



**RIFTEK**  
Sensors & Instruments



# **LASER WHEEL PROFILOMETER**

**IKP-5 Series, Model 2016 Year**

**User's manual**

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## 1. Safety precautions and measurement conditions

- Prior to mounting the profilometer onto the wheel, areas of contact of the side supports with the wheel surface should be thoroughly cleaned from dirt.
- When mounting the module on the wheel, do not allow heavy shocks of its support against the wheel.
- The output window of the profilometer and profilometer supports must be carefully inspected and cleaned.
- Do not use laser module in locations close to powerful light sources.

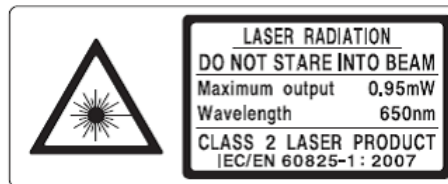
## 2. Electromagnetic compatibility

The profilometer have been developed for use in industry and meet the requirements of the following standards:

- EN 55022:2006 Information Technology Equipment. Radio disturbance characteristics. Limits and methods of measurement.
- EN 61000-6-2:2005 Electromagnetic compatibility (EMC). Generic standards. Immunity for industrial environments.
- EN 61326-1:2006 Electrical Equipment for Measurement, Control, and Laboratory Use. EMC Requirements. General requirements.

## 3. Laser safety

The profilometer make use of an c.w. 660 (or 405) nm wavelength semiconductor laser. Maximum output power is 1 mW. The device belongs to the 2 laser safety class according IEC 60825-1:2007. The following warning label is placed on the profilometer body:



The following safety measures should be taken while operating the profilometer:

- Do not target laser beam to humans;
- Do not disassemble the sensor;
- Avoid staring into the laser beam.

## 4. General information

A laser profilometer IKP5 Series is designed for the measuring of

- wheel flange height
- wheel flange thickness
- wheel flange slope
- rim 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.

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

Profilometers are implemented in three configurations: with the standard handle, with the shorten handle (Short version) and very short handle (Super short version). The version with the shorten handle is intended to measure the wheels with the limited space for

installing the profilometer. The version with very short handle is specially designed to measure wheels of **Ansaldo Breda low floor trams** with very limited space for profilometer installing. This super short profilometer version has separate battery block, connected by cable with laser module.

## 5. Basic technical data

Name of parameter	Value
<i>Measurement range</i>	
flange height, mm	20...45
flange thickness, mm	20...50
flange slope, mm	1...15
rim thickness, mm	36...100 (30...90)
diameter (calculation method), mm	400...1400
<i>Measurement error</i>	
flange height, mm	± 0,1
flange thickness, mm	± 0,1
flange slope, mm	± 0,2
rim thickness, mm	± 0,5
diameter, mm	± 0,1
<i>Discreteness of indication</i>	
all parameters, mm	0,01
Profile measurement range, mm	145
Discreteness of the profile formation, not worse than, mm	0,1
Digital readout device (PDA) dimensions, mm	see Fig. 3
Dimensions of laser scanning module, mm	see Fig. 5
Power supply (laser scanning module)	4,8V, 4 AAA rechargeable batteries, 1,2V
Power supply (PDA)	3,7V Li-polymer battery 3300mAh
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

## 6. Example of designation when ordering

### IKP-Short-M-S-T

Symbol	Description
without symbol or Short or Sshort	Standard version or version of the profilometer with the shorten handle or super short handle.
M	Options of the set of magnets for mounting on the internal/external rim face: S – standard. Standard magnets (specified by default). F – forced. Reinforced magnets.
S	Options of the support plates embodiment: D – direct. Standard plates, profilometer is mounted on the internal rim face (specified by default). I – invert. Custom plates, profilometer is mounted on the external rim face.
T	Presence of the rim measurement rod.

**Example:**

**IKP-T** – standard magnets; standard support plates; presence of the rim measurement rod.

**IKP-F-I** – reinforced magnets; custom support plates.

**IKP-Short-T** – the shorten handle; presence of the rim measurement rod.

## 7. Complete set to be supplied

Designation	Name	Quantity	Weight, kg
RF303M	Digital readout device (PDA)	1	0,3
RF505	Laser scanning module	1	0,8
RF505.40	Charging device 9V 3.0A for PDA	1	0,2
RF505.41	Charging device 9V 3.0A for laser module	1	0,2
RF505.42	Data cable	1	
RF505.43	Bluetooth adapter	1	
RF505.30	Packing case	1	1,2
IKP5_DB	Database management system (CD)	1	
RF505UM	User's manual	1	
	<b>Calibration tools (option):</b>		
RF505.11	Calibration block		4
RF505Calibr	Calibration software		

The profilometer comes in the special case that protects the device against any possible damage.



## 8. Device structure

### 8.1. Basic components of the device and their functions

Fig. 1 shows basic components of the device:



**Figure 1**

- (1) Digital readout device (personal digital assistant, PDA)
- (2) Laser scanning module
- (3) Calibration block
- (4) Charging device
- (5) Data cable

#### 8.1.1. Digital readout device

Digital readout device (PDA) is designed for control of the laser scanning module, data reception from the scanning module, indication of measurement results, parameter input, and data storage.



**Figure 2**

Fig. 2 indicates:

- (1) Turn-on button
- (2) Charging indication, red/blue LED
- (3) Connector to PC USB-port or charging device
- (4) Flash memory card connector
- (5) Stylus
- (6) Bluetooth antenna

Overall dimensions of PDA are shown in figure 3:

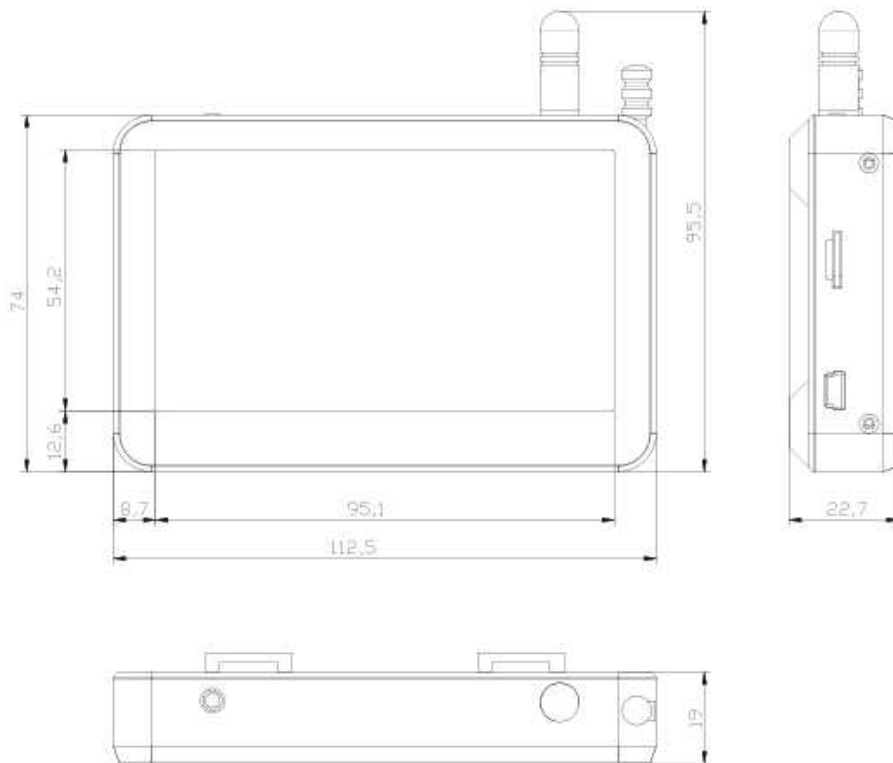


Figure 3

### 8.1.2. Laser scanning module

The module is intended for laser scanning of the wheel surface.

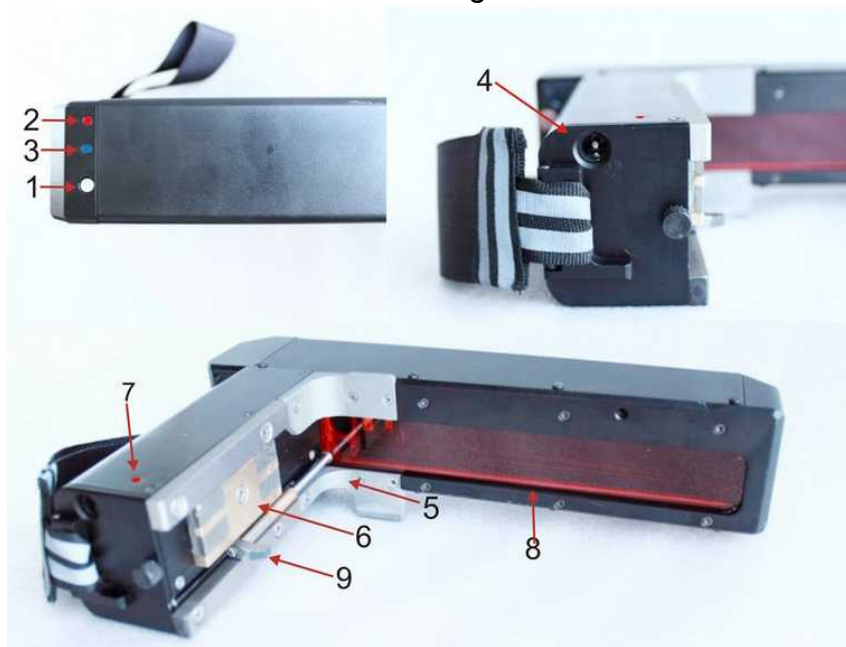


Figure 4

Fig. 4 indicates:

- (1) Turn ON button
- (2) Indicator of turn ON (red LED)
- (3) Indicator of Bluetooth connection (blue LED)
- (4) Charging device connector
- (5) Support for mounting of the device on the wheel flange

- (6) Magnetic support for mounting on the wheel side surface
- (7) Charging indication, red/green LED
- (8) Output window
- (9) Rim measurement rod

Overall dimensions of the standard scanning module are shown in figure 5.

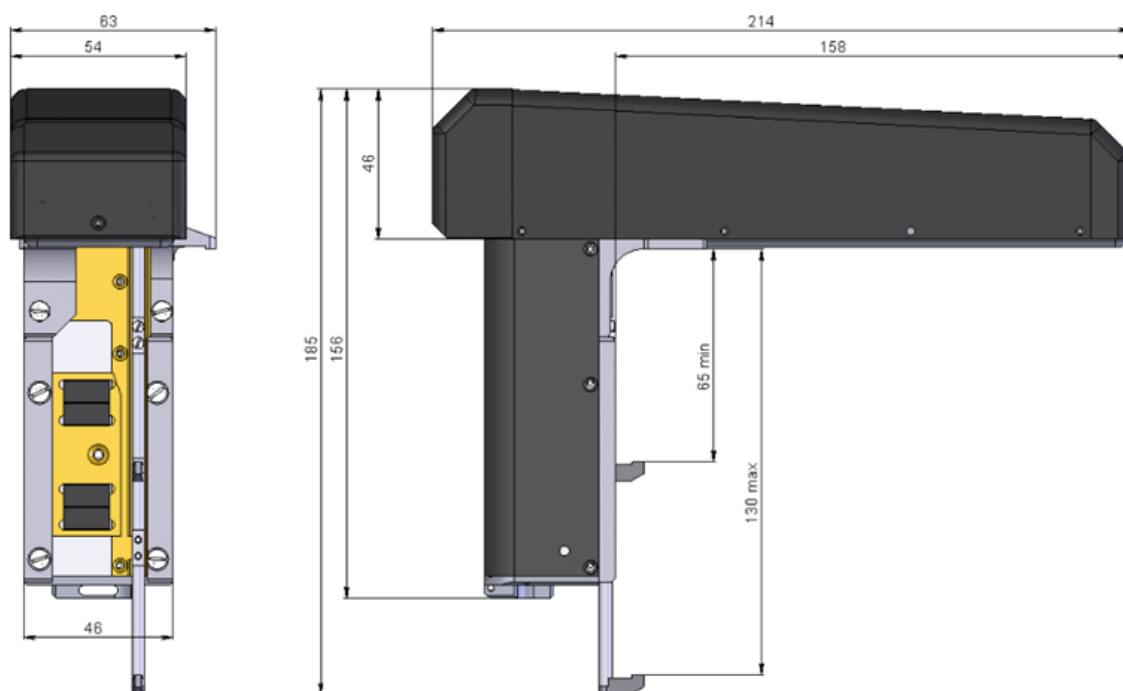


Figure 5

Overall dimensions of the scanning module with the shortened handle are shown in figure 6.

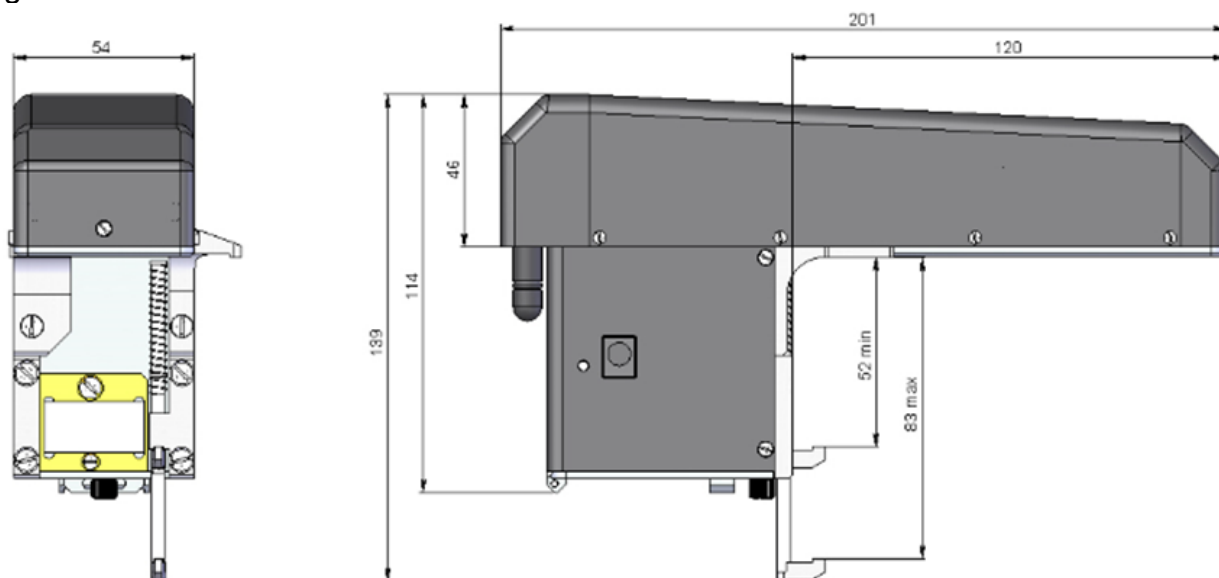


Figure 6

Overall dimensions of super short scanning module and battery block are shown in figure 6.1.

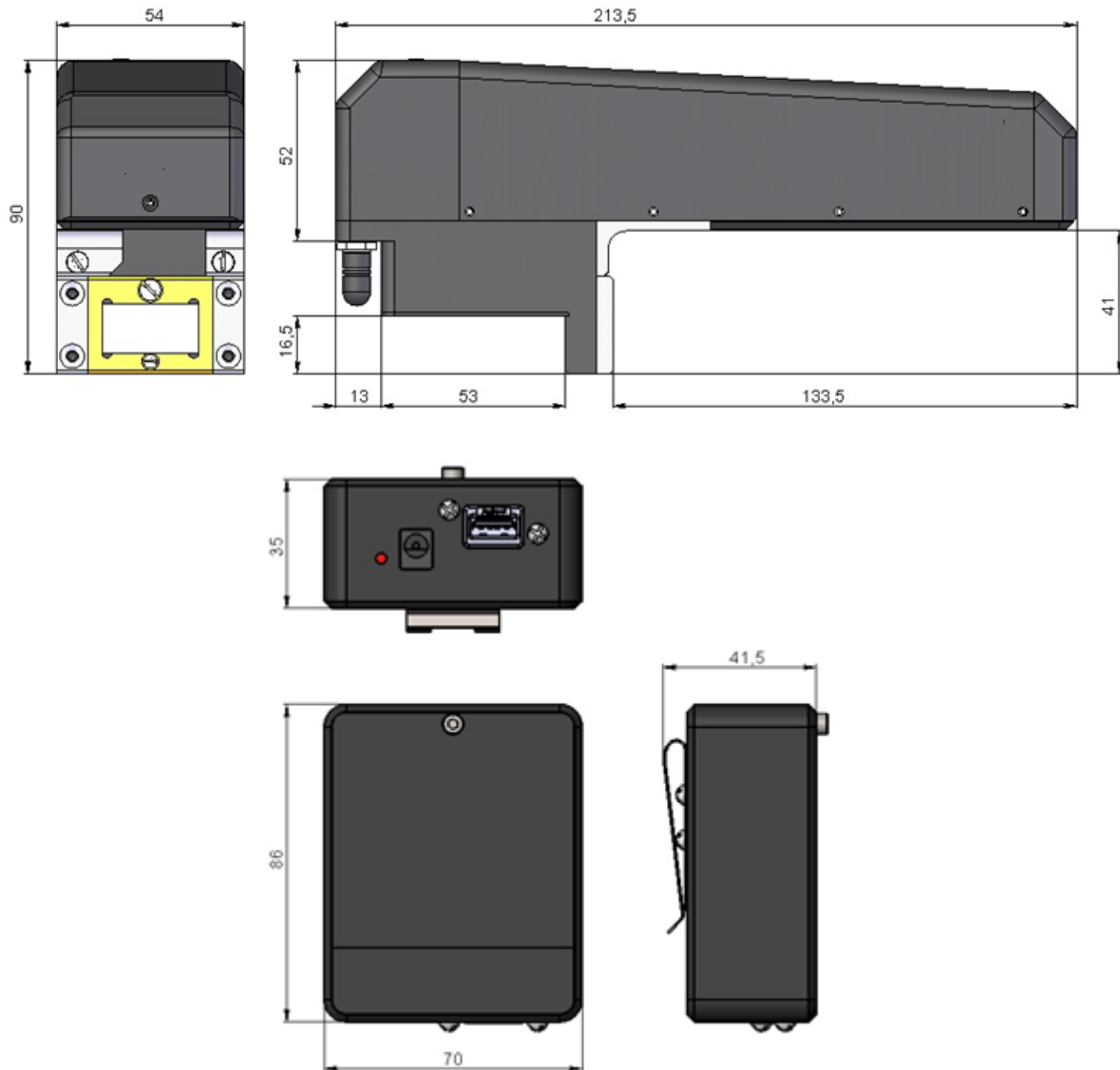


Figure 6.1

### 8.1.3. Calibration block

Calibration block is intended for calibration and tests of the profilometer. Calibration block is a metal imitator of the part of wheel with a definite profile.

Overall dimensions of calibration block are shown in figure 1A of paragraph [30.3](#). Also possible is supply of a unit with a profile made to the customer's drawings.

## 9. Operation principle

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. Measurement results (geometric parameters and profile of the surface) are displayed on PDA, can be saved in the PDA memory, and transferred to the PC database. Simultaneously, additional parameters can be saved: operator number, side identifier (left or right wheel), axis number, locomotive (carriage) number, wheel pair number, etc.

Video demonstration: <https://riftek.com/eng/products/~show/instruments/railway-devices/railway-wheel-profile-gauge-ikp>

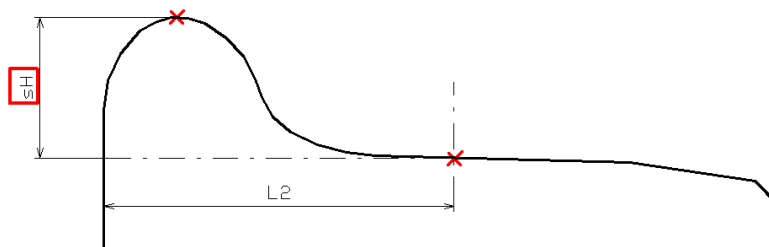
## 10. Geometric parameters of the wheel under control

Geometric parameters of the wheel are calculated automatically after laser scanning of the wheel is completed. To calculate geometric parameters, use is made of reference points on the wheel profile. Location of the reference points is defined by L- and P-parameters. Values of L- and P-parameters preset in PDA are given in paragraph [14.4.](#) and can be changed by the user.

### 10.1. Flange height, sH

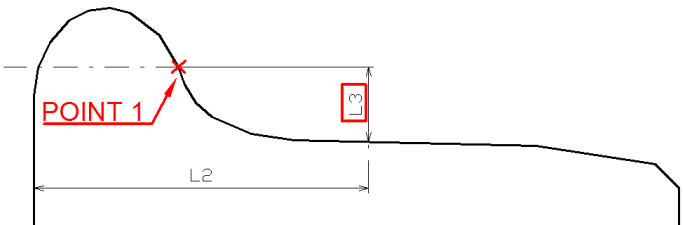
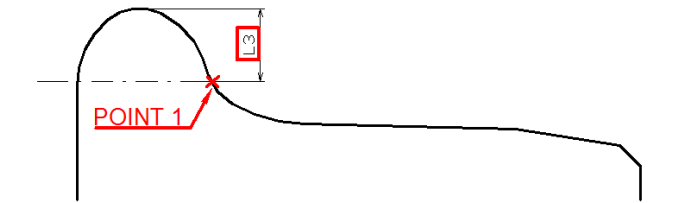
Calculation of the flange height is determined by parameter L2.

The flange height is calculated as a distance measured vertically between the flange top and the point of wheel rolling surface at any preselected distance (L2) away from the inner face of the wheel tire.



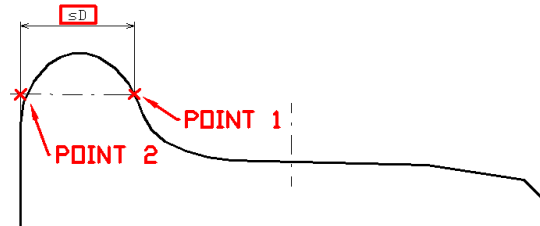
### 10.2. Flange thickness, sD

Calculation of the flange thickness is determined by parameter L3 that specifies Point 1 on the flange surface. There are two ways to specify the parameter:

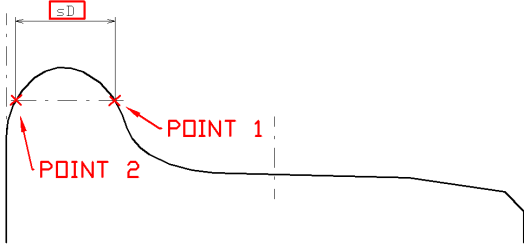
Method 1	
Height L3 is measured vertically upward from a point of the wheel rolling surface, the position of which is defined by parameter L2.	
Method 2	
Height L3 is measured vertically downward from the flange top.	

