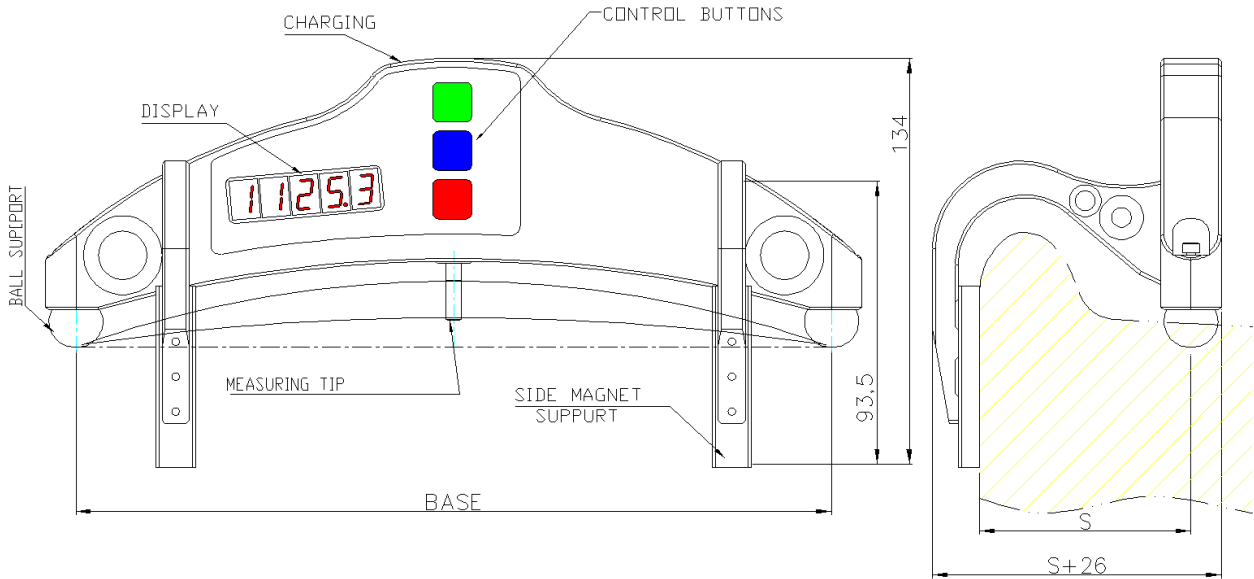


Figure 1

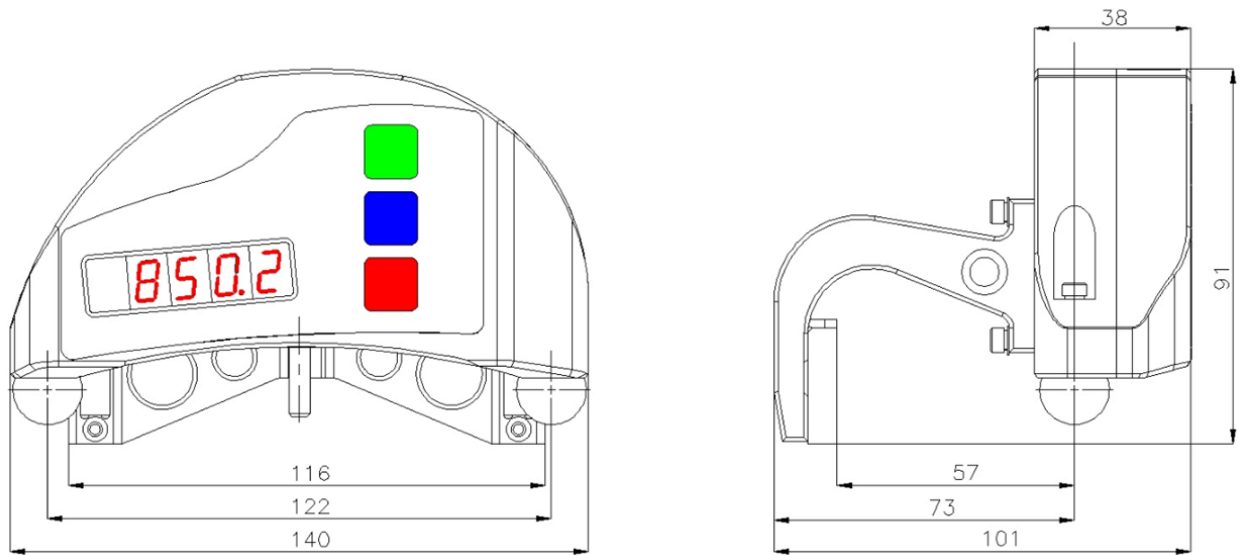


Figure 1.1

8. Operation principle

The measurement method is based on the diameter calculation from a known length of the segment chord (the distance between the ball bearings centers), which is obtained at placing the gauge onto the wheel and measured by means of the displacement converter. Video demonstration: <https://youtu.be/pMienHfBizg>.

9. Working with the gauge

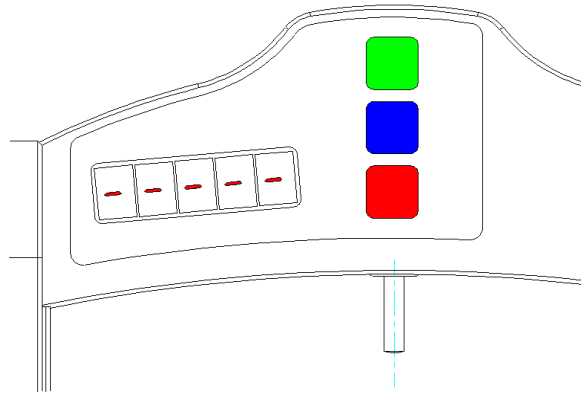
9.1. Turning on the gauge

Press the **Red** button to turn on the power. The display shows "ErrP" message if the battery voltage became lower than the control level. In this case, the short-term work is possible after pressing any key.

9.2. Single measurement

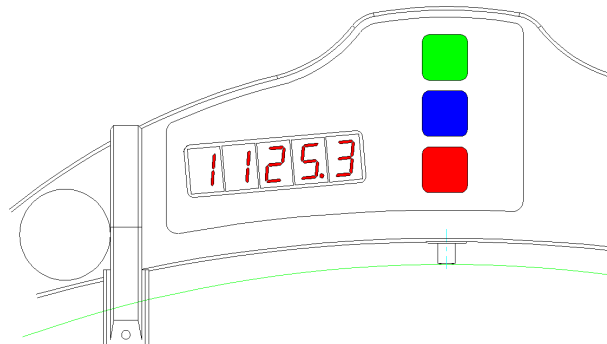
To carry out measurements, it is necessary to:

- Turn on the power (press the **Red** button). The display shows "- - - - -".



- Place the gauge onto the wheel.
- Make sure the ball supports and the measuring tip are tight against the roll surface and the side supports are adjacent to the edge of the wheel.
- Press the **Green** button.
- In one second, the display will show the value of the wheel diameter.

For viewing the measurement result with a discreteness of 0.01 mm (only available in direct indication mode), it is necessary to press the **Blue** button, thus the displayed result will be shifted to the left by one digit. Pressing the **Blue** button again will return the indication to its initial position.



9.3. Measurement with averaging

The program of the wheel diameter calculation contains an averaging algorithm that allows eliminating the surface defects influence on the measurement result. All the results of metering, performed after the **Red** button pressing, are averaged. The measurement is meant to be each pressing of the **Green** button.

To carry out measurements, it is necessary to:

- Turn on the power (press the **Red** button). The display shows "- - - - -".
- Place the gauge onto the wheel.
- Make sure the ball supports are tight against the roll surface and the side supports are adjacent to the edge of the wheel.
- Press the **Green** button.
- The display will show the value of the averaging counter: "**n** x", where x – number of averaged values.
- In one second, the display will show the average value of the wheel diameter.
- Reinstall the gauge and repeat the measurement.

The total number of measurements averaged in this way can be up to 9999.