The flange thickness is calculated as a distance measured horizontally at any preselected height (L3) between two points (Point 1 and Point 2) lying on the opposite sides of the flange top.

There are two ways to calculate the flange thickness:

Method 1	
Point 1 is defined by parameter L3. Point 2 is the intersection point of a horizontal line and a line lying on the internal face of the wheel.	

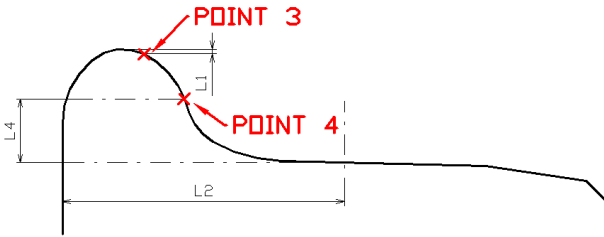


Method 2	
Point 1 is defined by parameter L3. Point 2 is the intersection point of a horizontal line and the flange surface.	

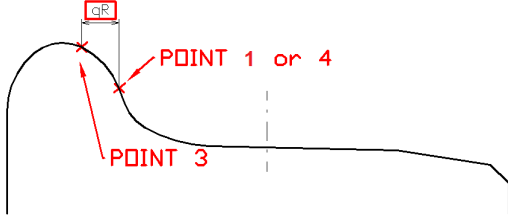
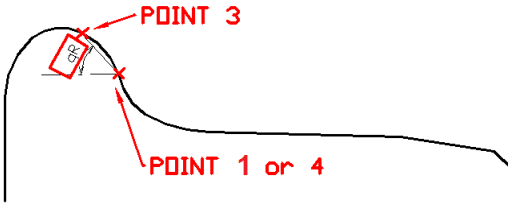
**Note:** Both calculation methods can be performed simultaneously.

### 10.3. Flange slope, qR

Calculation of the flange slope is determined by parameters L1 and L3 (or L4).

<p>Height L1 is measured vertically downward from the flange top and determines Point 3 on the flange surface.</p> <p>Height L4 is measured vertically upward from a point of the wheel rolling surface, the position of which is defined by parameter L2 (wheel rolling circle), and determines Point 4 on the flange surface.</p> <p>Height L3 is described in paragraph <a href="#">10.2</a>.</p>	
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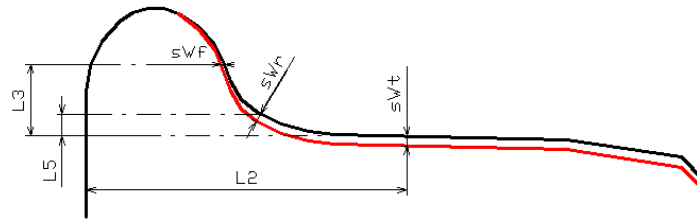
There are three ways to calculate the flange slope:

Method 1 <b>Calculation in millimeters</b>	
The flange slope is calculated as a distance measured horizontally between Point 3 and Point 1 (or 4). The PDA screen displays information in millimeters.	
Method 2 <b>Calculation in degrees</b>	
The slope is calculated as the inclination angle of a straight line passing through Point 1 or 4. The PDA screen displays information in degrees.	
Method 3 <b>Pass/Fail</b>	
The calculation is performed according to Method 1. The PDA screen displays information only about whether the measured slope meets the tolerance conditions or not.	

### 10.4. Wear parameters

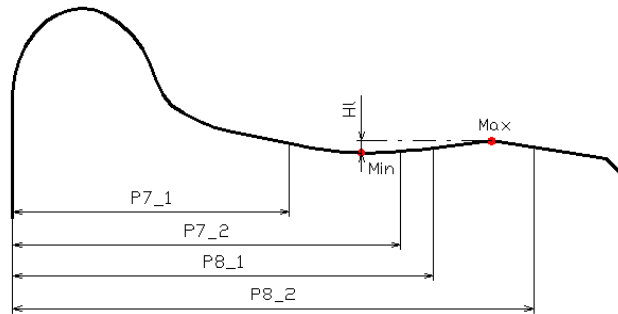
The following wear parameters are calculated automatically:

Vertical wear	Wt	is calculated as the difference between the measured flange height and the flange height of the selected reference.
Horizontal wear	Wf	is calculated as the difference between the measured flange thickness and the flange thickness of the selected reference at the height L3.
Corner wear	Wr	is calculated as the distance along the normal to the tangent at a point on the height L5 from the wheel rolling circle of the measured profile, and the selected reference.

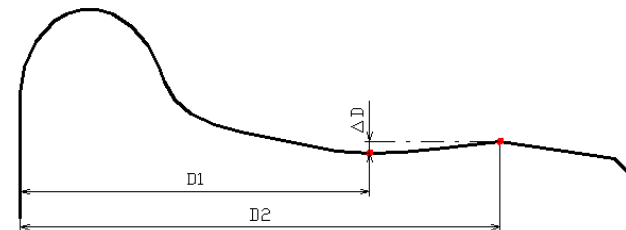


\* Red color indicates the worn profile

Hollow	HI	<p>is calculated as the difference between the maximum and minimum values within the specified limits.</p> <p>The search limits:</p> <ul style="list-style-type: none"> <li>- parameters of the minimum value [P7_1..P7_2]</li> <li>- parameters of the maximum value [P8_1..P8_2]</li> </ul>
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Difference of diameters	dD	is calculated as the difference between diameter at point D1 and diameter at point D2.
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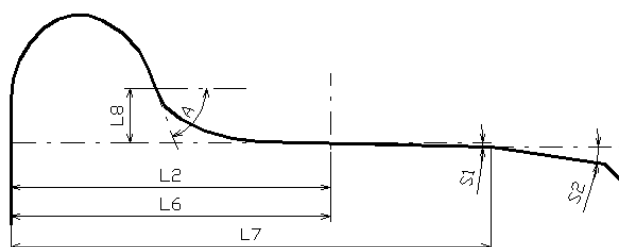


Even wear	W1	is the maximum vertical wheel wear selected from several measurements.
Uneven wear	W2	is the difference between the maximum wheel wear and the minimum wheel wear (selected from several measurements).

## 10.5. Angle parameters

The following profile parameters are calculated automatically:

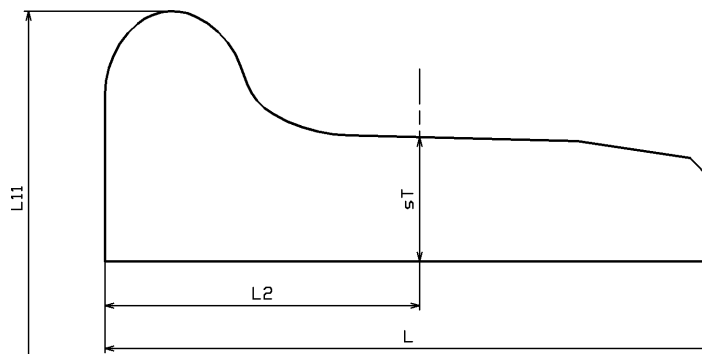
Inclination	A	is calculated as the profile inclination angle (in degrees) at a point with coordinate L8.
Angle 1	S1	is calculated as the inclination angle of the straight line (in percents) passing through points on the wheel surface located at preset distance L6 from the wheel face and the distance L6+10mm from the wheel face.
Angle 2	S2	is calculated as the inclination angle of the straight line (in percents) passing through points on the wheel surface located at preset distance L7 from the wheel face and the distance L7+10mm from the wheel face.



## 10.6. Rim parameters

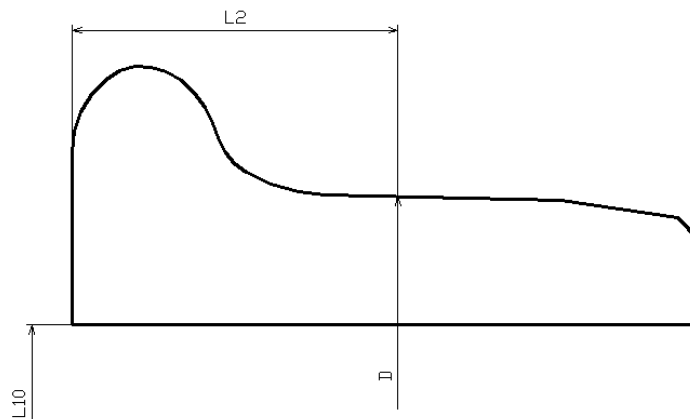
The following rim parameters are calculated automatically:

Rim width	L	is calculated as a distance measured vertically between the internal and the external basic wheel surface.
Rim thickness	sT	is calculated as a distance measured vertically between the internal rim diameter and a point on the wheel rolling circle located on any preset distance L2 from the wheel face.
		L11 is an external wheel diameter.



## 10.7. Wheel diameter

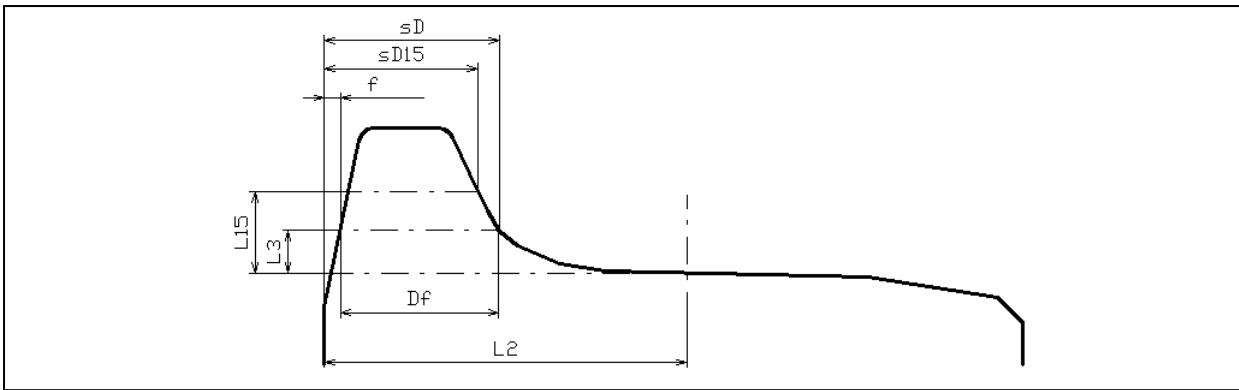
Diameter	D	is calculated by the formula: $D = 2 \cdot T + L10$ , T – rim thickness L10 – diameter of the wheel center
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## 10.8. Parameters of tram wheels

The following parameters of the tram wheels profile are calculated automatically:

Flange thickness	sD15	is calculated as a distance measured horizontally at the set height (L15) between two points: 1st point is at the internal flange surface, 2nd point is at the line lying on the internal face of the wheel surface.
Flange thickness	Df	is calculated as a distance measured horizontally at the set height (L3) from the surface of the wheel rolling circle between two points lying on opposite sides from the flange top.
Reverse slope	f	is calculated as a distance measured horizontally from the point on the internal flange side at the set height (L3) to the point on the line lying on the internal face of the wheel.



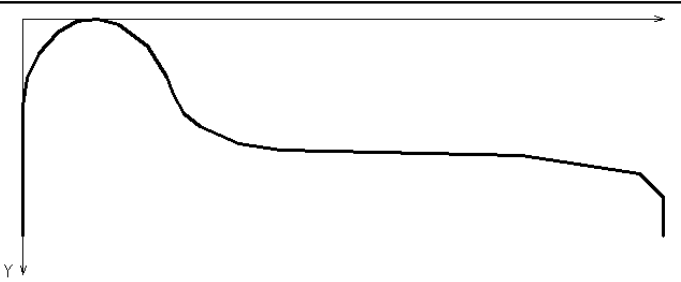
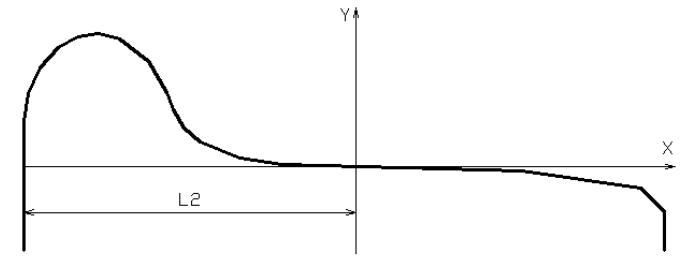
## 10.9. Wheel defects

The following parameters of defects of the wheel surface are calculated:

Slide	sP	is calculated as a difference of the wear measurements in two places of the wheel: on the slide and close to it (in the place without defects) at the point on the wheel rolling circle at any preset distance (L2) from the wheel face.
Cavity size	hR	is calculated as a difference of the wear measurements in two places of the wheel: on the cavity and close to it (in the place without defects) at any profile point.
Cavity area	sR	is calculated in the place of the maximum deviation.

## 11. Coordinate system

When comparing the profiles, two variants of location of the coordinate system of the wheel is possible to use.

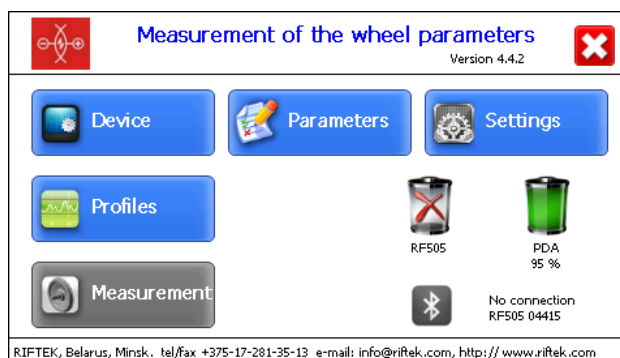
Coordinate system origin	
<p><b>Top</b></p> <p>When comparing and displaying profiles, the coordinate system origin is located at the intersection point of lines passing through the profile top and the internal wheel surface.</p>	
<p><b>Wheel rolling circle</b></p> <p>When comparing and displaying profiles, the coordinate system origin is located at the intersection point of lines passing through the wheel rolling circle.</p>	

## 12. First activation and measurement procedure

Charge accumulators of the laser module and indication device by connecting them to charging devices (see par. 28).

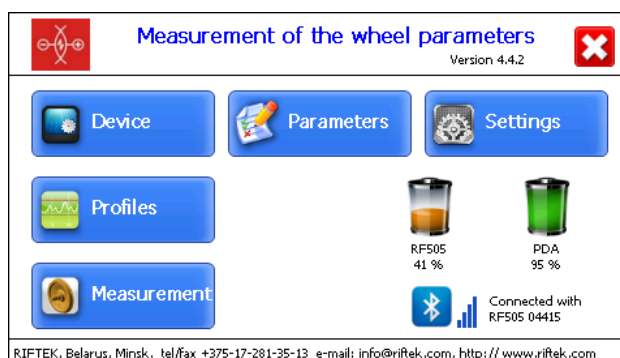
### 12.1. Activation

- Turn the PDA on by pressing the button (1), Fig. 2. The PDA screen will show the main program window containing: main menu; indicators of PDA and laser module charging degree; indicator of Bluetooth connection.



Button	Assignment
Device	Setting the PDA basic parameters (p.13)
Parameters	Setting the measurement parameters (p.14)
Settings	Setting parameters of database, tolerances, and others (p.15)
Profiles	View the wheelset profile (p.20.2.)
Measurement	Run the measurement process (p.12.2.)

- Switch the laser module on by pressing and holding button 1 (Fig. 4) for several seconds. When connecting the laser module, a red LED blinks (2).
- After the laser module is switched on, some time will pass until automatic wireless communication is set between the profilometer and the PDA, which is accompanied by blinking of a blue LED (3) on the laser module. The LED goes out when the link is established.
- The main program window will be updated.



The **Measurement** button, indicator of Bluetooth connection, serial number of the laser scanning module, and indicators of the charging degree will be active.

## 12.2. Measurement

There are two types of measurements:

1. Rapid measurements without saving the results.
2. Measurements by using the selected scheme with saving results to database.

The measurement procedure by using type 2 is described in par. 18. How to select the measurement type see in par. 13.1.

Measurement by using the scheme (type 2) is used for full-featured work with the profilometer with maintaining the database of measurements.

### Attention!



Before installing the scanning module onto the wheel, you need to remove the dirt from the areas, where the laser scanning module will be in contact with the wheel surface. When installing the laser scanning module onto the wheel, avoid of strong impacts of its supports, because it can lead to incorrect operation of the profilometer.



You need to inspect periodically the output window and basic supports of the laser scanning module and to clean them of dirt.  
Do not clean the glass by using abrasive and aggressive cleaning agents.

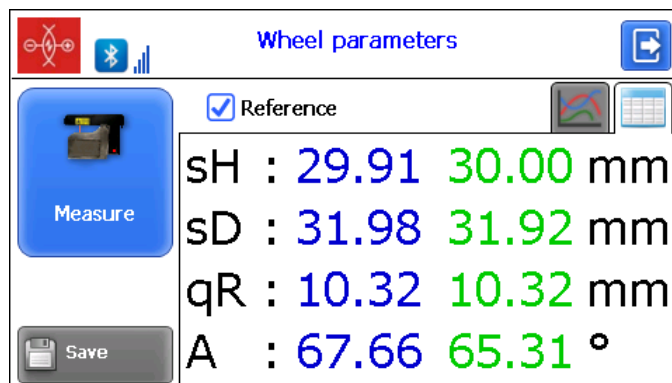
To perform the measurement, it is necessary to:

- Fix the laser module on the calibration unit or wheel by mounting the module support (5) onto the wheel flange and pressing magnetic support (6) to the internal face of the wheel.
- For the rim measurement, extract the rim measurement rod and hitch it up to the rim.

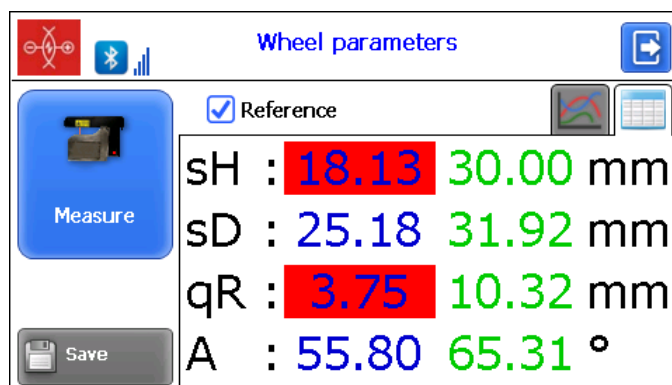


Figure 6

- Make sure that the module is mounted correctly without any misalignment and gaps.
- Press the **Measurement** button on the PDA display.
- With the **Measurement** button pressed, the laser module will scan the wheel surface. During scanning time of about 1-2 seconds a red LED (2) is lit.
- When scanning is completed, the PDA will show values of measured parameters selected for presentation (see par. 14.2.).

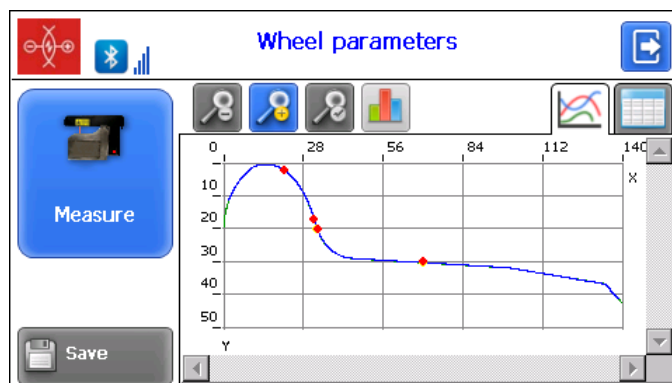


When the parameter goes beyond set limits its value is highlighted with red color:



The **Reference** option enables/disables the display of the reference profile parameters on the screen (highlighted in green ).

- To view the wheel profile, press the **Profile** button, and the PDA display will show the scanned wheel profile, the measured parameters, and parameters of calibration unit (or a wheel, chosen as a reference):



- If you scan the calibration block or the reference wheel and scanning results differ from the reference values by no more than 0.1 mm, the device is ready to work, otherwise it must be calibrated in accordance with par. [27.1](#) or [30](#).

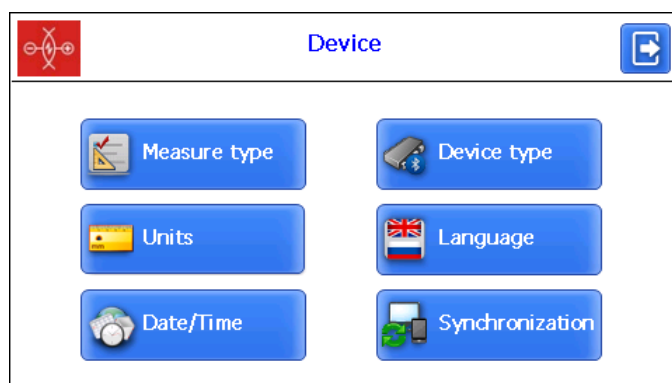


The **Save** button is not active in the **Rapid measurements** mode.

## 13. PDA basic parameters setting

Prior to starting work with the profilometer, PDA program setting must be performed.

The window of basic parameters setting is called by pressing the **Device** button in the main program window (par. [12.1](#)):



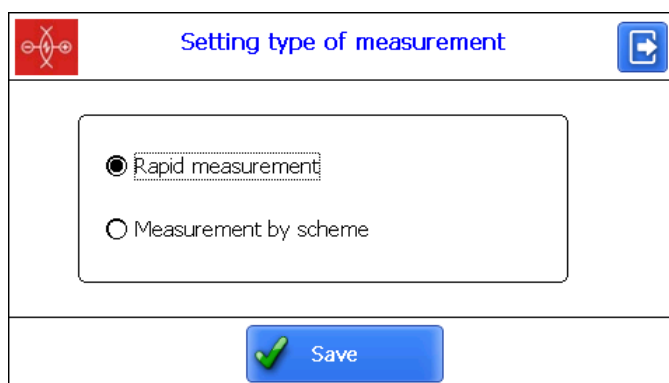
Button	Assignment
Measure type	Rapid measurements/measurements with saving results to database
Units of measurement	Millimeters/inches
Date/time	Date/time setting
Device type	Device selection (IKP, IDK, IMR)
Language	Language selection
Synchronization	Synchronization with PC

### 13.1. Measurement type

Two measurement types are available:

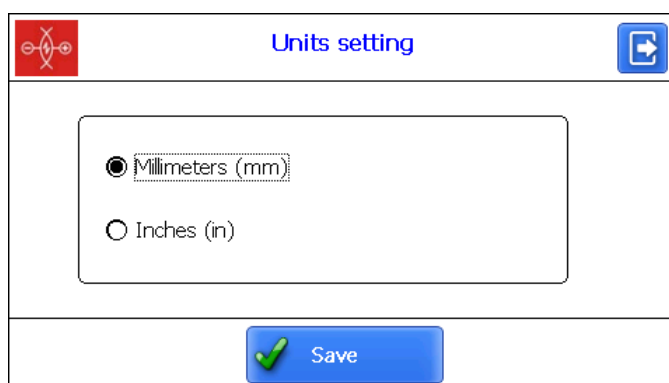
1. Rapid measurements without saving the results.
2. Measurements by using the selected scheme with saving results to database.

To set the measure type, press the **Measure type** button. Then select the measure type: **Rapid measurement** or **Measurement by scheme**. Press the **Save** button.



### 13.2. Units of measurement

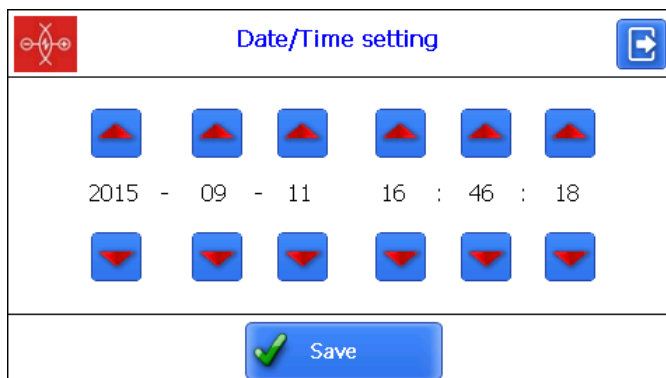
All parameters and measurement results can be in the Metric system (millimeters), or in the English system (inches). To set the units of measurement, press the **Units** button. Next, select **Millimeters (mm)** or **Inches (in)**, and press **Save**.





### 13.3. Date/time setting

To set date and time, press the **Date/Time** button. Next, by using the buttons  , set the date and time values, and press the **Save** button.



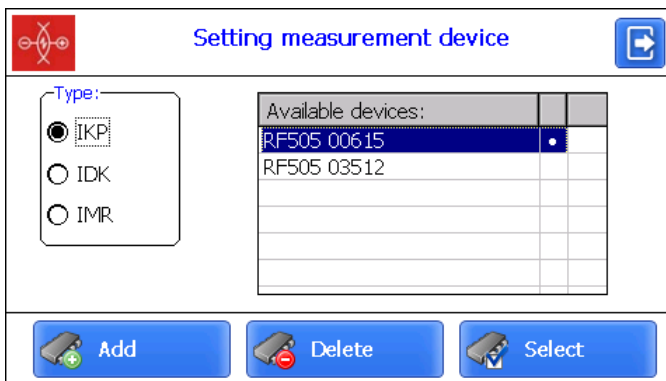
The screen displays the date and time settings. The date is set to 2015 - 09 - 11 and the time is set to 16 : 46 : 18. Below the date and time, there is a **Save** button with a green checkmark icon.

### 13.4. Device selection

PDA Bluetooth-connection is automatically configured to work with the laser scanning module, which comes bundled with the PDA. Moreover, the PDA provides operation with other IKP scanning modules and measurement instruments for railway transport manufactured by RIFTEK (Wheel Diameter Measuring Gauge, IDK; Back-to-Back Distance Measuring Gauge, IMR).

To connect other device, press the **Device type** button. The device selection window contains 3 types of devices available for connecting to PDA: IKP, IDK, IMR.

Each type of devices has a list of available devices (devices, with which connection has been established earlier, and which have been saved in the IKP memory).



The screen displays the device selection interface. On the left, under "Type:", there are three radio buttons: **IKP** (selected), **IDK**, and **IMR**. On the right, under "Available devices:", there is a list of devices with two columns: Name and Address. The list contains two entries: RF505 00615 and RF505 03512. At the bottom, there are three buttons: **Add** (with a plus icon), **Delete** (with a minus icon), and **Select** (with a checkmark icon).

If the device that you need is included in the list, you can select it and press the **Select** button. The PDA will attempt to connect to the selected device.

If the device number is absent in the list, you can add it. In order to do it, you need to press the **Add** button and to go to the window for searching Bluetooth devices.



The screen displays the device searching interface. At the top, it says "Tap 'Start' to search for other Bluetooth device." Below this, there is a table with two columns: **Name** and **Address**. The table is currently empty. Below the table, it says "0 Devices found". At the bottom, there are two buttons: **Start** (with a magnifying glass icon) and **Save** (with a checkmark icon).

To search for devices, press the **Start** button and wait until the search is completed:



Name	Address

0 Devices found

Start Save

Detected devices (with serial numbers) will appear on the screen:

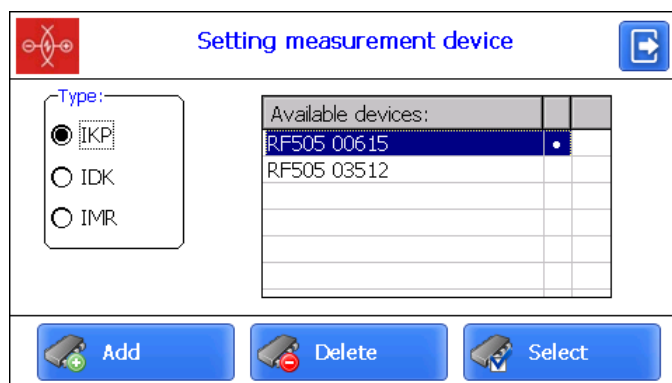


Name	Address
RF505 00615	00:12:6f:2b:fe:c6

1 Devices found

Start Save

Next, select the device and press the **Save** button to save the address of a new device.



Type:

☒ IKP  
☐ IDK  
☐ IMR

Available devices:	
RF505 00615	
RF505 03512	

Add Delete Select

You can delete the device that you do not use anymore by pressing the **Delete** button.



Type:

☒ IKP  
☐ IDK  
☐ IMR

Available devices:	
RF505 00615	
RF505 03512	

Add Delete Select

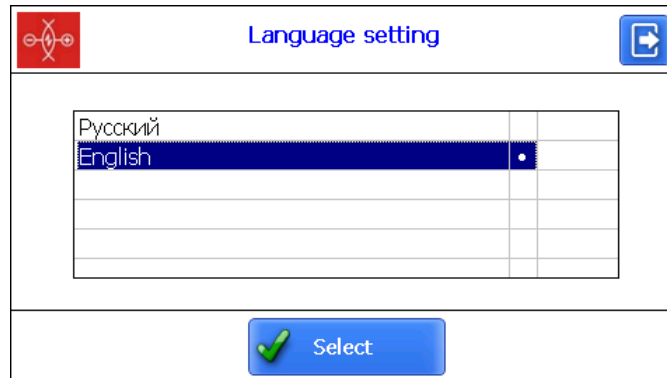
Are you sure you want to delete this device?

Yes No

## 13.5. Language setting

It is possible for the user to change the program language, form his own language support files as well as change/edit the terminology used.

To select the language, press the **Language** button. Next, select the required language support file and press the **Select** button.



If no such file is available, it is necessary to use the new files preparation procedure, which is described in par. [22.2.4.1.](#), and then load a new language file from PC to PDA as it is shown in par. [23.1.3.](#)

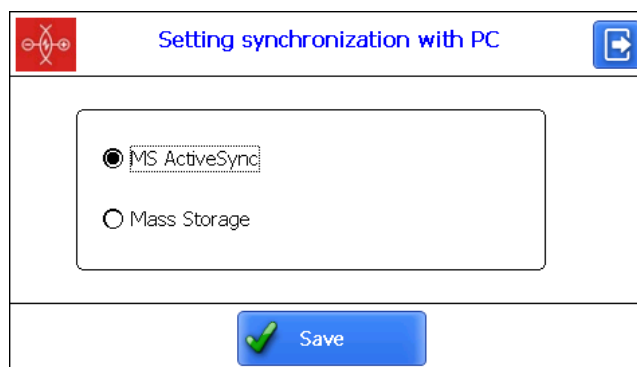
## 13.6. Synchronization with PC

To transfer data between PDA and PC, it is necessary to synchronize them. There are two ways of synchronization via USB cable.

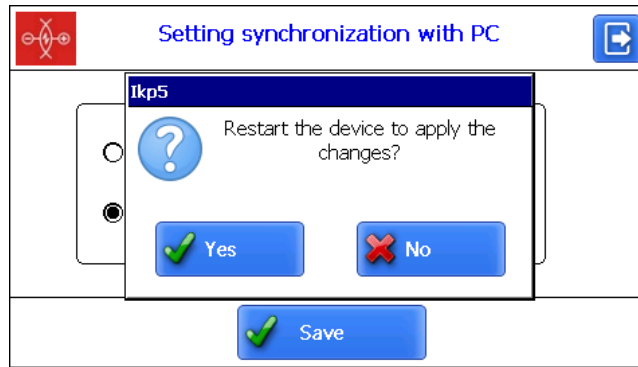
When you select **MS ActiveSync**, synchronization with PC is performed via the **ActiveSync** software (Windows XP), or via **Windows Mobile Device Center** (Windows 7).

When you select **Mass Storage**, the device is detected in Windows as an external storage device.

To select the type of synchronization, press the **Synchronization** button in the **Device** window. Next, select the required type and press **Save**.

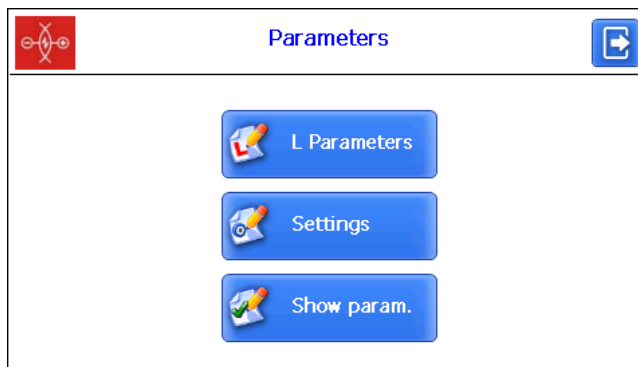


To apply the changes, PDA will prompt you to restart. If you do not need to sync the PDA with PC currently, you can restart the PDA later.



## 14. Measurement parameters setting

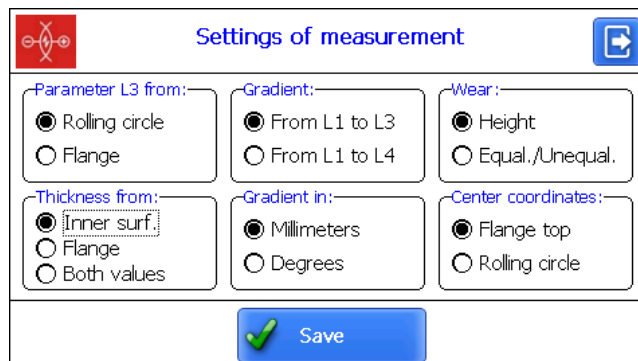
The **Parameters** window, which is called from the main program window, is intended for calculation settings of controlled parameters of the wheel.



Button	Assignment
Settings	Calculation methods setting
Show param.	Selection of displayed parameters
L Parameters	L Parameters setting

### 14.1. Calculation methods setting

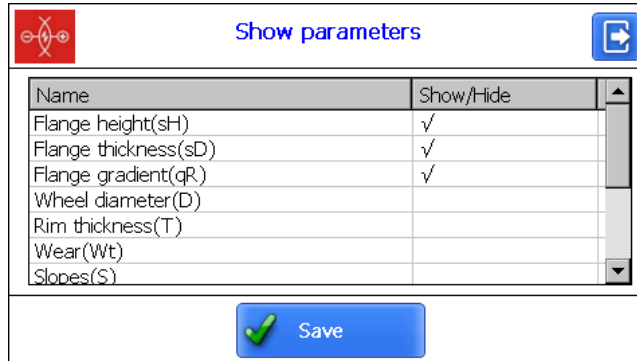
To select the method of the geometrical parameters calculation, press the **Settings** button. The window of measurement settings will appear on the screen according to par. [10](#):



After selecting the required parameters, press the **Save** button.

## 14.2. Selection of displayed parameters

To enable the mode, press the **Show param.** button.




Name	Show/Hide
Flange height(sH)	✓
Flange thickness(sD)	✓
Flange gradient(qR)	✓
Wheel diameter(D)	
Rim thickness(T)	
Wear(Wt)	
Slopes(S)	

To select/deselect the parameter to display, double-click in the column **Show/Hide** opposite to the required parameter. After selecting, you need to press **Save**.

## 14.3. L Parameters setting

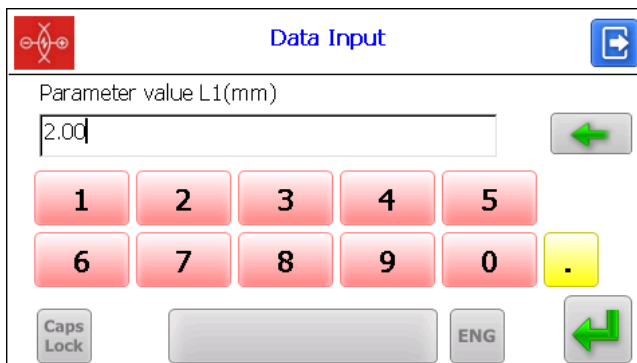
To set L-parameters, press the **L Parameters** button.

In the table will be displayed only those parameters, which are necessary to calculate the selected geometrical parameters of the wheel.



Code	Value	mm
L1	2.00	mm
L2	70.00	mm
L3	13.00	mm
L15	15.00	mm

To edit the parameters, double-click in the **Value column** opposite to the required parameter, and enter a new value in the **Data Input** window. Press the **Enter** button - .



When you set all parameters, press the **Save** button to save them.

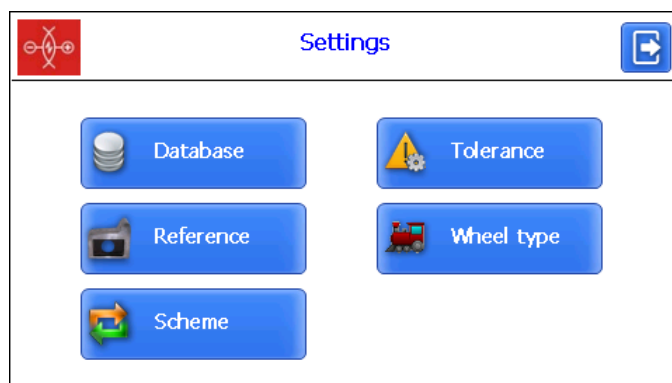
## 14.4. Preset parameters values

Values of L-parameters preset in the PDA are given in the Table:

L- параметр	Default value	Assignment
<b>L1</b>	2 mm	Used for calculation of the flange slope ( <b>qR</b> )
<b>L2</b>	70 mm	Defines position of the wheel rolling circle, and used for calculation: - flange height ( <b>sH</b> ) - flange thickness ( <b>sD</b> ) - flange slope ( <b>qR</b> ) - inclination angle ( <b>A</b> ) - wheel diameter ( <b>D</b> ) - rim thickness ( <b>T</b> ) - wear ( <b>Wt</b> , <b>Wf</b> , <b>Wr</b> )
<b>L3</b>	13 mm	Used for calculation: - flange thickness ( <b>sD</b> ) - flange slope ( <b>qR</b> ) - wear ( <b>Wf</b> )
<b>L4</b>	13 mm	An additional point for calculation of the flange slope ( <b>qR</b> )
<b>L5</b>	10 mm	Used for calculation of an angular wear ( <b>Wr</b> )
<b>L6</b>	70 mm	Used for calculation of slope of the rolling surface section ( <b>S1</b> )
<b>L7</b>	105 mm	Used for calculation of slope of the rolling surface section ( <b>S2</b> )
<b>L8</b>	10 mm	Used for measurement of the profile inclination angle at the required point ( <b>A</b> )
<b>L9</b>	140 mm	Used for inverting the measurement direction ( <b>L9</b> – profile width)
<b>L10</b>	599,35 mm	Used for calculation of the profile diameter ( <b>D</b> )
<b>L11</b>	767 mm	Used for calculation of the reference profile rim thickness ( <b>T</b> )
<b>L15</b>	13 mm	Used for calculation of the flange thickness of tram wheels ( <b>sD15</b> )
<b>P7_1</b> <b>P7_2</b> <b>P8_1</b> <b>P8_2</b>	50 mm 105 mm 110 mm 130 mm	Used for calculation of the hollow ( <b>HI</b> )
<b>D1</b> <b>D2</b>	70 mm 107,5 mm	Used for calculation of the hollow ( <b>HI</b> )

## 15. Setting the database parameters, tolerances and measurements schemes

The **Settings** window is intended to set the database parameters, tolerances, measurements schemes, etc.

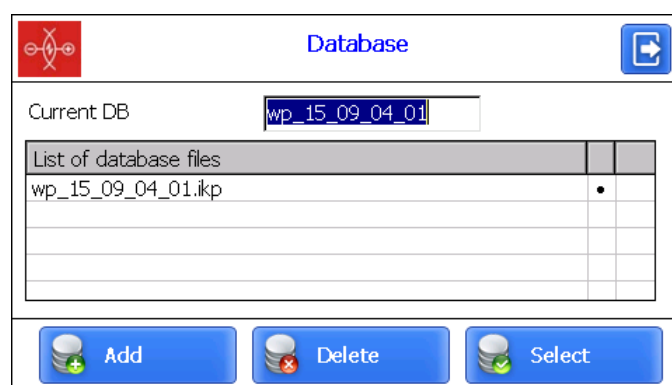


Button	Assignment
Database	Selection of the current database
Reference	Reference profile selection
Scheme	Measurement scheme setting
Tolerance	Tolerances setting
Wheel type	Wheel type selection

### 15.1. Selection of the current database

You can save the measurement results to the PDA database, when it is necessary. The program allows to create and to store several database files related to the date of measurement.

To select the database file, press the **Database** button.



To create a new database, press the **Add** button. The window for entering a name of a new database will appear.

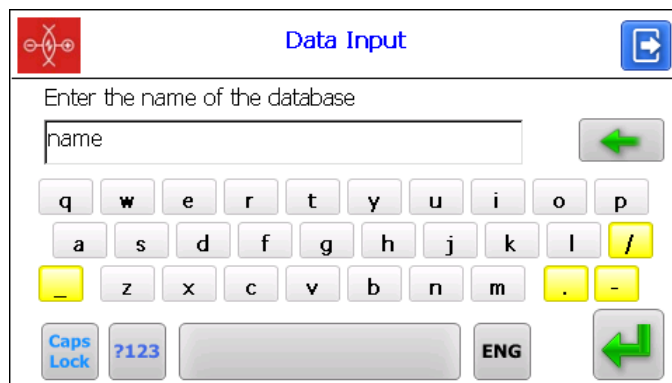
By default, it will be prompted to form the database file with the name **wp\_yy\_mm\_dd.i kp**, where yy\_mm\_dd is the current date:

**yy** – the last two digits of the year;

**mm** – month;

**dd** – day.

You can agree with this name, or enter another:



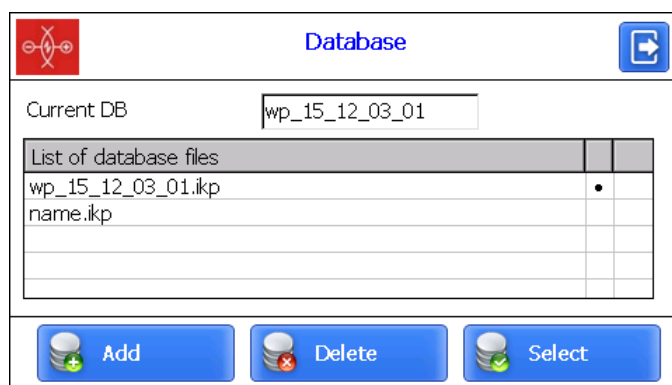
**Data Input**

Enter the name of the database

name

q w e r t y u i o p  
a s d f g h j k l /  
\_ z x c v b n m . -  
Caps Lock ?123 ENG

Then, press the **Enter** button - .



**Database**

Current DB wp\_15\_12\_03\_01

List of database files		
wp_15_12_03_01.ikp	•	
name.ikp		

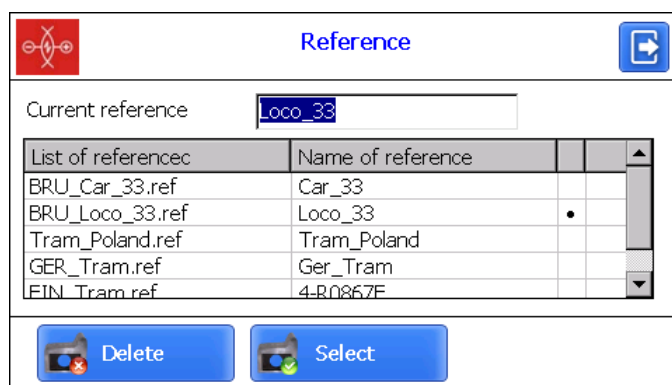
Add Delete Select

To select a database from a list of previously created, activate the respective line and press **Select**. The selected file will be marked with the symbol "•".

To delete the database file, activate the respective line and press **Delete**. If you delete the current database, the error message will appear.

## 15.2. Reference profile selection and installation

The program allows to compare the scanned profile of the wheel with the reference profile. To select the reference profile, press the **Reference** button.



**Reference**

Current reference Loco\_33

List of referencec	Name of reference		
BRU_Car_33.ref	Car_33		
BRU_Loco_33.ref	Loco_33	•	
Tram_Poland.ref	Tram_Poland		
GER_Train.ref	Ger_Train		
FIN_Train.ref	4-R0867F		

Delete Select

To select the reference file, activate the respective line and press **Select**. The selected file will be marked with the symbol "•".

To delete the reference file, activate the respective line and press **Delete**. If you delete the current reference, the error message will appear.



### 15.2.1. Writing reference profile to database

Reference profiles are stored in the PDA database as profile description files with extension **.ref**. The PDA is supplied with several pre-installed profiles.