To reset the averaging result, press the **Red** button.

For viewing the measurement result with a discreteness of 0.01 mm (only available in direct indication mode), it is necessary to press the **Blue** button, thus the displayed result will be shifted to the left by one digit. Pressing the **Blue** button again will return the indication to its initial position.

9.4. Turning off the gauge

The gauge turns off automatically. The display extinguishes if there were no button pressings for 60 seconds, at that only a blinking dot is shown. If there were no button pressings for 4 more minutes, the gauge is turned off completely. You can turn off the gauge by long pressing the **Red** button (more than 3 seconds).

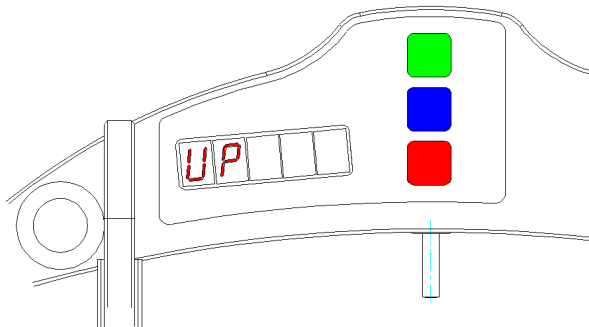
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10. Indication parameters

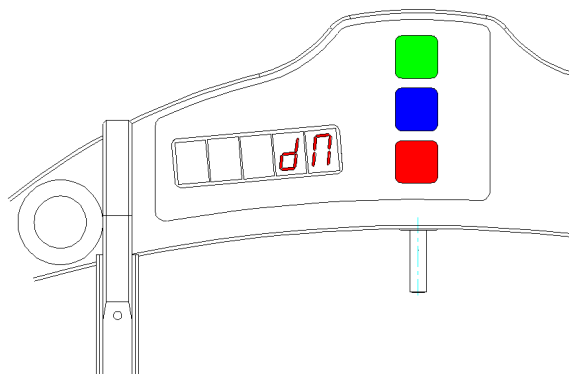
10.1. Image rotation

To rotate the image, it is necessary to:

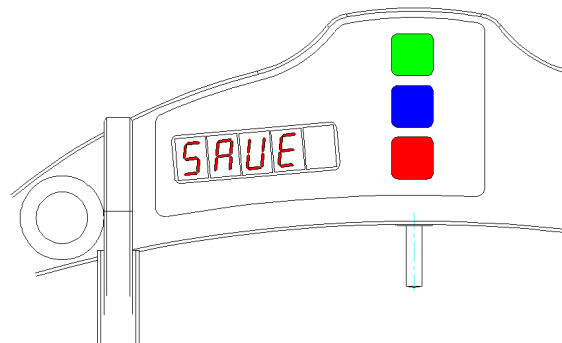
- Turn on the gauge by pressing the **Red** button.
- Press the **Blue** button and keep it pressed for more than 3 seconds.
- The display will show **"UP"**.



- Press the **Green** button to rotate the image. The **"UP"** message will be rotated.



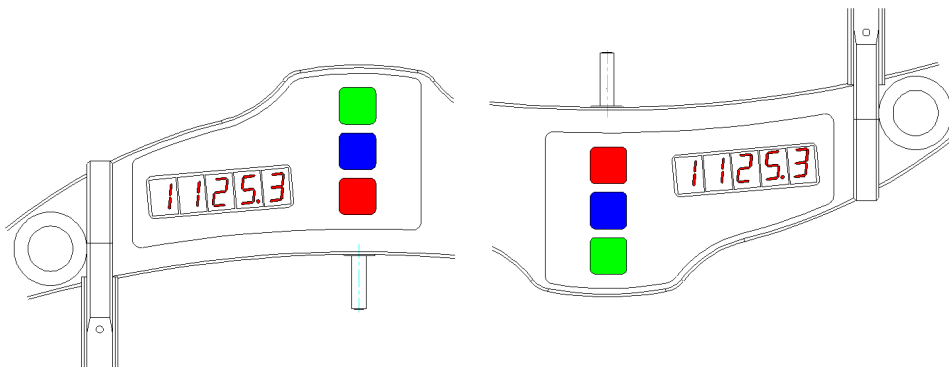
- Press the **Red** button to save the changes. The display will show the **"SAUE"** message. Press the **Green** button to confirm saving or the **Red** button to cancel.