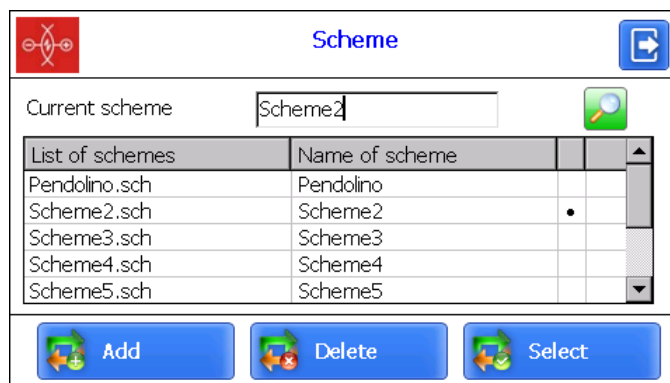
If there is no required reference profile in the database, the user can request the lacking profile from **RIFTEK** (free service), and then to transfer the received profile to the PDA as it is shown in par. [23.1.4](#).

## 15.3. Selection and formation of the measurement scheme

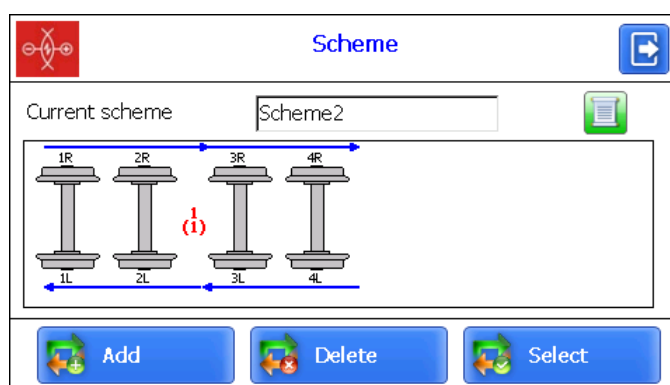
Measurement scheme is meant as a sequence of making measurements/processing of wheels in the rolling stock with specified parameters of each wheelset (wheelset numbers, car numbers, series, etc.). The program automatically offers operator to perform measurement on a concrete wheel in accordance with selected scheme of wheel processing. The program contains several preset schemes. Besides, the user can form his own measurement scheme.

### 15.3.1. Selection or removal of the measurement scheme

To select the measurement scheme file, press the **Scheme** button.



To view the scheme, you need to activate the line containing the scheme file name and to press the **View** button.



Arrows in the figure show direction of processing of wheel pairs as well as the names assigned to wheels (1L-first axis, left side; 2L-second axis, left side; 1R-first axis, right side, etc.).

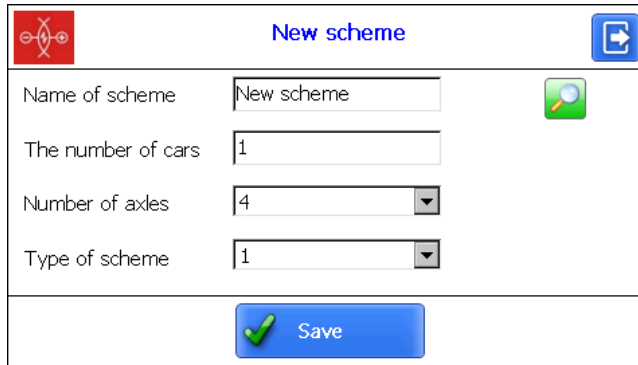
To select the scheme file, activate the respective line and press **Select**. The selected file will be marked with the symbol ".".

To delete the scheme file, activate the respective line and press **Delete**. If you delete the current scheme, the error message will appear.

### 15.3.2. Formation of a new measurement scheme


To form a new measurement scheme, press **Add**. The window for entering the measurement scheme name will appear.

By using on-screen keyboard type the scheme name. Then press the **Enter** button -

Next:

- select the number of cars;
- select the number of axes;
- select the wheel processing scheme out of the options suggested;
- press **Save**.

You can look at the formed scheme by pressing the **View** button - .

This method of formation the measurement scheme allows to create only simple schemes without specifying the numbers of wheelsets, coaches, series, etc. To form a complete scheme, see par. [29](#).

### 15.3.3. Loading of a new measurement scheme

If you can not create a new scheme as described in the previous paragraph, you can use the special program for PC (see par. [29](#)), and then upload that scheme to the PDA as described in par. [23.1.5](#).

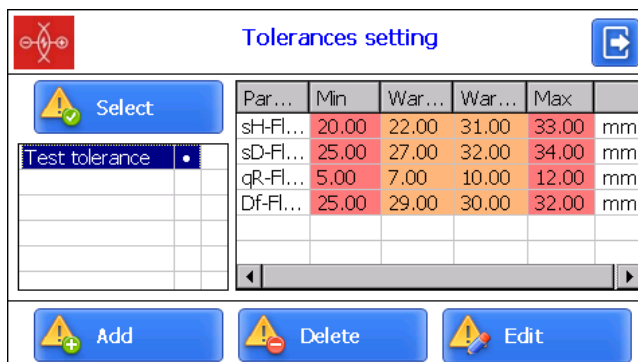
## 15.4. Tolerances setting

The program automatically controls measured geometric parameters for going out beyond the tolerances set. It is possible for the user to create groups of tolerances. Control of parameters will be performed for a selected group.

To select the current group of tolerances, press the **Tolerance** button.

The table will show tolerances only for the selected geometric parameters of the wheel.

A red color indicates the maximum/minimum critical values of parameters. An orange color indicates the maximum/minimum values, which are close to critical values.



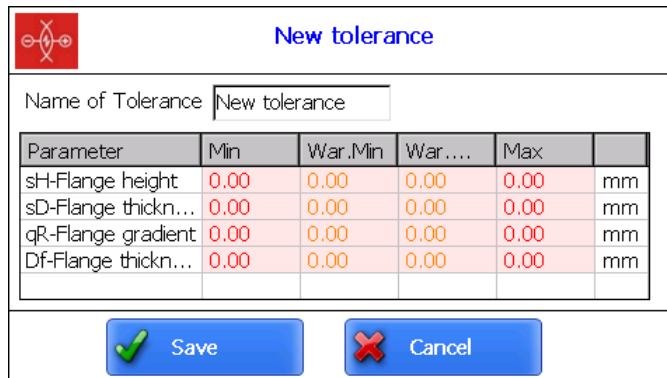
Par...	Min	War...	War...	Max	
sH-Fl...	20.00	22.00	31.00	33.00	mm
sD-Fl...	25.00	27.00	32.00	34.00	mm
qR-Fl...	5.00	7.00	10.00	12.00	mm
Df-Fl...	25.00	29.00	30.00	32.00	mm

To select the group of tolerances, activate the respective line and press **Select**. The selected file will be marked with the symbol "·".


To delete the tolerance, activate the respective line and press **Delete**. If you delete the current tolerance, the error message will appear.

To edit the tolerance, activate the respective line and press **Edit**.

To add a new tolerance, activate the line with the type name and press **Add**. View on the screen:



Parameter	Min	War.Min	War....	Max	
sH-Flange height	0.00	0.00	0.00	0.00	mm
sD-Flange thickn...	0.00	0.00	0.00	0.00	mm
qR-Flange gradient	0.00	0.00	0.00	0.00	mm
Df-Flange thickn...	0.00	0.00	0.00	0.00	mm

To change the type name, it is necessary to set cursor in the **Name of Tolerance** field, and to enter a new value in the appeared window. Then press the **Enter** button - .

To edit the value, it is necessary to double-click on the **Min/Max/War.Min/War.Max** column opposite to the specific parameter, and to enter a new value in the emerged window. Then press the **Enter** button. If any parameter has a zero value, the tolerance will not be used.

To save changes, press **Save**.

## 15.5. Wheel type selection and installation

If several wheels types are used, it is possible to set definite measurement scheme, reference profile and L-parameters for every wheel type

For example, we have three types of wheels: WheelType1, WheelType2, WheelType3. Every time for a new wheel type we can measure L-parameters, scheme, reference and tolerances, or we can define these values for every wheel type, and select only the required type.

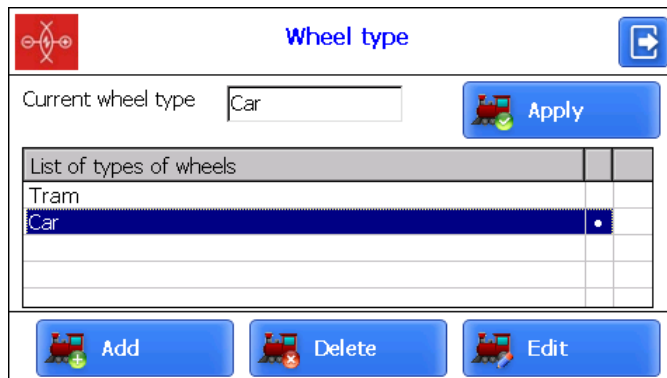
### Example

WheelType 1: Reference 1, Scheme 1, Tolerance 1, L-Parameters 1;

WheelType 2: Reference 2, Scheme 2, Tolerance 2, L-Parameters 2;

WheelType 3: Reference 3, Scheme 3, Tolerance 3, L-Parameters 3;

To select the wheel type, press the **Wheel type** button.



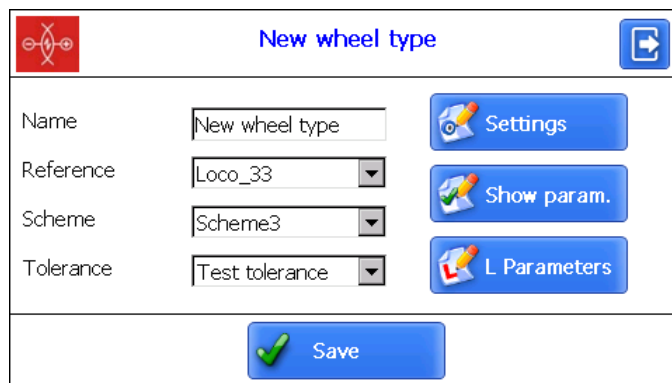
List of types of wheels	
Tram	
Car	•

To select the wheel type, activate the respective line and press **Apply**. The selected file will be marked with the symbol "·".


To delete the wheel type, activate the respective line and press **Delete**. If you delete the current type, the error message will appear.

To edit the wheel type, activate the respective line and press **Edit**.

To add a new wheel type, activate the line with the type name and press **Add**. View on the screen:



32

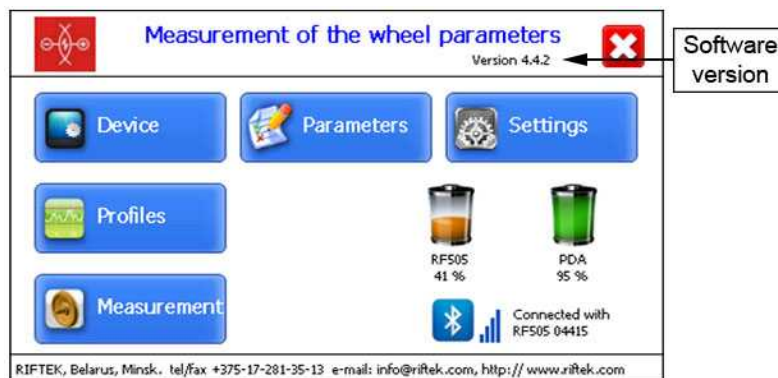
To change the type name, it is necessary to set cursor in the **Name** field, and to enter a new value in the appeared window. Then press the **Enter** button - .

Next:

- select the reference profile (**Reference**);
- select the scheme (**Scheme**);
- select the tolerance (**Tolerance**);
- set Settings (**Settings** button, see par. [14.1.](#));
- set the displayed parameters (**Show param.** button, see par. [14.2.](#));
- set L-parameters (**L Parameters** button, see par. [14.3.](#));
- press **Save**.

## 16. Updating of PDA software

You can view the software version in the main program window:



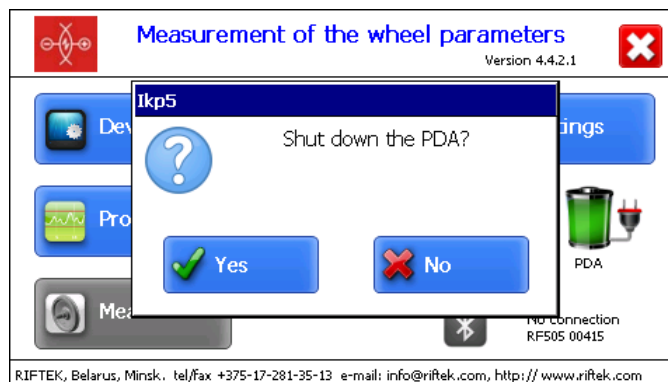
The latest software version can be downloaded from the site:

[www.riftek.com/media/documents/ikp/lkp5\\_PDA\\_Software.zip](http://www.riftek.com/media/documents/ikp/lkp5_PDA_Software.zip)

Procedure of PDA software updating is described in par. [23.1.6.](#) of this manual.

## 17. Shutdown

To shutdown the PDA, press the **Shutdown** button - .



## 18. Measurements with database maintenance

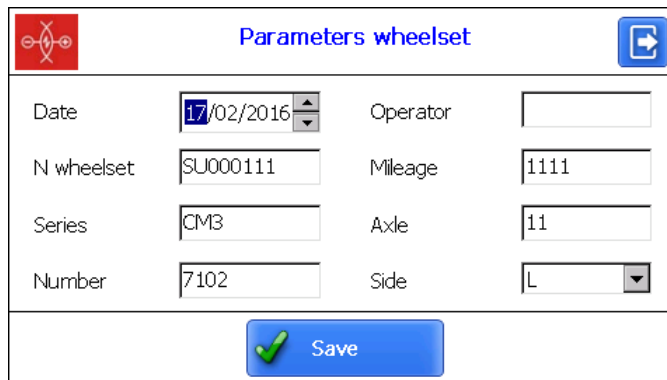
There are two types of measurements:

1. Rapid measurements without saving the results.
2. Measurements by using the selected scheme with saving results to the database.

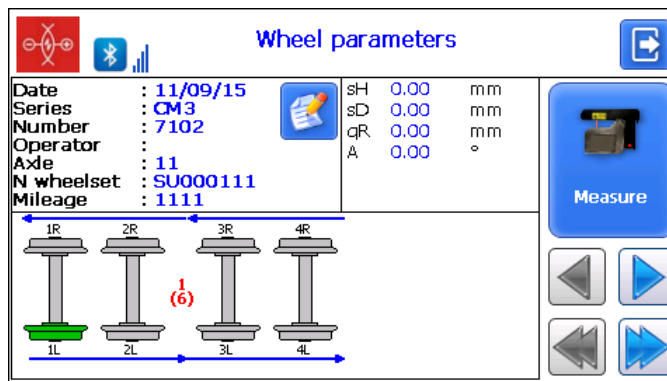
Procedure of rapid measurements is described in par. 12. How to select the measurement type, see par. 12.2.

The second type is used for a fully functional work with the profilometer with maintenance of the measurements database.










When Bluetooth-connection is established, you can pass to measurement by pressing the **Measurement** button in the main program window. The window for entering wheelset parameters will appear on the screen:



Parameters fields will be filled in accordance with the selected measurement scheme. If needed, you can fill/edit the required fields, and press the **Save** button to save changes. The selected scheme will be displayed on the screen:



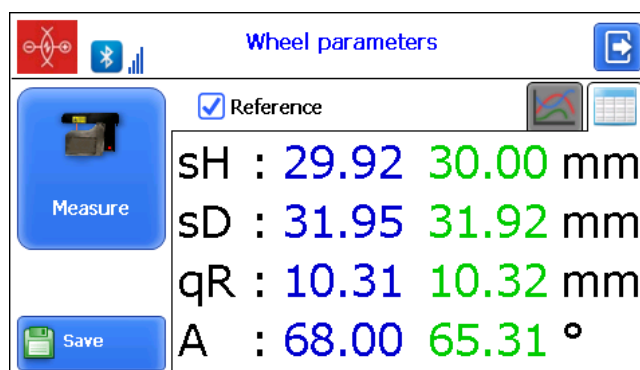
## Designations and buttons:

	order number of the car to be measured (number of cars in the train)
	editing of the inputted wheelset parameters
	pass to a previous/subsequent wheel
	pass to a previous/subsequent car
	a measured wheel
	a wheel to be measured next time
	a non-measured wheel
	a measured wheel to be measured again
	measurement

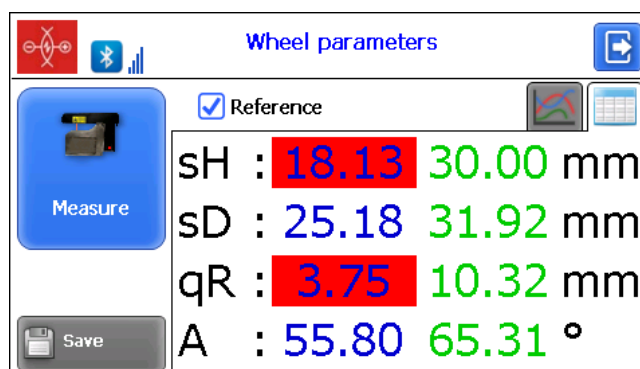
34

## 18.1. Measurement

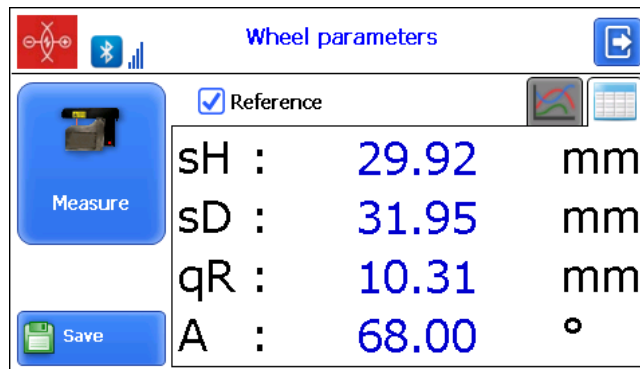
- Measure the wheel offered by program (highlighted in green). To do this, click the **Measure** button. Laser module will scan the wheel surface.
- Upon completion of the scanning process, the measured values of geometrical parameters selected for displaying will appear on the PDA screen.




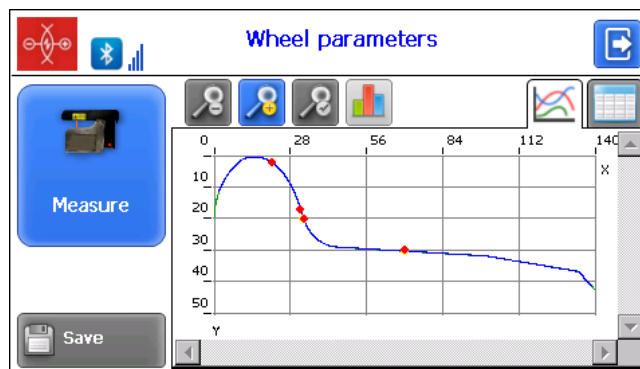
Measured values, which are beyond the tolerances, will be highlighted in red:



The program allows to display only parameters of the measured profile. To hide the reference values, you need to uncheck the **Reference** checkbox.

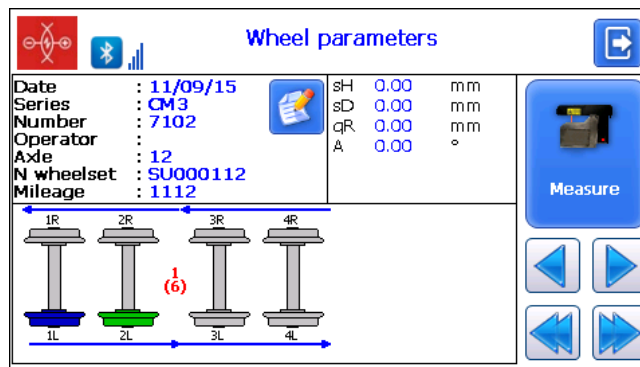


- To view the wheel profile, press the **View** button - . The scanned wheel profile and the selected reference profile will be displayed on the PDA screen.

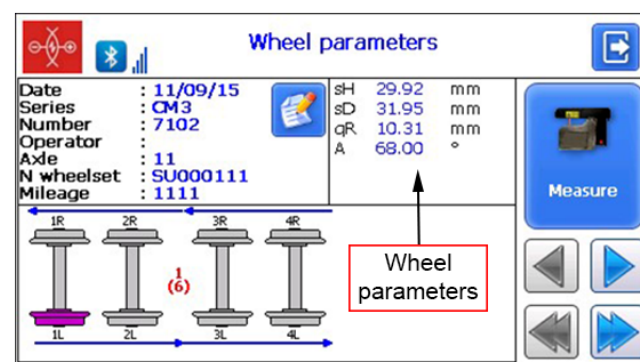


For more information, see par. [20.2](#).

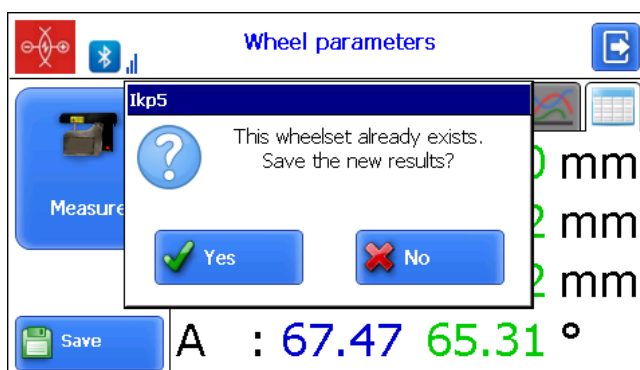
- To perform the measurement again, press the **Measure** button.
- When a satisfactory result is obtained, press the **Save** button to save it.
- The program will offer to pass to measurement of the next wheel in accordance with selected scheme of measurement.



- To view the results of previous measurements, you can use the arrows. If you select the measured wheel, the saved wheel parameters will be displayed on the PDA screen.



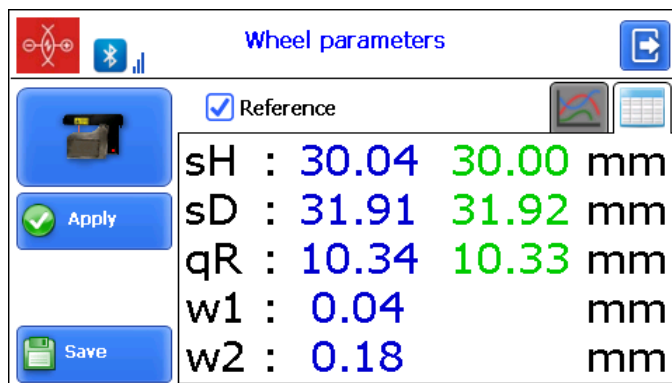
- When you measure the wheel that was previously measured, the program prompts you to replace the existed database file with the new one.



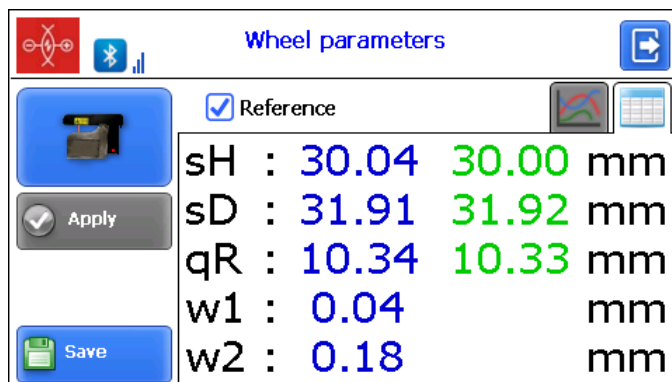
36

## 18.2. Measurement of even/uneven wear

Measurement of an even/uneven wear is slightly different from a standard measurement. To obtain the result of the wear, it is necessary to perform several measurements at different points of the wheel. When passing to the measurement window, an additional button **Accept** will appear on the screen.



After each performed measurement, you need to press **Accept** to save current values of the wear. At subsequent measurements the program will automatically find the maximum and minimum wear of the wheel and calculate an even/uneven wear.



When a satisfactory result is obtained, press the **Save** button to save it.

## 18.3. Measurement of defects

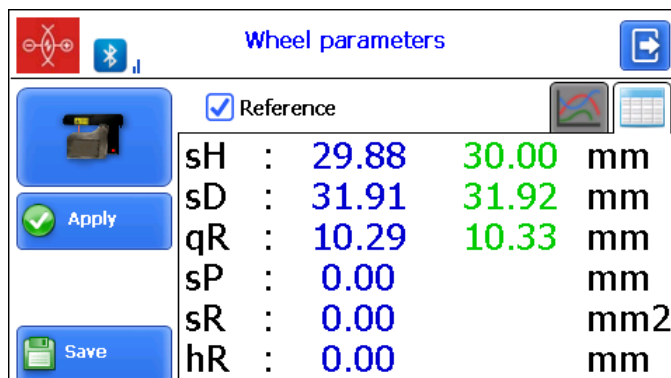
IKP allows to measure defects of wheelsets.

- Slide size (sP)
- Cavity size (hR)
- Cavity area (sR)



Measurement of defects differs from the standard measurement.  
The procedure of measuring the slide (cavity) is described below:

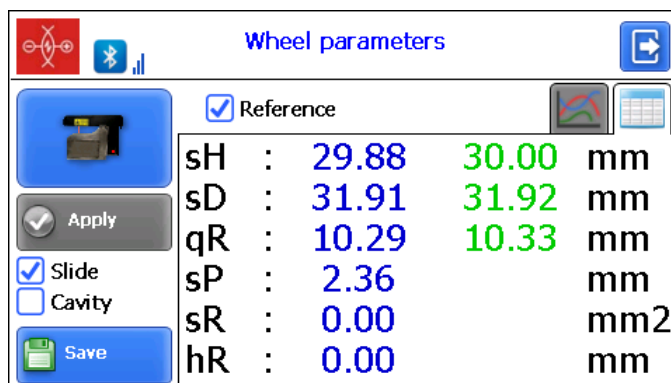
- Perform the measurement at the profile point that do not have any defects (slides, cavities), which can be detected visually.



The screenshot shows the 'Wheel parameters' screen with a 'Reference' checkbox checked. The parameters are listed as follows:

Parameter	Value 1	Value 2	Unit
sH	29.88	30.00	mm
sD	31.91	31.92	mm
qR	10.29	10.33	mm
sP	0.00		mm
sR	0.00		mm <sup>2</sup>
hR	0.00		mm

- If you obtained a satisfactory result, press the **Apply** button. The checkboxes **Slide** and **Cavity** will appear on the screen.



The screenshot shows the 'Wheel parameters' screen after selecting 'Slide' and 'Cavity'. The parameters are listed as follows:

Parameter	Value 1	Value 2	Unit
sH	29.88	30.00	mm
sD	31.91	31.92	mm
qR	10.29	10.33	mm
sP	2.36		mm
sR	0.00		mm <sup>2</sup>
hR	0.00		mm

- Select the defect that you need to measure (tick the required checkbox).
- Place the profilometer properly (a laser beam must pass through the measured defect).
- Press the **Measure** button to start the measurement.

Upon completion of the measurement, the program calculates the value of selected parameter.

When a satisfactory result is obtained, press **Save** to save data to database.

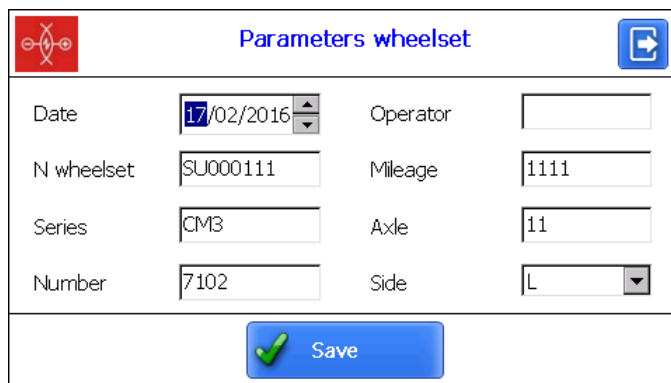
## 19. Measuring by IKP, IDK, IMR, and saving to database

How to use the PDA with other devices is described in the corresponding User's Manuals.

It is often needed that the measurement results obtained from different devices were stored in one database. In this case, all entered parameters of the specific wheelset must be the same in all devices.

These parameters are:

- Date
- N wheelset
- Series
- Number
- Axle
- Side (besides IMR)




**Parameters wheelset**

Date: 17/02/2016 Operator:

N wheelset: SU000111 Mileage: 1111

Series: CM3 Axle: 11

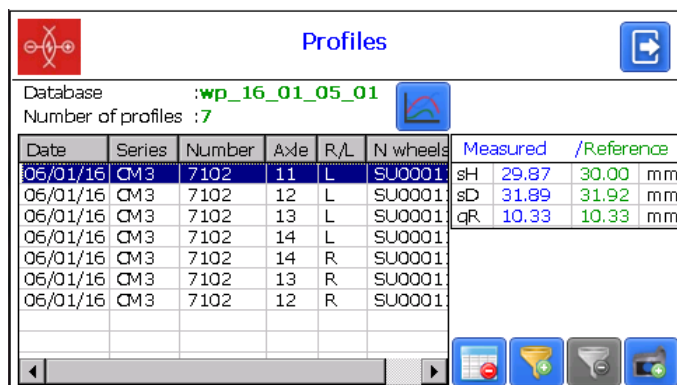
Number: 7102 Side: L



## 20. Browsing the database

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To browse the saved data, press the **Profiles** button in the main window. The PDA screen will display information about the current database, quantity of saved profiles, table with saved profiles, and measured values of selected parameters.




**Profiles**






Database: wp\_16\_01\_05\_01

Number of profiles: 7

Date	Series	Number	Axle	R/L	N wheels	Measured	/Reference
06/01/16	CM3	7102	11	L	SU0001	sH 29.87	30.00 mm
06/01/16	CM3	7102	12	L	SU0001	sD 31.89	31.92 mm
06/01/16	CM3	7102	13	L	SU0001	qR 10.33	10.33 mm
06/01/16	CM3	7102	14	L	SU0001		
06/01/16	CM3	7102	14	R	SU0001		
06/01/16	CM3	7102	13	R	SU0001		
06/01/16	CM3	7102	12	R	SU0001		



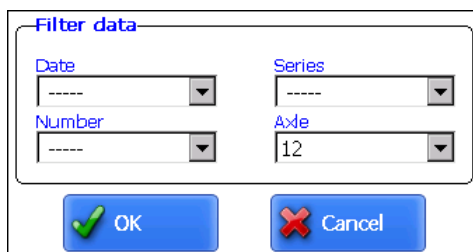
Buttons:

	Pass to browsing the profile of selected wheel
	Delete the selected wheel
	Add a filter when browsing the database
	Delete a filter
	Save the reference file

### 20.1. Data filtering

To add a filter, you need to press the **Filter** button, and to set filter parameters in the appeared window.



An example of filtering by the **Axle** parameter:



**Filter data**


Date:  Series:

Number:  Axle: 12


 

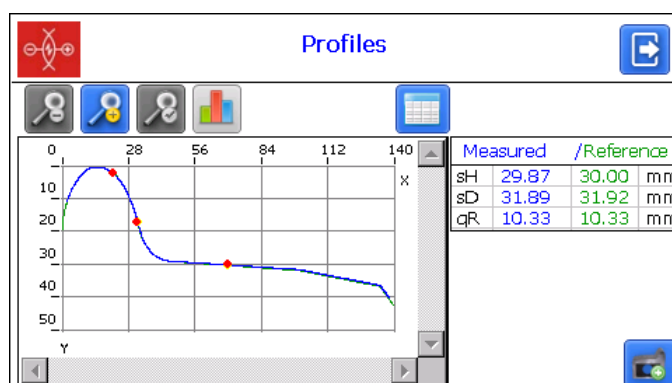
The filtered field will be highlighted in yellow:

Profiles									
Database		:wp_16_01_05_01							
Number of profiles		:2							
Date	Series	Number	Axle	R/L	N wheels	Measured	/Reference		
06/01/16	CM3	7102	12	L	SU0001	sH	29.87	30.00	mm
06/01/16	CM3	7102	12	R	SU0001	sD	31.89	31.92	mm
						qR	10.33	10.33	mm





To delete a current filter, you need to press .

## 20.2. Visualization of the wheel profile

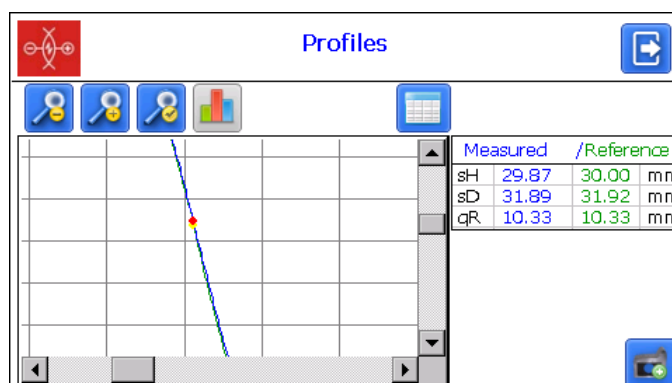
To browse the wheel profile, you need to press the **Profile** button - . The scanned wheel profile and the profile of selected reference will be displayed on the PDA screen.



Buttons for operating with profiles:

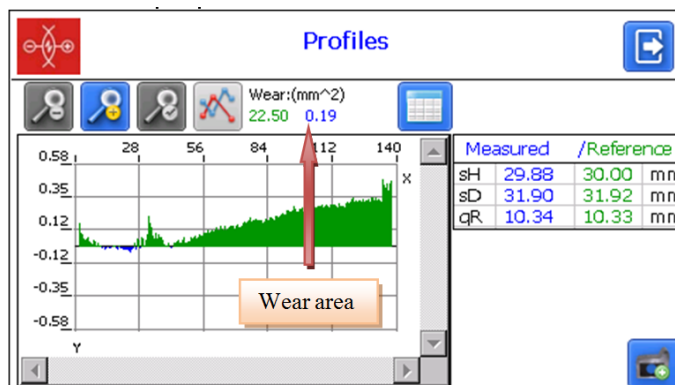
	Zoom in
	Zoom out
	Standard image scale
	Browse the profile wear

An example of a zoomed image:



An example of visualizing the profile wear.

Information about the wear area is displayed on the screen. A positive wear area is highlighted in green, a negative one - in blue.



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## 21. Installation of software on PC and startup

### 21.1. Installation of database support software

The **ikp5\_DB** software is intended for maintaining wheel sets wear database on a personal computer (the updated version of the program can be downloaded from [www.riftek.com/media/documents/ikp/ikp5\\_PC\\_Software.zip](http://www.riftek.com/media/documents/ikp/ikp5_PC_Software.zip)).

To install the software, insert a compact disk to the PC CD drive, select and start the **Install\_ikp5.exe** file in the **Software** folder. Follow guidelines of the installation wizard. By default, the software will be installed in the following directory **C:\Program Files (x86)\Riftek, LLC\ikp5\_db\**.

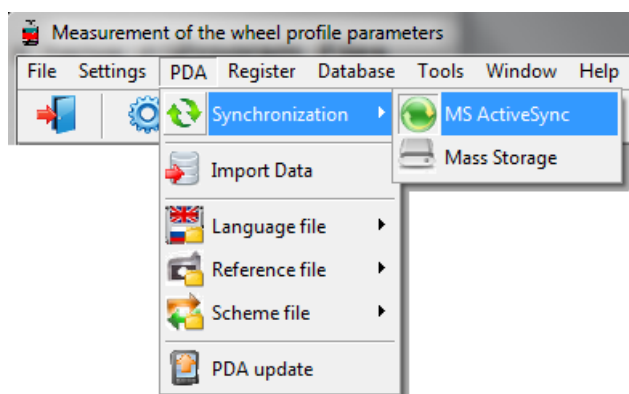
### 21.2. Synchronization of PDA and PC

There are two ways of synchronization via USB cable to transfer data between PDA and PC:

- MS ActiveSync
- Mass Storage

When you select **MS ActiveSync**, synchronization with PC is performed via the **ActiveSync** software (Windows XP), or via **Windows Mobile Device Center** (Windows 7), which need to be installed on PC.

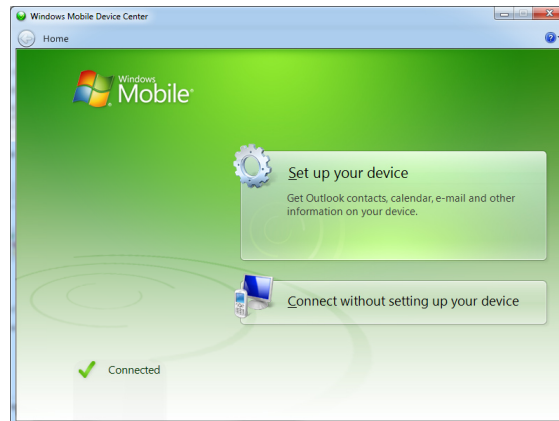
It is necessary to select **MS ActiveSync** as the synchronization type (see par. [13.6.](#)).



When you select **Mass Storage**, the device will be detected in Windows as an external storage device.

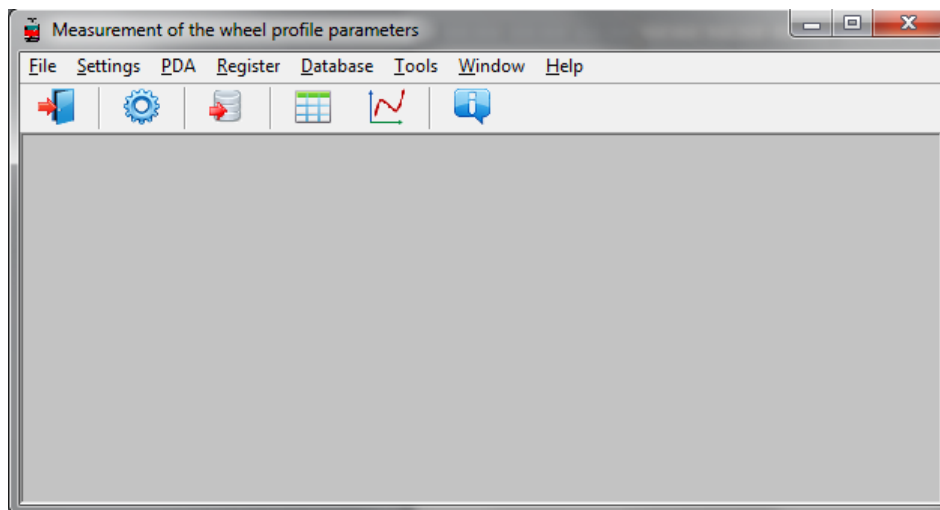
It is necessary to select **Mass Storage** as the synchronization type (see par. [13.6.](#)).

To check if the **MS ActiveSync** synchronization is correct, switch on the PDA and connect it to the USB port of the PC by the supplied cable. If the connection is successful, a message about it will appear on the screen:




### 21.3. Program startup

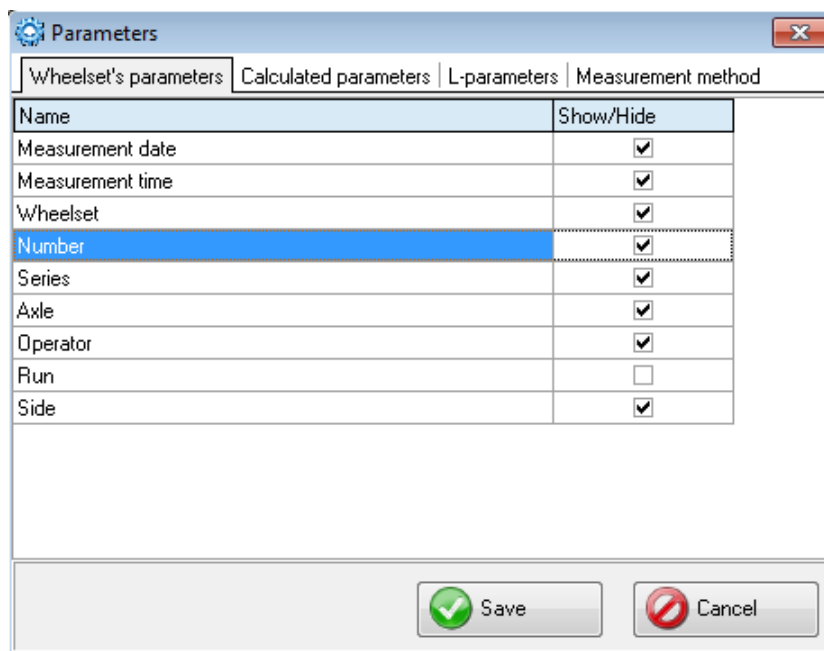
To start the program, click **Start > All programs > Riftek, LLC > IKP5\_DB > Ikp5\_DB.exe**. View of the main program window is shown below.



## 22. User settings of the program

### 22.1. Parameters setting

To go to the window of parameters setting, click **Settings > Parameters** in the main window, or click .



The window of parameters contains 4 tabs:

- Wheelset's parameters
- Calculated parameters
- L parameters
- Measurement method

#### 22.1.1. "Wheelset's parameters" tab

This tab is intended to select parameters, which will be displayed on the screen when viewing the database.

Wheelset's parameters	Calculated parameters	L-parameters	Measurement method
Name	Show/Hide		
Measurement date	<input checked="" type="checkbox"/>		
Measurement time	<input checked="" type="checkbox"/>		
Wheelset	<input checked="" type="checkbox"/>		
Number	<input checked="" type="checkbox"/>		
Series	<input checked="" type="checkbox"/>		
Axle	<input checked="" type="checkbox"/>		
Operator	<input checked="" type="checkbox"/>		
Run	<input type="checkbox"/>		
Side	<input checked="" type="checkbox"/>		

If the parameter is ticked, its value will be shown in the table of results and in the table of profiles.

### 22.1.2. "Calculated parameters" tab

This tab is intended to select the wheelset geometrical parameters, which will be calculated and displayed on the screen when viewing the database.

Wheelset's parameters   Calculated parameters   L-parameters   Measurement method	
Name	Show/Hide
Height (sH)	<input checked="" type="checkbox"/>
Thickness (sD)	<input checked="" type="checkbox"/>
Thickness (sD1)	<input checked="" type="checkbox"/>
Parameter (sF)	<input checked="" type="checkbox"/>
Gradient (qR)	<input checked="" type="checkbox"/>
Diameter (D)	<input checked="" type="checkbox"/>
Tire (T)	<input type="checkbox"/>
Slope (SI)	<input type="checkbox"/>
Angle (A)	<input type="checkbox"/>
Hollow (HI)	<input type="checkbox"/>
Rim width (L)	<input type="checkbox"/>
Wear (Wt)	<input type="checkbox"/>
Back-to-Back distance (M)	<input type="checkbox"/>
Multiple measurements (M)	<input type="checkbox"/>

Description and functions of parameters are the same as in the PDA software (see par. [10.](#)).

### 22.1.3. "L parameters" tab

This tab is intended to set the values of reference points for calculated geometrical parameters of the wheelset.

Wheelset's parameters   Calculated parameters   L-parameters   Measurement method		
Code	Value	
Parameter L1	2,00	mm
Parameter L2	70,00	mm
Parameter L3	13,00	mm
Parameter L10	14975,00	mm
Parameter L15	15,00	mm

Description and functions of the reference points are the same as in the PDA software (see par. [10.](#)).

### 22.1.4. "Measurement method" tab

This tab is intended to select the calculation method.

Wheelset's parameters   Calculated parameters   L-parameters   Measurement method	
Parameter L3 from: <input checked="" type="radio"/> Rolling circle <input type="radio"/> Flange	Thickness from: <input checked="" type="radio"/> Inner surf. <input type="radio"/> Flange <input type="radio"/> Both values
Gradient: <input checked="" type="radio"/> From L1 to L3 <input type="radio"/> From L1 to L4	Wear: <input checked="" type="radio"/> Height <input type="radio"/> Equal./Unequal
Gradient in: <input checked="" type="radio"/> Millimeters <input type="radio"/> Degrees <input type="radio"/> Accept./Unaccept.	Coordinates center: <input checked="" type="radio"/> Flange top <input type="radio"/> Rolling circle
Units measure <input checked="" type="radio"/> mm <input type="radio"/> inch	Inverted profile <input checked="" type="radio"/> No <input type="radio"/> Yes

Description and functions of the measurement methods are the same as in the PDA software (see par. [10.](#)).