The image rotation function allows the operator to view the result regardless of the direction of installation of the gauge.

NOTES:

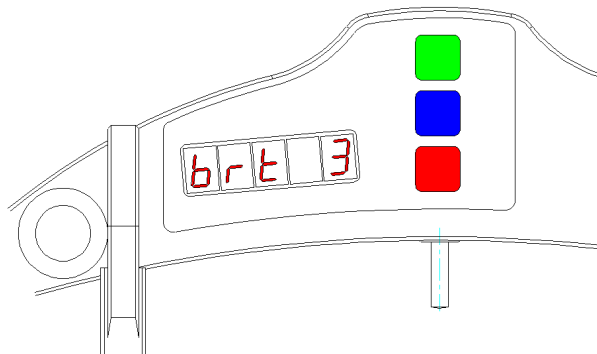
- Indication discreteness of 0.01 mm is only available in direct indication mode.
- In inches, the diameter is indicated with two decimal places. When the image is rotated, the dot is displayed at the top.



10.2. Image brightness

To change the display brightness, it is necessary to:

- Turn on the gauge by pressing the **Red** button.
- Press the **Blue** button and keep it pressed for more than 3 seconds.
- The display will show **"UP"**.
- Press the **Blue** button again and enter the brightness adjustment mode (**"brt"**).



- Press the **Green** button to change the parameter.
- To save the parameter, press the **Red** button. The display will show the **"SAUE"** message. Press the **Green** button to confirm saving or the **Red** button to cancel.

When adjusting the brightness, keep in mind that higher brightness will significantly increase power consumption and shorten battery life.

10.3. Millimeters-Inches display

To change the mode, it is necessary to:

- Turn on the gauge by pressing the **Red** button.
- Press the **Blue** button and keep it pressed for more than 3 seconds.
- The display will show **"UP"**.
- Press the **Blue** button again until **"SI"** or **"Inch"** appears on the display. **"SI"** – indication in millimeters, **"Inch"** – indication in inches, **"tape"** – indication in tapes.
- Press the **Green** button to change the parameter.
- To save the parameter, press the **Red** button. The display will show the **"SAUE"** message. Press the **Green** button to confirm saving or the **Red** button to cancel.

NOTE. In inches, the diameter is indicated with two decimal places. When the image is rotated, the dot is displayed at the top.

11. Operating modes

This section describes the gauge calibration modes. Since erroneous actions in these modes can lead to invalid measurement results, only specially trained personnel should perform such operations.

11.1. Calibration conditions

ATTENTION! Calibration of the device is not necessary in the current work. It is necessary only after producing, repairing and also after checking with negative result.

To perform calibration, the following means are necessary:

- Calibration plate with the deviation from flatness less than $\pm 0.5 \mu\text{m}$ for a length of 250 mm (or Flat block RF510.11.000, Figure 2).
- Johansson gauge.
- Reference wheel of the known diameter (or Reference wheel block RF510.11.850, Figure 3).

11.2. Entering the operating mode

- To enter the operating modes, it is necessary to turn off the gauge (press the **Red** button for more than 3 seconds).
- While holding down the **Green** button, press the **Red** button to turn on the gauge.
- The display will show the message **"CLbr.0"** – sensor zero calibration.
- To enter the sensor zero calibration mode, press the **Green** button (see par. [11.3](#)).
- To move to the next calibration mode, press the **Blue** button.
- The display will show the message **"CLbr.b"** – device base calibration (distance between the centers of the support balls).
- To enter the device base calibration mode, press the **Green** button (see par. [11.4](#)).

Thus, in the operating mode, the buttons perform the following functions:

- **Blue** button – switch the mode.
- **Green** button – enter the mode.
- **Red** button – exit the mode.