### 22.1.4.1. Selection of measurement units

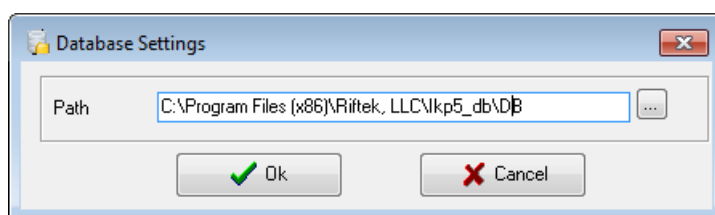
All parameters and measurement results can be in the Metric system (millimeters), or in the English system (inches).

To set the units of measurement, you need to select **mm** or **inches** in the **Units of measurement** field. After saving the changes, all information will be displayed in the selected units of measurement.

## 22.2. Database settings

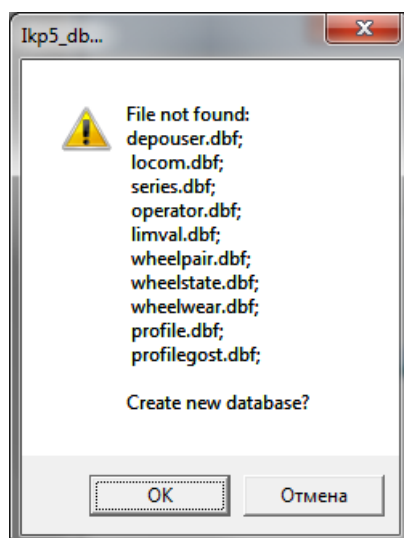
### 22.2.1. Setting the path to database

The program allows the user to change the drive and the directory of the profiles database storage. To do it, select **File > Path to DB...** in the main menu window.

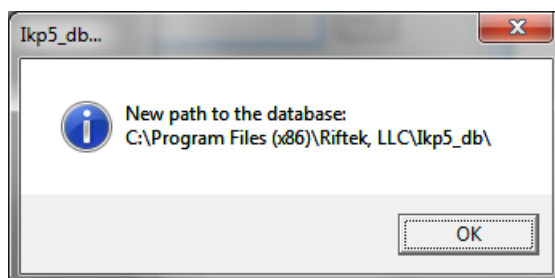


Next:

- click **Ok**
- specify a new path to the database
- confirm the creation of a new database



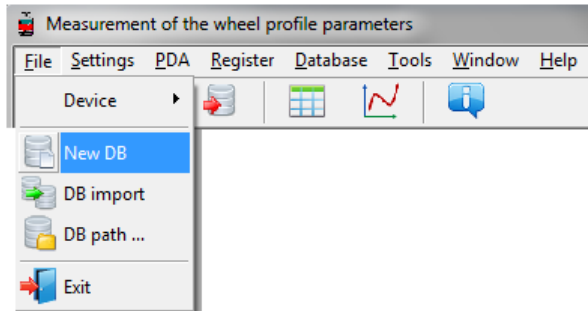
After that, all database files will be copied to the specified path.





### 22.2.2. Creation of empty database

To create an empty database, select **File > New DB** in the main menu.

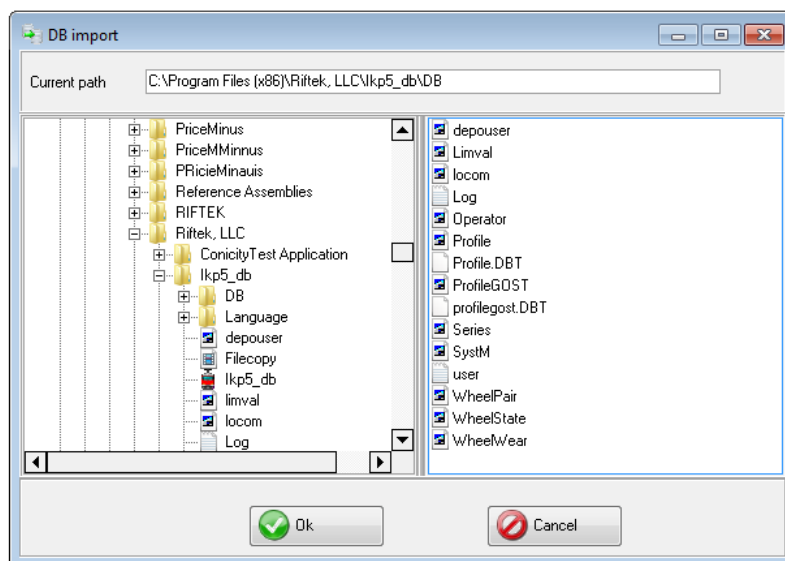


All data, excepting the reference files, will be deleted from the database. At the same time, catalog **DB(dd.mm.yy)** will be created in the installation directory whereto all deleted data (**dd.mm.yy** – current date) will be copied. Subsequently, these data can be restored (see par. [22.2.3](#)).

### 22.2.3. Import of database

To import data to the database from the other database (previously saved) you need to:

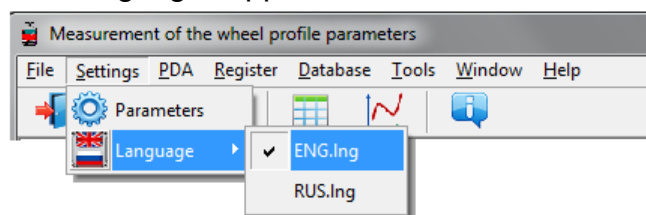
- Select **File > Import Data** in the menu.
- Select the folder with DB files in the left-hand window. All files will appear in the right-hand window:



- Click **OK** to import data.

### 22.2.4. Selection of software language

To choose the software language, select **Settings > Language** in the main window menu and set the required language support file.



### 22.2.4.1. Preparation and installation of the language support file

The user can change the language, form his own language support files as well as change/edit the terminology used. Language support files are located in the directory used in the process of installation. By default the following directory is used: **C:\Program Files (x86)\Riftek, LLC\Ikp5\_db\Language\**.

The directory contains two files, **RUS.Ing** and **ENG.Ing**, to support Russian and English languages respectively.

To create the support file for any other language, it is necessary to:

- copy one of the existing files. For example, **ENG.Ing** under the other name, for example, **DEU.Ing**;
- edit the renamed file by using any text processor, namely, change all terms and phrases to analogous ones from the required language;
- save the edited \*.Ing file in the **Language** folder.

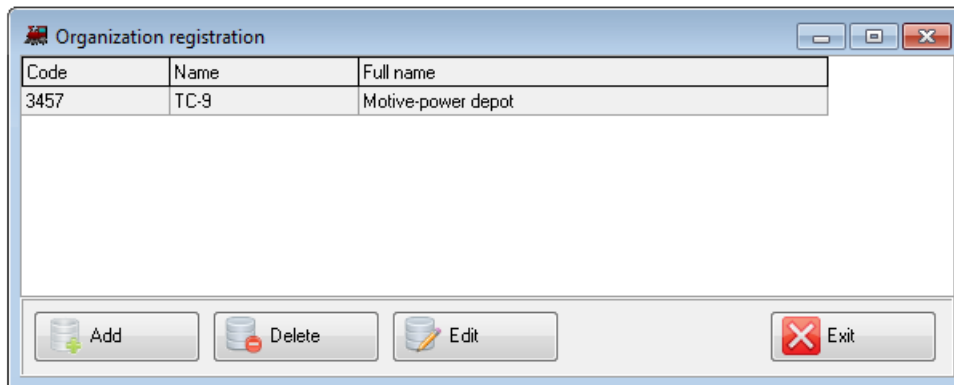
To change and edit terminology, it is necessary to:

- edit the corresponding language file by using any text processor;
- save the edited \*.Ing file in the **Language** folder.





## 22.3. Registration data

### 22.3.1. Selection of the organization

To add/select the user organization, select in the main window menu **Registration > Organization**. Subsequently, this information will be used for obtaining data from the selected depot and for generating reports.



#### Buttons functions:

	Add a new organization
	Delete the selected organization
	Edit the selected organization
	Exit the organization registration mode

To select a current organization:

- Click **Edit**
- Tick the depot
- Click **Save**

Organization

Code  ☒

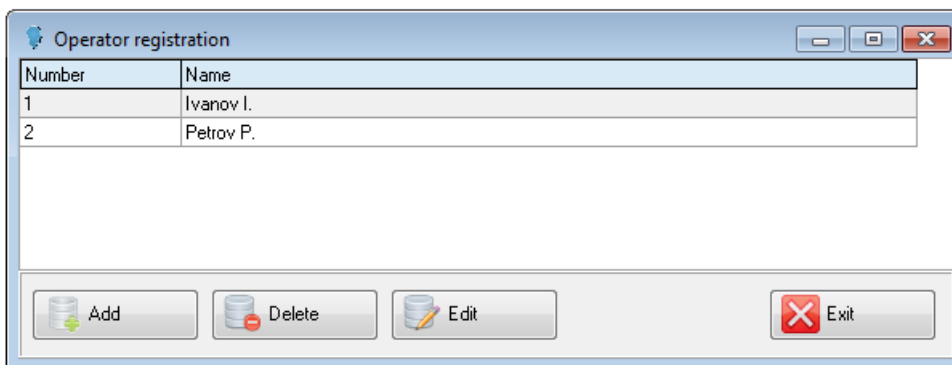
Name

Full name

☒ Save

### 22.3.2. Registration of operators

Steps to follow: menu **Registration > Operator**. Operators data are used for identifying operators by **Number**.

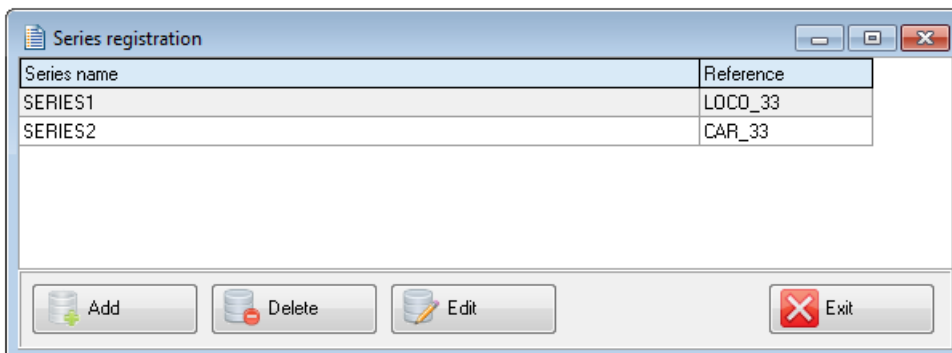


Number	Name
1	Ivanov I.
2	Petrov P.

Functions of buttons are similar to those in par. [22.3.1.](#)

### 22.3.3. Registration of series

Steps to follow: menu **Registration > Series**. Registered series of cars or locomotives are displayed in the emerged window.



Series name	Reference
SERIES1	LOCO_33
SERIES2	CAR_33

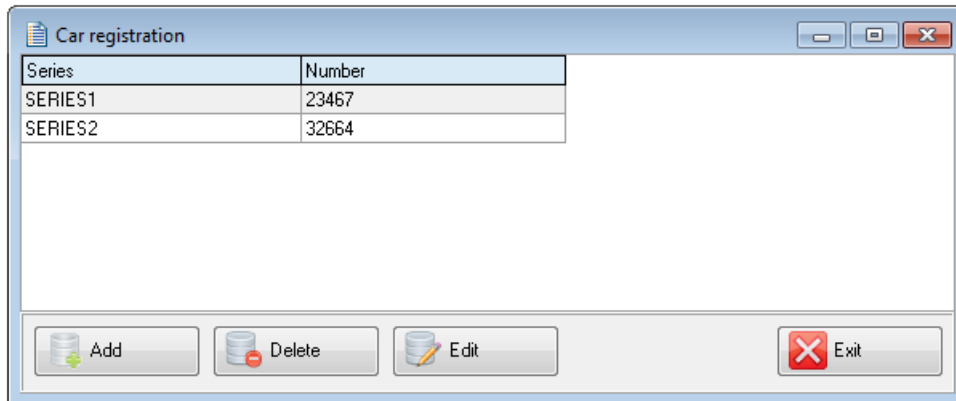
When registering a new series, a new entry for this series will be added in the table of tolerances automatically (see par. [22.3.5](#)).

Functions of buttons are similar to those in par. [22.3.1.](#)

When adding a new series, it is necessary to enter the name of the series and to select the reference profile for it. Flange parameters of the selected profile will be calculated and added to the table of tolerances automatically after saving the series (see par. [22.3.6](#)).

#### 22.3.4. Registration of car/locomotive numbers

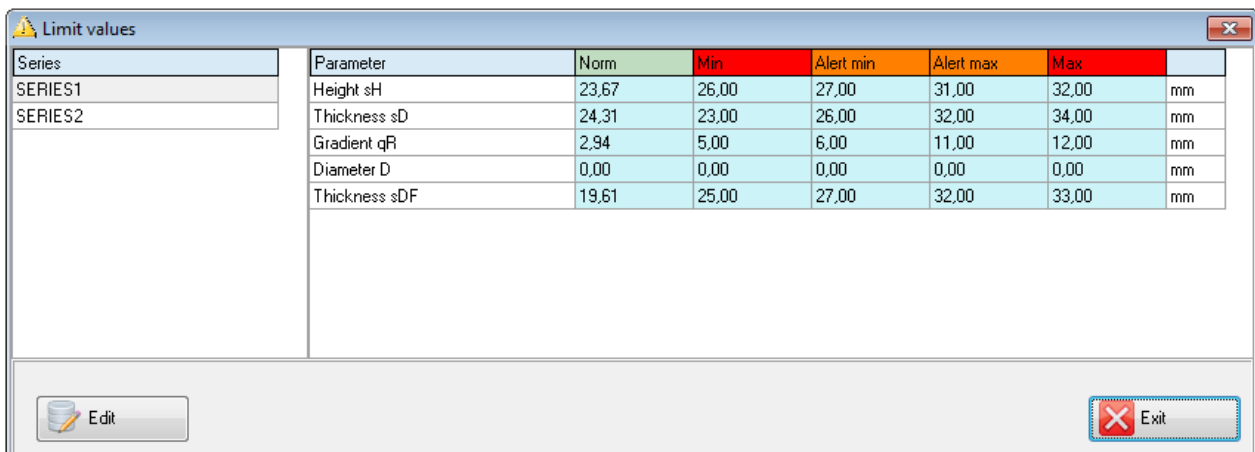
Steps to follow: menu **Registration** > **Number**. Registered numbers of cars/locomotives are displayed in the emerged window.



Functions of buttons are similar to those in par. [22.3.1](#).

#### 22.3.5. Registration of tolerances

Steps to follow: menu **Registration** > **Tolerance**. Registered series of cars/locomotives with boundary values of calculated geometric parameters of the wheelset are displayed in the emerged window.



Series	Parameter	Norm	Min	Alert min	Alert max	Max	
SERIES1	Height sH	23,67	26,00	27,00	31,00	32,00	mm
SERIES2	Thickness sD	24,31	23,00	26,00	32,00	34,00	mm
	Gradient qR	2,94	5,00	6,00	11,00	12,00	mm
	Diameter D	0,00	0,00	0,00	0,00	0,00	mm
	Thickness sDF	19,61	25,00	27,00	32,00	33,00	mm

Only parameters, which were selected in the list of parameters, are available for editing (see par. [22.1.2](#)).

Maximum/minimum critical values of parameters are indicated with a red color. An orange color indicates maximum/minimum values of parameters, which are close to critical.

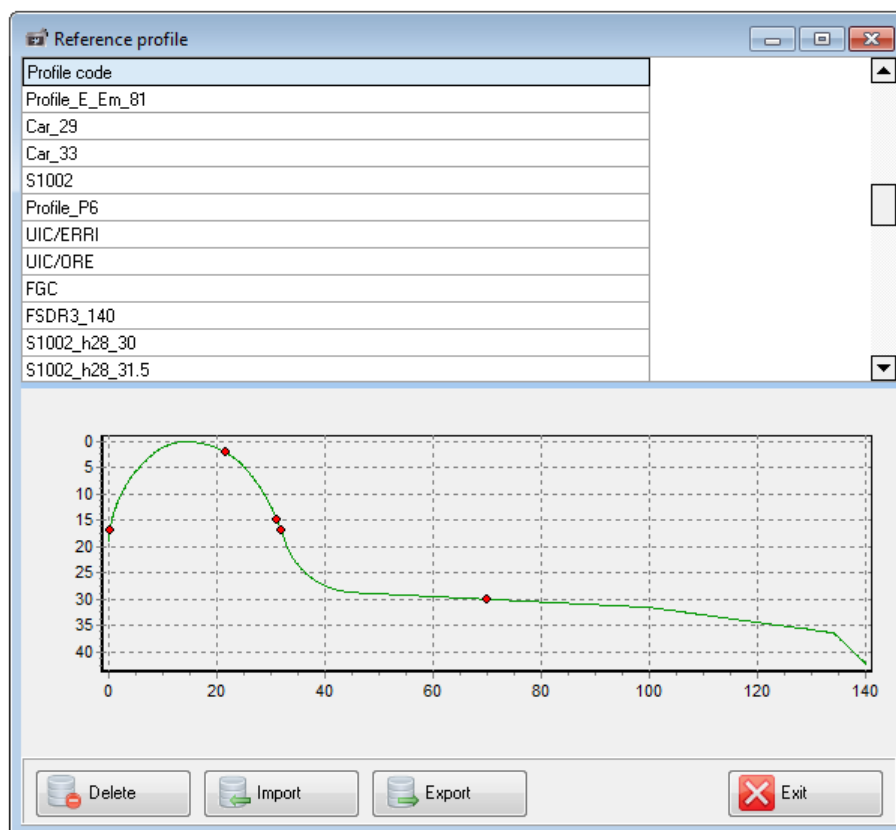
The **Norm** value is calculated and added to the table automatically when adding/editing the series of the selected reference (see par. [22.3.3](#)).

#### 22.3.6. Registration of reference profiles

The program comes with several preset profiles. In addition, the supplied disc with software contains the base of reference profiles. Profiles are in the **Reference Profiles** directory and divided into separate folders for each country.





In addition, the user can form a description of the required profile himself or request it from **RIFTEK** (free service).

To browse available profiles, select menu **Registration** > **Reference**:



The window of profiles displays the table with the list of reference profiles, saved to database, and a graphical view of the selected profile.

#### Buttons functions:

 Delete	Delete the reference profile
 Import	Import the reference profile from *.ref file
 Export	Export the reference profile to *.ref file
 Exit	Exit the organization registration mode

#### 22.3.6.1. Request and registration of the profile file

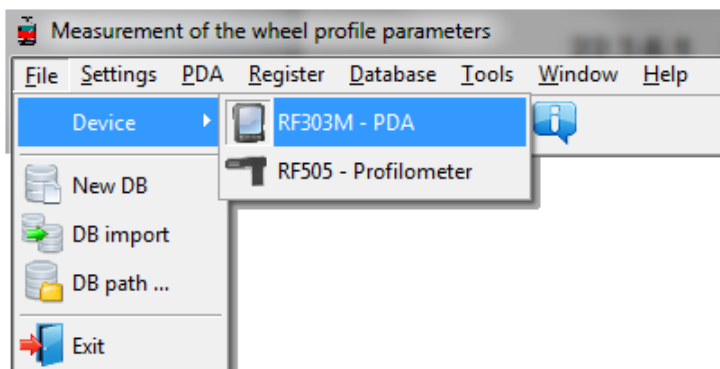
To get .ref-file of reference profile send the drawing of profile to **RIFTEK** ([info@riftek.com](mailto:info@riftek.com)). Register the received .ref-file as follows:

- click **Import**
- in the window appeared indicate the way to the .ref-file
- click **Open**

The profile will be added to the base of reference profiles.

## 23. Data exchange between PDA and PC

To exchange data between PC and PDA, you need to select the device: **File > Device > RF303M-PDA**.



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Data exchange between PC and PDA is performed by means of direct cable connection of PDA to PC USB-port (special **RF505.42** cable is supplied).

There are two ways of synchronization via USB cable:

- ActiveSync
- Mass Storage

For more details see par. [21.2](#).