11.3. Sensor zero calibration

- In zero calibration mode, the display shows the Johansson gauge value used for calibration in increments of 0.5 μm .
- If editing of the Johansson gauge value is not required, go to the next step. To edit the Johansson gauge value, press the **Blue** button, and the digit to be edited starts blinking. Changing over between the digits is made by pressing the **Blue** button while changing of values is made by pressing the **Green** button. When editing is finished, press the **Red** button and confirm or cancel saving of the parameter by pressing the **Green** button or **Red** button, respectively.
- Press the **Green** button. The Johansson gauge value starts blinking, which means that the device must be placed onto a flat plate and the Johansson gauge with a nominal value of the previous step must be placed under the measuring tip. The Johansson gauge must be tightly fitted to the flat plate and supports and balls of the device must be firmly forced against the plate.
- Press the **Green** button. The display shows the current reading of the sensor in its own coordinate system. By moving the device, assure that repeatability of measurement results is obtained.
- If readings of the sensor are sufficiently stable, press the **Blue** button. The zero position of the sensor is calculated in the device coordinate system, and a prompt appears to save the calibration results. Press the **Green** or **Red** button to confirm or cancel saving of the results, respectively.

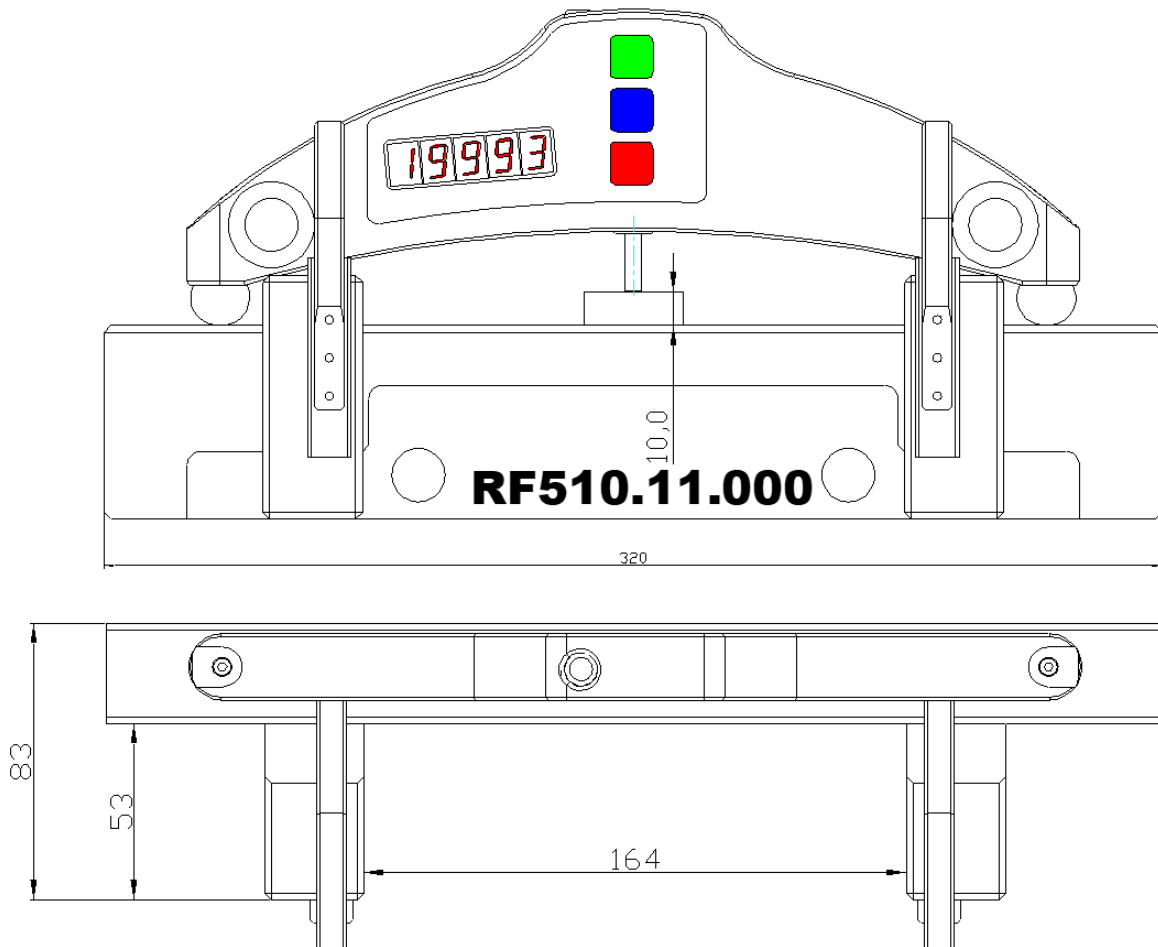


Figure 2

11.4. Device base calibration

- In device base calibration mode, the display shows the diameter value of the reference used for calibration.
- If editing of the diameter value is not required, go to the next step. To edit the diameter value, press the **Blue** button, and the digit to be edited starts blinking. Changing over between the digits is made by pressing the **Blue** button while changing of values is made by pressing the **Green** button. When editing is finished, press the **Red** button and confirm or cancel saving of the parameter by pressing the **Green** button or **Red** button, respectively.
- Press the **Green** button. The reference diameter value starts blinking, which means that the device must be placed onto the reference with the diameter value set at the previous step. The device supports must be firmly forced against the reference block.
- Press the **Green** button. The display shows the current reading of the sensor in the device coordinate system. By moving the device, assure that repeatability of measurement results is obtained.
- If readings of the instrument are sufficiently stable, press the **Blue** button. The device base value is calculated, and a prompt appears to save the calibration results. Press the **Green** or **Red** button to confirm or cancel saving of the results, respectively.