### 23.1. ActiveSync synchronization

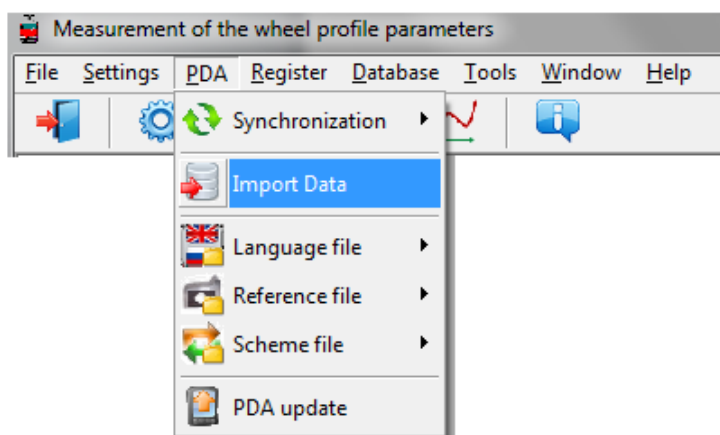
When you select this type of synchronization, additional features of data exchange with PDA will be available:

- Transfer of database files to PC
- Transfer of language files
- Transfer of reference profile files
- Transfer of processing scheme files
- Updating of PDA software

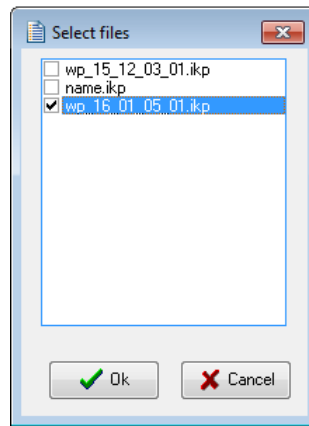
#### 23.1.1. Transfer of database file to PC

To transfer the database file from PDA to PC, it is necessary to:

- select **PDA > Import Data**



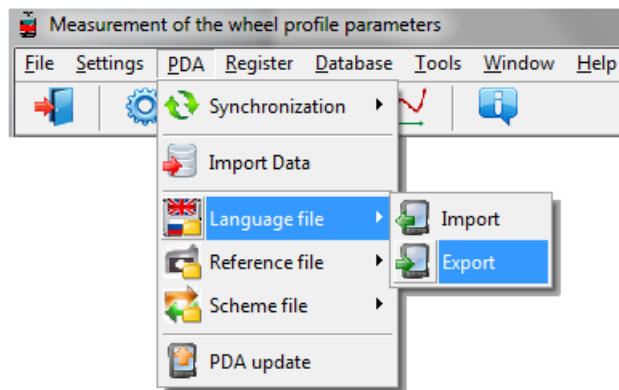
- mark the required files in the emerged window and click **OK**



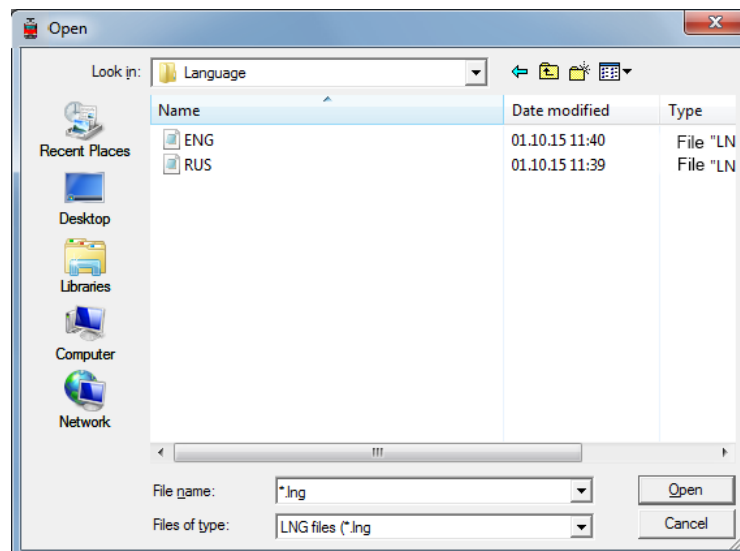
### 23.1.2. Transfer of language file from PC to PDA

To transfer the language file from PC to PDA, it is necessary to:

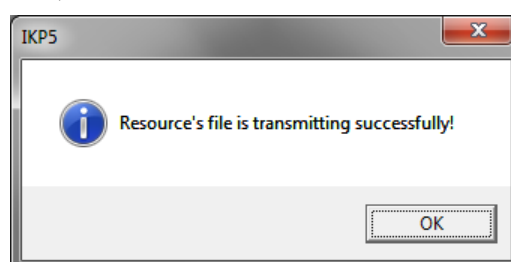
- select **PDA > Language file > Export**



- select the required file



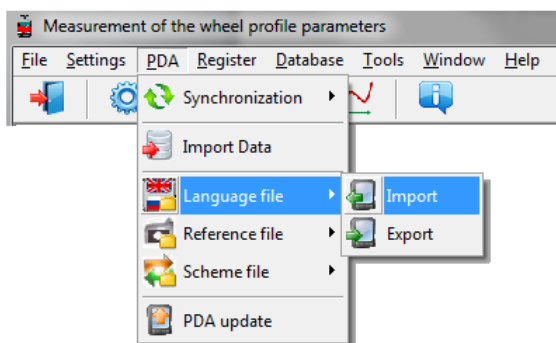
If transfer is successful, the screen will show:



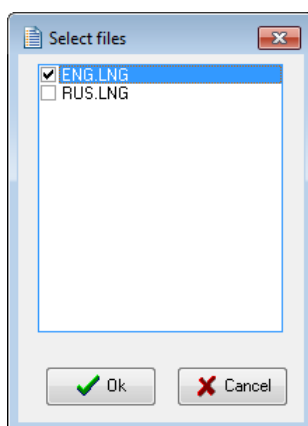
### 23.1.3. Transfer of language file from PDA to PC

To transfer the language file from PDA to PC, it is necessary to:

- select **PDA > Language file > Import**



- select the required file

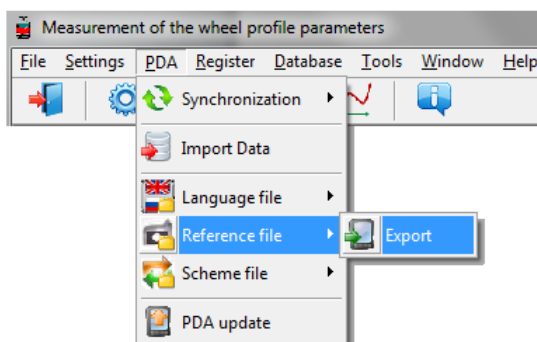


If transfer is successful, the selected files will be saved in the specified path.

### 23.1.4. Transfer of reference profile files from PC to PDA

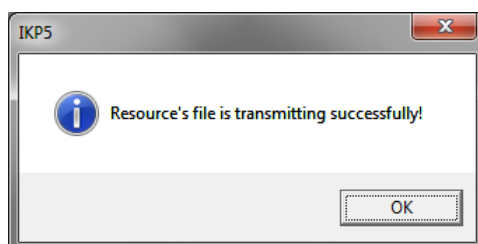
To transfer the reference profile file from PC to PDA, it is necessary to:

- select **PDA > Reference file > Export**



- select the required **.ref** file

If transfer is successful, the screen will show:

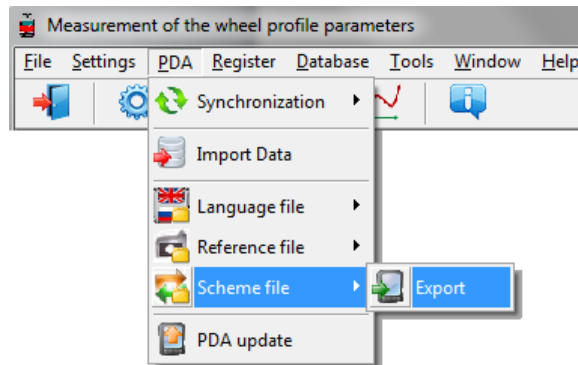




### 23.1.5. Transfer of processing scheme file from PC to PDA

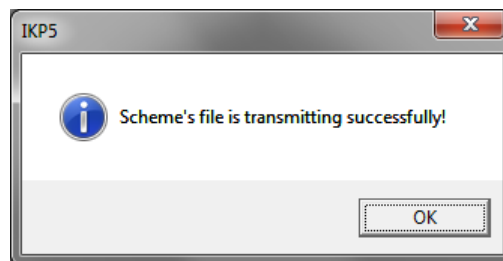
To transfer the processing scheme file from PC to PDA, it is necessary to:

- select **PDA > Scheme file > Export**



- select the required **.sch** file

If transfer is successful, the screen will show:



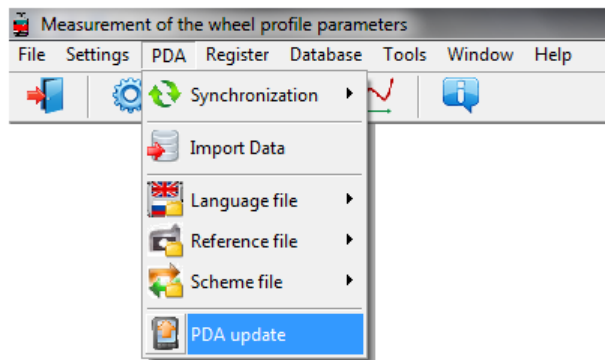
### 23.1.6. Updating of PDA software

The latest software version can be downloaded from the site:

[www.riftek.com/media/documents/ikp/lkp5\\_PDA\\_Software.zip](http://www.riftek.com/media/documents/ikp/lkp5_PDA_Software.zip).

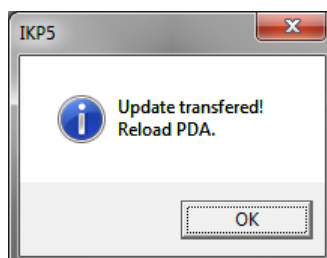
To transfer the update file to PDA, it is necessary to:

- select **PDA > PDA update**



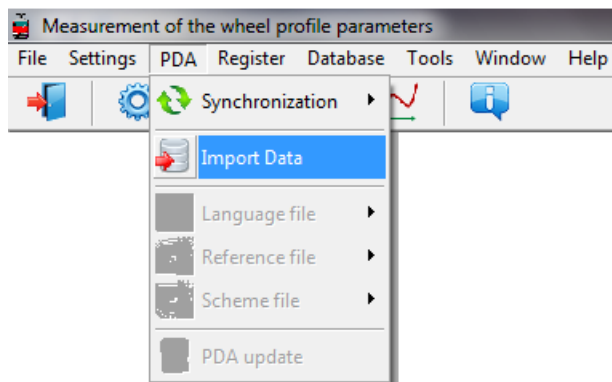
- select file for transfer

If transfer is successful, the window will appear:



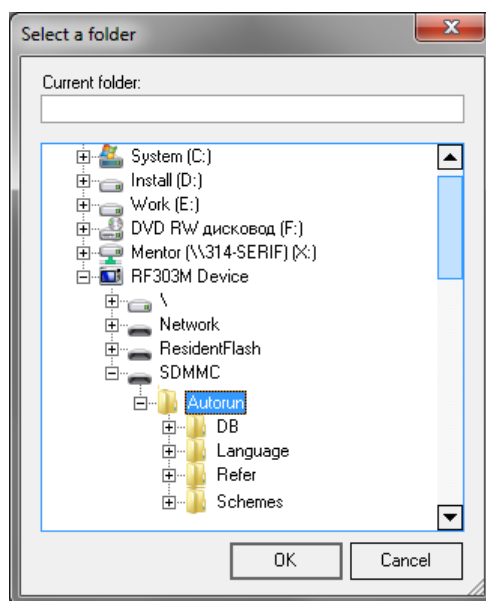
## 23.2. Mass Storage synchronization

When you select this type of synchronization, PDA is detected as an external storage device. Therefore, the only **Import Data** item is active. Transfer of language/scheme/reference files from PDA to PC and back can be performed by simple copying.

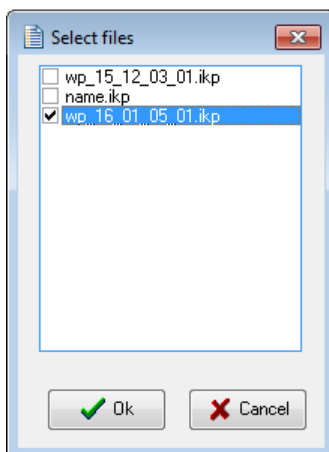


To transfer database files from PDA to PC, it is necessary to:

- select **PDA > Import Data**
- specify the path to the database on PDA (by default, **SDMMC\Autorun\DB**)




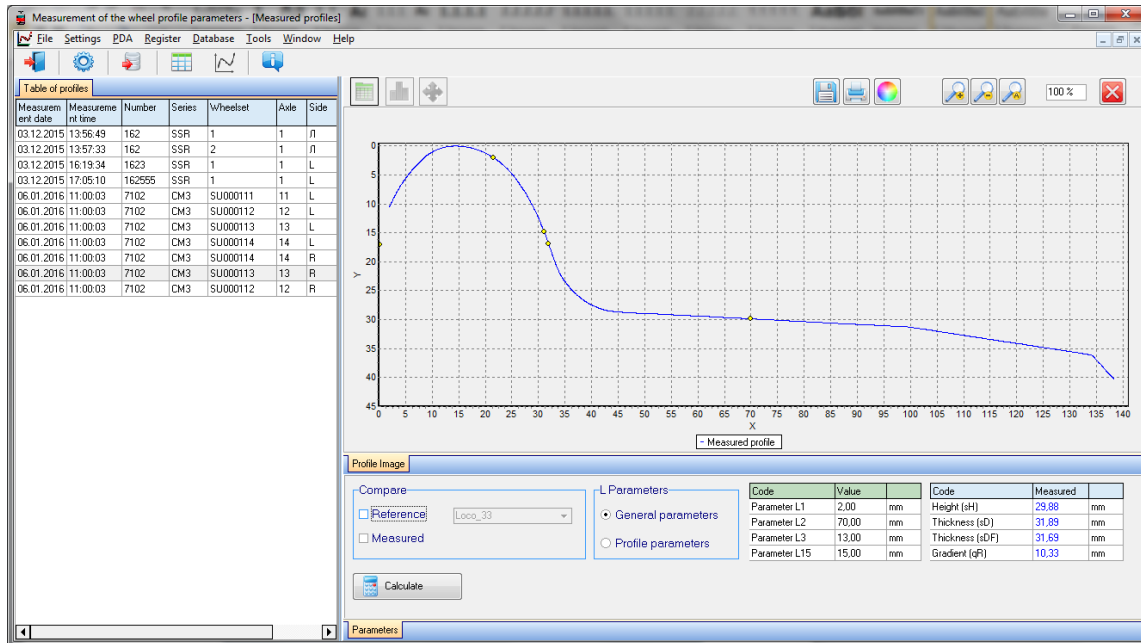
- mark the required files in the emerged window and click **OK**



## 24. Working with profilograms and wear calculations

### 24.1. Browsing the graph and the profile coordinates








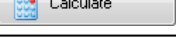
To browse the saved profiles of the rolling surface, select **Database > Profiles**, or click the **Profiles** button - .



At the left side of the window you can see the **Table of profiles** tab, which contains a list of saved profiles. The table displays only the identification parameters of the wheel, which were selected in the parameters window (see par. 22.1.).

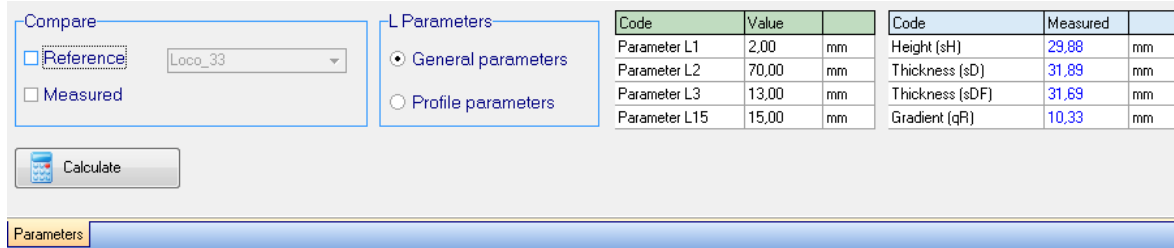
When selecting a profile, it is possible to browse a graphical image and geometric parameters of the measured wheel. To browse the coordinates of the selected profile you need to click the **Profile Values** button. After that an additional tab with the measured coordinates will appear.

#### Buttons functions:

	Show/hide the <b>Wear</b> graph
	Show/hide the <b>Profile Values</b> tab
	Show/hide the <b>Profile alignment</b> tab
	Save the profile image to file (.bmp file)
	Print the profile image
	Change the background color of the graph
	Zoom in/out the profile graph
	Calculate geometric parameters of the wheel

## 24.2. Parameters tab

Calculated geometric parameters of the profile as well as L-parameters values are displayed on the **Parameters** tab, which is at the bottom of the window.



Code	Value	
Parameter L1	2,00	mm
Parameter L2	70,00	mm
Parameter L3	13,00	mm
Parameter L15	15,00	mm

Code	Measured	
Height (sH)	29,88	mm
Thickness (sD)	31,89	mm
Thickness (sDF)	31,69	mm
Gradient (qR)	10,33	mm

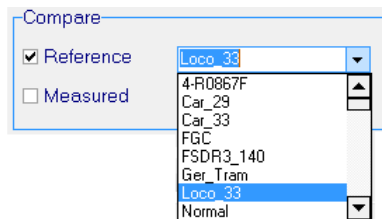
If needed it is possible to change settings of the calculated parameters or support points (see par. [22.1](#)).

### 24.2.1. Selection of comparison profile

To compare a profile with a reference, it is necessary to tick the **Compare** field. There are two ways of comparing:

- with the reference
- with the measured profile

When comparing with the reference, select the required reference profile in the drop-down list.



To compare two arbitrarily chosen profiles to each other (for example, profiles of left and right wheels), it is necessary to select **Measured**. The **Table of profiles** tab will show an additional table for selection of profile to compare.

### 24.2.2. Selection of L-parameters values

When calculating geometric parameters of wheelsets, the specified support points will be used (see par. [22.1.3](#)). There are two possible variants of L-parameters:

- General parameters
- Profile parameters

When selecting **General parameters**, values of L-parameters will be taken from the file of database parameters set by default (see par. [22.1.3](#)).

When selecting **Profile parameters**, values of L-parameters will be taken from the saved database profile file, i.e. the values, which were set in PDA when measuring the wheelset (see par. [14.3](#)).

Values of L-parameters are displayed on the screen in the table of parameters.

Code	Value	
Parameter L1	2,00	mm
Parameter L2	70,00	mm
Parameter L3	13,00	mm
Parameter L15	15,00	mm

If needed, it is possible to edit any value and to recalculate values of geometric parameters of the flange. To do it, click **Calculate**. Parameters of the measured profile and selected reference will be recalculated.

### 24.2.3. Geometric parameters of the profile

The table of measured geometric parameters displays only parameters, which were selected in the parameters window (see par. [22.1.2](#)).

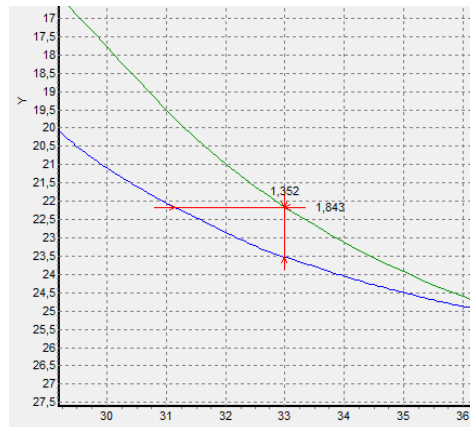
Code	Measured	Reference	
Height (sH)	29,87	28,00	mm
Thickness (sD)	31,89	32,32	mm
Gradient (qR)	10,33	9,10	mm

Parameters, which are beyond the set tolerances, are highlighted in red/orange (see par. [22.3.5](#)).

## 24.3. Wear calculation

### 24.3.1. Fast wear calculation

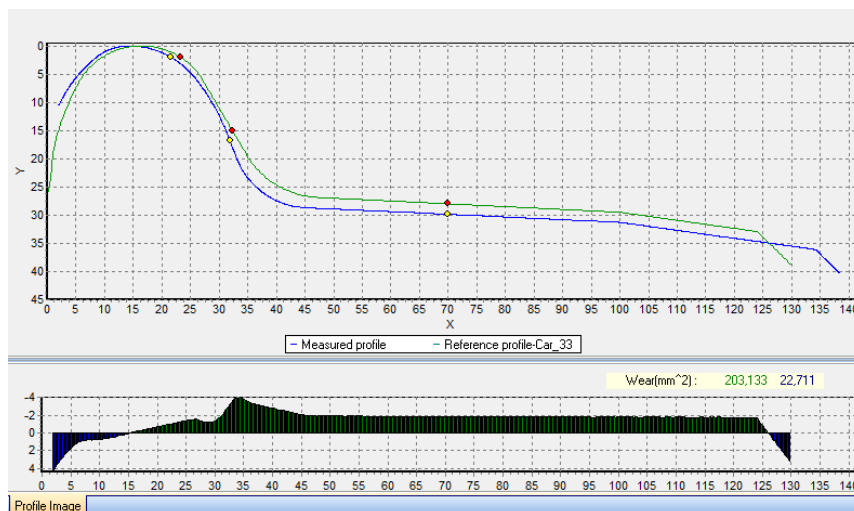
To obtain fast calculation of the profile wear at a certain point relative to the reference, put cursor bar to any of the profiles, and when a cross-like (+) mouse cursor appears press the left mouse key. The resulting screen will show the value of the coordinate difference between profiles taken along X- and Y-axes, as shown by arrows:



To remove size indication from the screen, it is necessary to put cursor to any of the profiles and press the right mouse key.

### 24.3.2. Wear calculation at all points

To calculate the wear at all points of the measured profile, it is necessary to click the **Wear** button. Calculated wear will be displayed on the screen in a graphic form:



The graph displays positive and negative values of the wear area. Value of the wear area is calculated in square millimeters with respect to the selected reference profile:

Wear(mm<sup>2</sup>): 203,133 22,711

To view the table of wear values, it is necessary to select **Profile Values > Wear**. The table will show deviations of the selected profile from the reference profile in two directions (X and Y).

N	Values on axis X	Values Measured on axis Y	Values Reference on axis Y	Wear on axis Y
1	1,96	10,45	14,85	4,41
2	2,21	10,06	14,06	4,00
3	2,46	9,56	13,31	3,75
4	2,71	9,11	12,61	3,51
5	2,96	8,65	11,94	3,29
6	3,21	8,18	11,29	3,11
7	3,46	7,77	10,69	2,92
8	3,71	7,40	10,10	2,70
9	3,96	7,02	9,53	2,51
10	4,21	6,65	8,98	2,33
11	4,46	6,32	8,46	2,14
12	4,71	5,99	7,95	1,95
13	4,96	5,66	7,45	1,79
14	5,21	5,34	6,97	1,63
15	5,46	5,05	6,50	1,45
16	5,71	4,75	6,06	1,32
17	5,96	4,45	5,67	1,22
18	6,21	4,18	5,29	1,12
19	6,46	3,92	4,95	1,03
20	6,71	3,68	4,64	0,96
21	6,96	3,43	4,33	0,90
22	7,21	3,20	4,05	0,86
23	7,46	2,96	3,79	0,83
24	7,71	2,73	3,54	0,81

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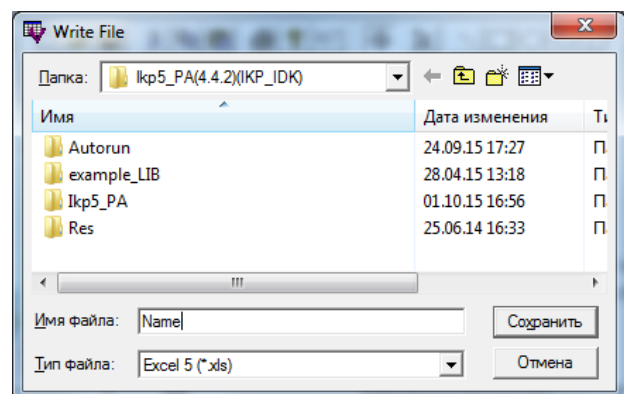
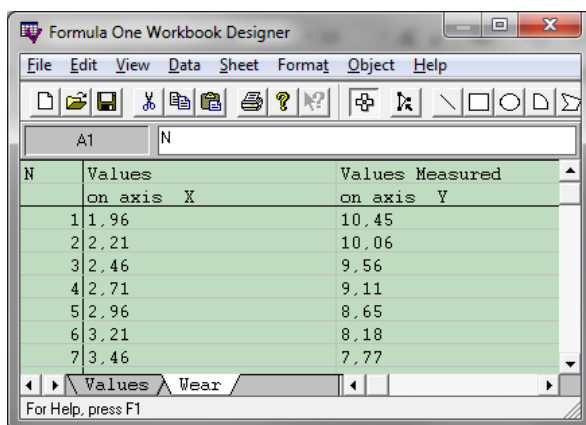
To save the table in the **Excel-format**, it is necessary to click the right mouse key in the table values section. The pop-up window will appear:

- Edit
- Save to the file

When selecting **Edit**, the editor window will appear, in which you can edit values and save them in the .xls format.