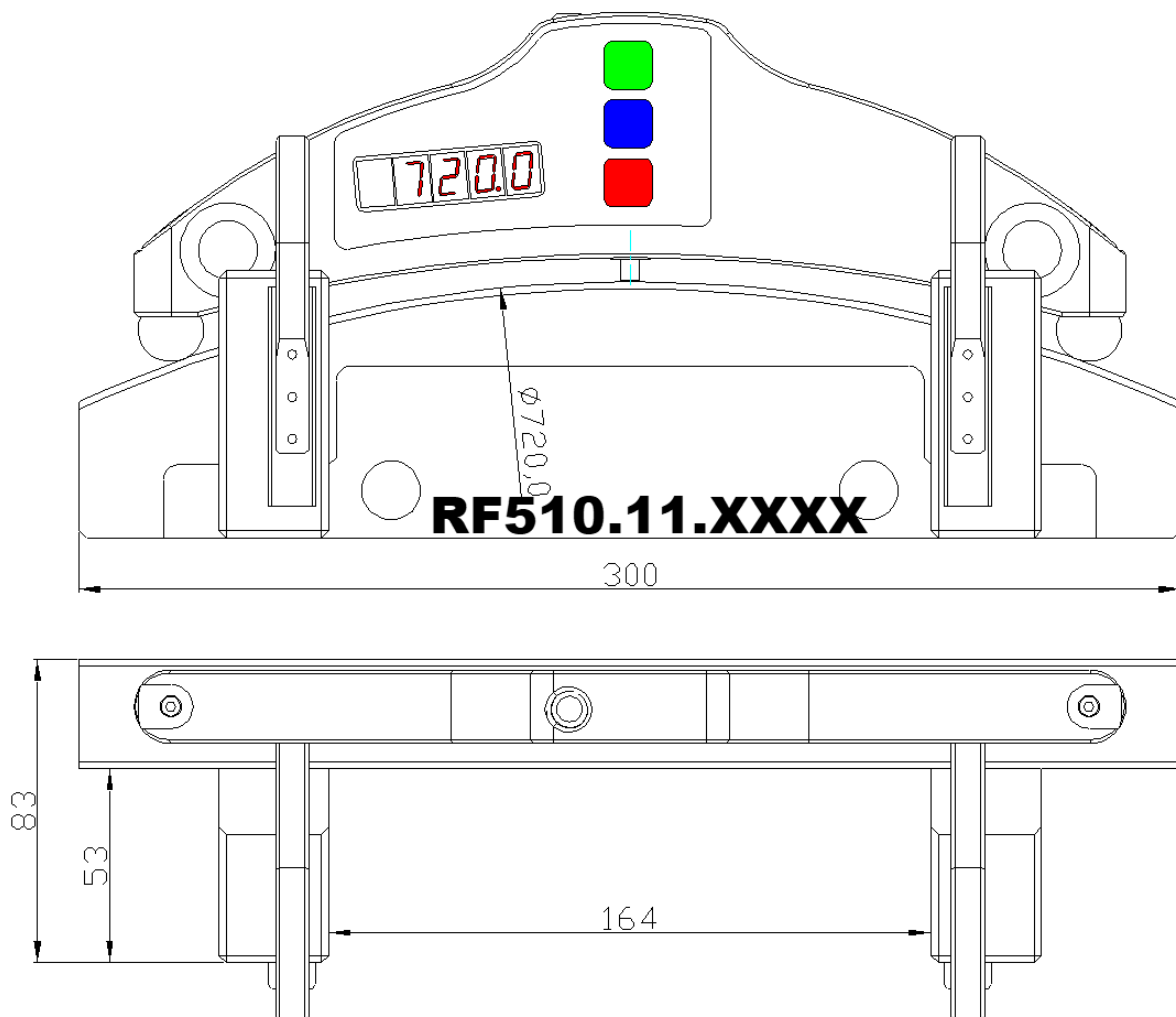


Figure 3

12. Charging accumulator batteries

To charge the accumulator batteries, it is necessary to connect the charging device to the mains 220 V and to the battery compartment on the top panel of the gauge.

The time of charging is 15 hours.

13. Warranty policy

Warranty assurance for the Wheel Diameter Measuring Gauge IDK Series – 18 months from the date of putting in operation; warranty shelf-life – 12 months.

14. Distributors

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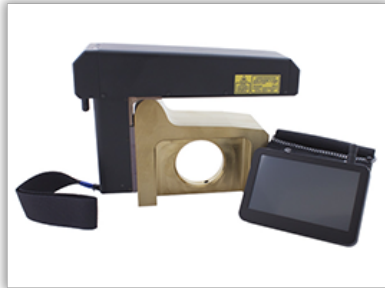
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15. RIFTEK's measurement devices for railway transport



Laser wheel profilometer. IKP Series

A laser profilometer is designed for the measuring of:

- wheel flange height;
- wheel flange thickness;
- wheel flange slope;
- 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.

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



Portable laser rail profilometer. PRP Series

The main functions of PRP are:

- 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 cross-section railhead profiles on the display of system unit.



Wheel diameter measuring gauge. IDK Series

Electronic gauge is designed for measuring wheel rolling circle diameter of railway, metro and tram wheel sets.

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



Back-to-back distance measuring gauge. IMR Series

Gauge is designed for contactless measuring of back-to-back distance of railway, metro and tram wheels in the course of checkup, examination, repair and formation of wheel sets.

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



Back-to-back distance measuring gauge. IMR-L Series

Gauge is designed for contactless measuring of back-to-back distance of railway, metro and tram wheels in the course of checkup, examination, repair and formation of wheel sets.

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



Disc brakes profile gauge, IKD Series

Laser disc brakes profilometer IKD Series is designed for disc brakes profile measuring.

The main functions of IKD are:

- obtaining the information on the profile parameters of the working disc brakes surface;
- full profile scanning and analyze of the disc brakes acting face;
- visualization of the combined graphical images of actual and new disc brakes profiles on the display of system unit.



Automatic real-time system for measurement of wheelsets geometrical parameters

The system is designed for contactless automatic measurement of geometrical parameters of railway wheels and uses a combination of 2D laser scanners, mounted wayside in the track area.

The system can be easily installed at any type of rail infrastructure.