To save you need to:

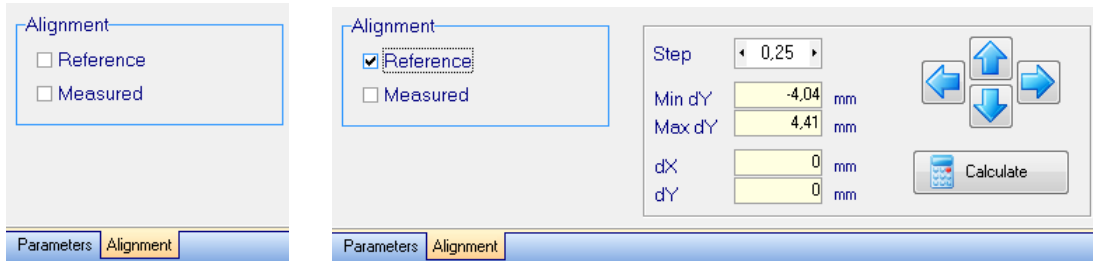
- select **File > Save**
- select **Excel 5 (\*.xls)**
- type the file name and click **Save**



When selecting **Save to the file**, a standard dialog for saving the file will appear.

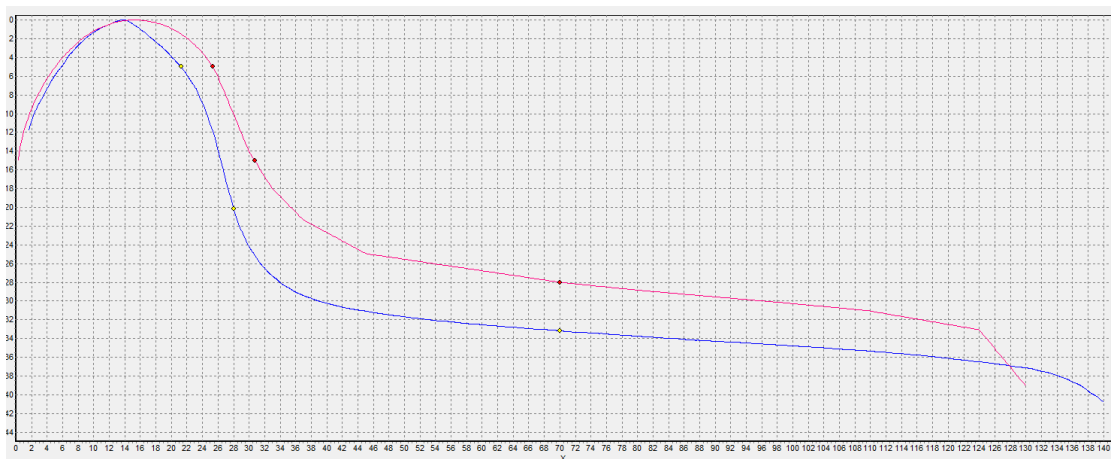
## 24.4. Alignment of profiles

To superimpose profiles (by vertical translation), you need to click the **Alignment** button. An additional tab will appear. Next, select the profile to be translated: **Reference** or **Measured**. The selected profile will be marked with red.




After selecting the profile the screen will display the maximum and minimum deviations of the selected profile from the reference [**Min dY..Max dY**].

Next, set the translation step and by using the buttons **Up/Down**, **Left/Right** translate the profile as required.



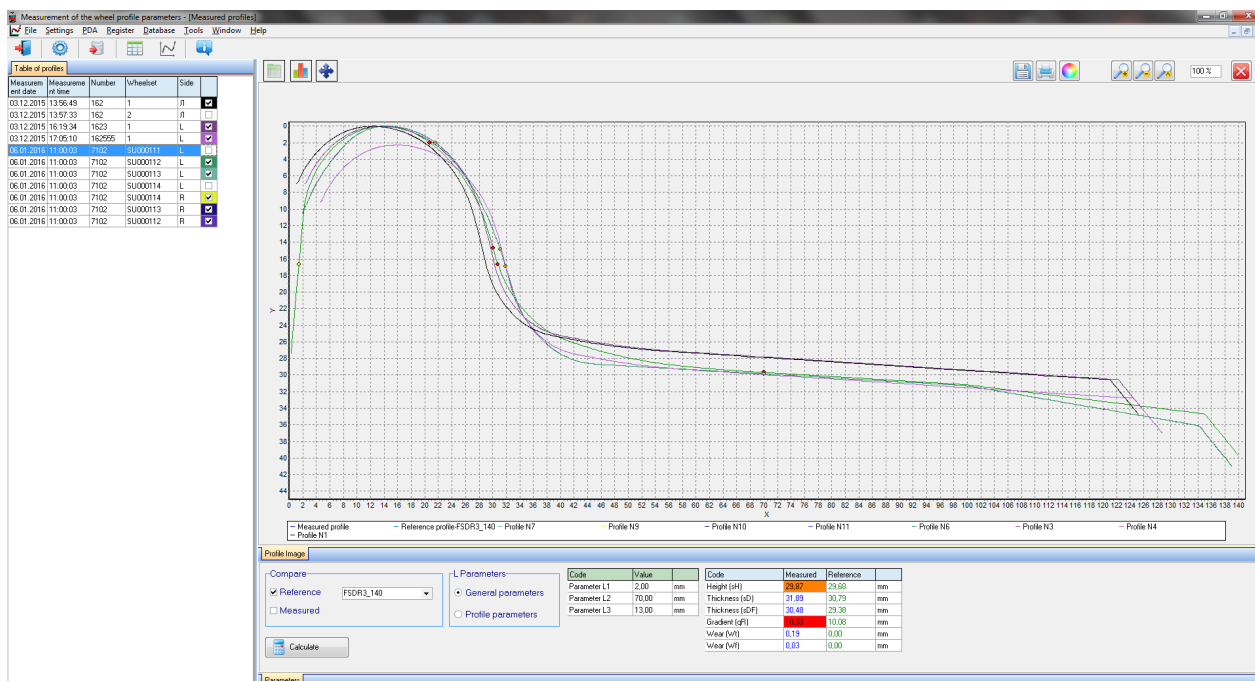
To save the changed profile, pass to the tab of identification parameters of the profile and click **Save**.






In order to create a new profile, it is necessary to change identification parameters of the profile.

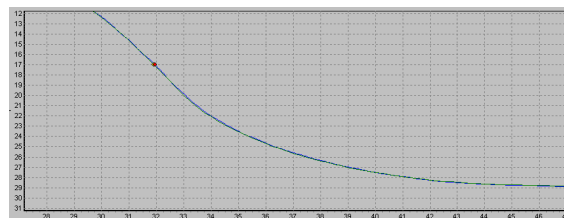
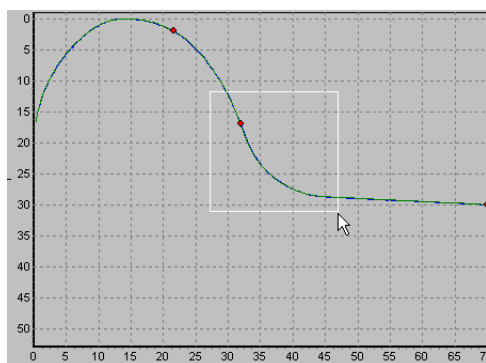
## 24.5. Superposition of profiles

To superimpose several changed profiles, you need to mark with a tick the required profiles in the left-hand table. Selected profiles will be displayed in different colors.



## 24.6. Rescaling

To change the image scale, mark a part of the image with the left mouse key, move the image by holding it with the right mouse key pressed, or with buttons **Increase** - , **Decrease** -  and **Show all** - .



## 25. Implementation of minimum wheel truing function

Select **Tools > Analysis of profiles**. The analysis of wheel profiles allows to choose such a type of the profile from the reference profiles, for which the total truing depth of two wheels would be minimal.

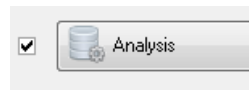
In the first table of profiles, select the first required profile of the wheelset (left wheel); in the second table of profiles, select the second required profile of the wheelset (right wheel).

The program allows to perform the automatic analysis by all the reference profiles, which stored in the database, or by the selected profile only.



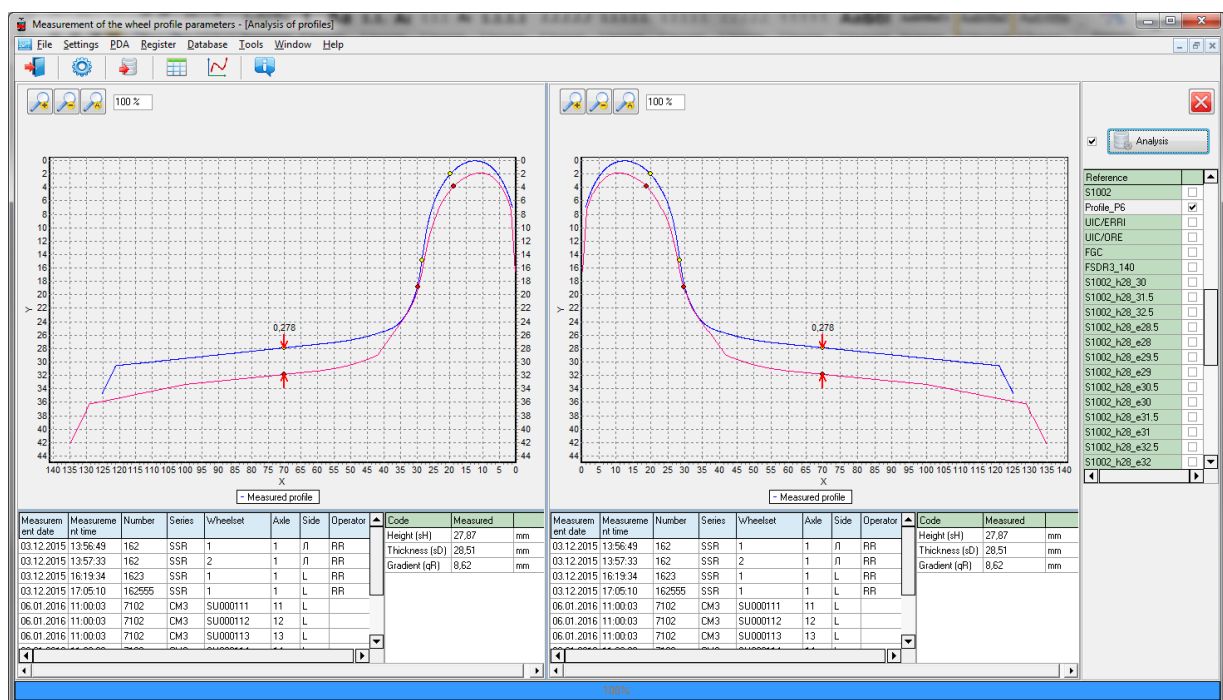
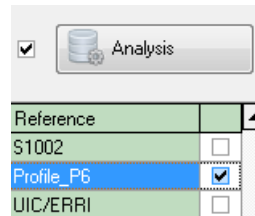
- Automatic analysis

Tick the box and click the **Analysis** button. Profiles in the table of references must not be marked.



- Analysis by the selected profile

Select the reference profile for analysis and click the **Analysis** button.

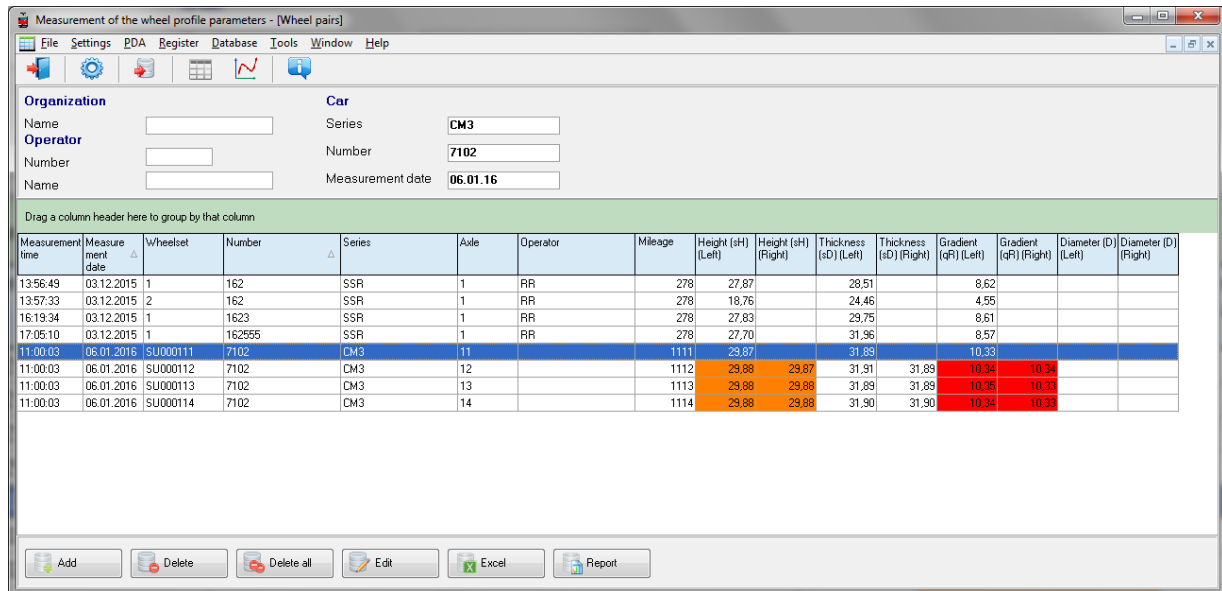


To know the wheel cutting depth in a certain point, put the cursor to any profile, and when a cross-like (+) mouse cursor appears press the left mouse key. The resulting screen will show the value of difference between profiles along X- and Y-axes, as shown by arrows. To remove size indication from the screen, put cursor to any of the profiles and press the right mouse key.

## 26. Scanning and editing of data

### 26.1. Scanning and filtering of data

To scan data, select **Database > Table** in the menu or click the **Table** button - . The form with results will be as follows:



- **Hide/show the field**

The table displays the identification and geometric parameters of the wheelset, which are marked for displaying in the parameters settings (see par. [22.1.1](#) and [22.1.2](#)).

- **Sorting of data**

To sort data for any of the fields, click left mouse key on the header of the field column:

Measureme nt date	Measurement time	Wheelset
03.12.2015	13:56:49	1
03.12.2015	13:57:33	2
03.12.2015	16:19:34	1
03.12.2015	17:05:10	1




Measureme nt date	Measurement time	Wheelset
03.12.2015	13:56:49	1
03.12.2015	16:19:34	1
03.12.2015	17:05:10	1
03.12.2015	13:57:33	2

To cancel data sorting, press the **Ctrl** key and click left mouse key on the header of the field column.

- **Filtering of data**

In order to filter data in any of the fields, click left mouse key on the header of the field grouping, and select required value in the emerged drop-down list:

Measureme nt date	Measurement time	Wheelset
03.12.2015	13:56:49	1
03.12.2015	13:57:33	2
03.12.2015	16:19:34	1
03.12.2015	17:05:10	1

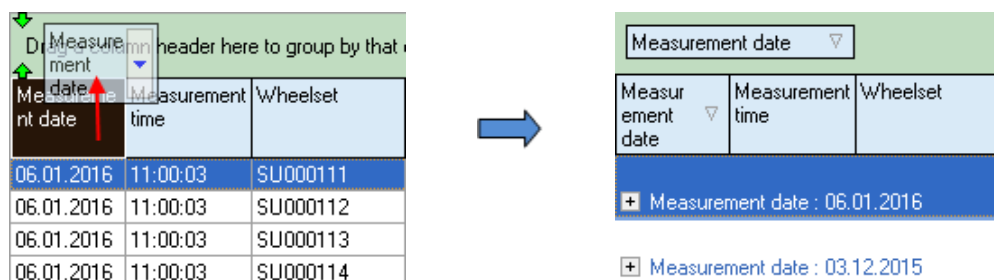


Measureme nt date	Measurement time	Wheelset
06.01.2016	11:00:03	SU000111
06.01.2016	11:00:03	SU000112
06.01.2016	11:00:03	SU000113
06.01.2016	11:00:03	SU000114

To cancel filtering, all steps should be taken in the reverse order.

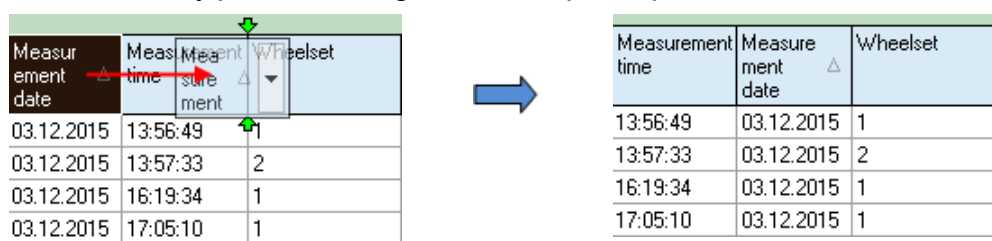
### • Data grouping

To group data for any of the fields, click left mouse key on the header of the field column, and, with the mouse key pressed, drag it onto the table header:









### • Changing of the field position order

To change the field position, click left mouse key on the header of the field column and, with the mouse key pressed, drag it to the required position:



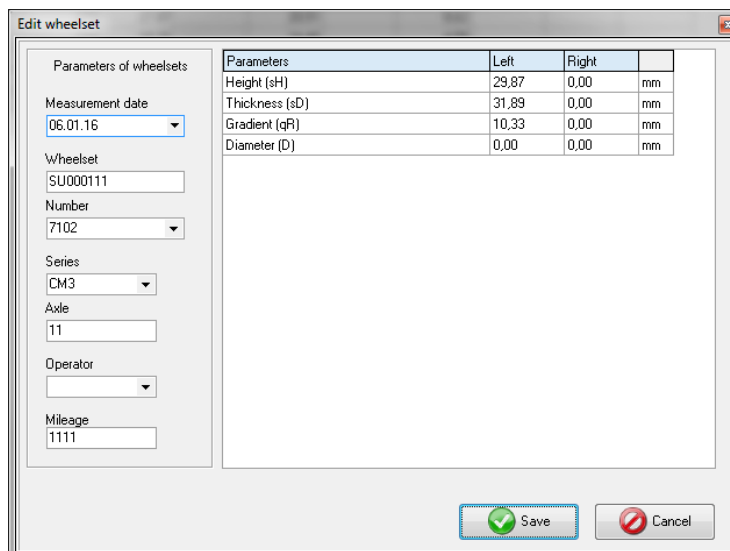
### Buttons functions:

	Add	Add the wheel pair
	Delete	Delete the selected wheel pair
	Delete all	Delete all wheel pairs
	Edit	Edit the selected wheel pair
	Excel	Export the coordinates of wheel pairs to the Excel format
	Report	Report preparation

## 26.2. Editing data

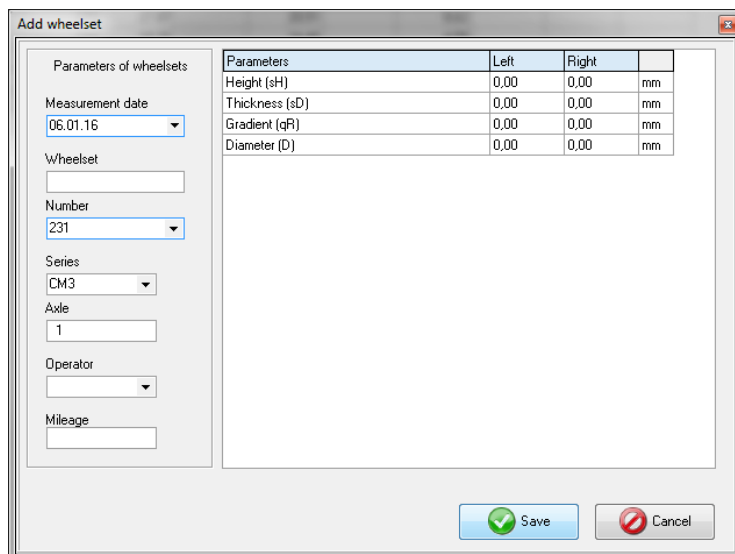
You can edit, add and remove data in/from the database.

### • Editing data



To edit the current entry, click the **Edit** button and input/change required values of parameters, after the editing is complete click the **Save** button.

- **Adding data**



The 'Add wheelset' dialog box contains the following fields and table:

Parameters of wheelsets

Measurement date: 06.01.16

Wheelset: [empty field]

Number: 231

Series: CM3

Axle: 1

Operator: [empty field]

Mileage: [empty field]

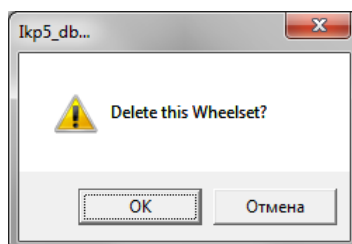
Parameters	Left	Right	
Height (sH)	0,00	0,00	mm
Thickness (sD)	0,00	0,00	mm
Gradient (qR)	0,00	0,00	mm
Diameter (D)	0,00	0,00	mm

Buttons: Save, Cancel

To add a new data entry, click the **Add** button and type required parameter values, after the editing is complete click the **Save** button.

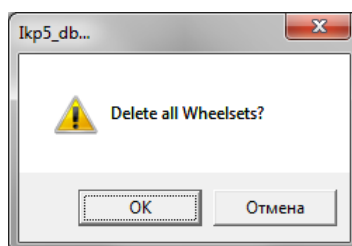
- **Deleting data**

To delete the current entry, click the **Delete** button and confirm the deletion.



- **Deleting all selected data**

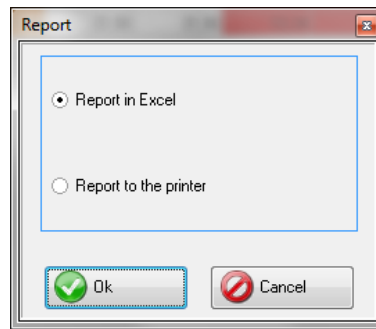
If it is necessary to delete not only one entry but several entries combined by some condition, filter the data according to the corresponding attribute (see par. [26.1.](#)), click the **Delete all** button and confirm the action.



## 26.3. Report preparation

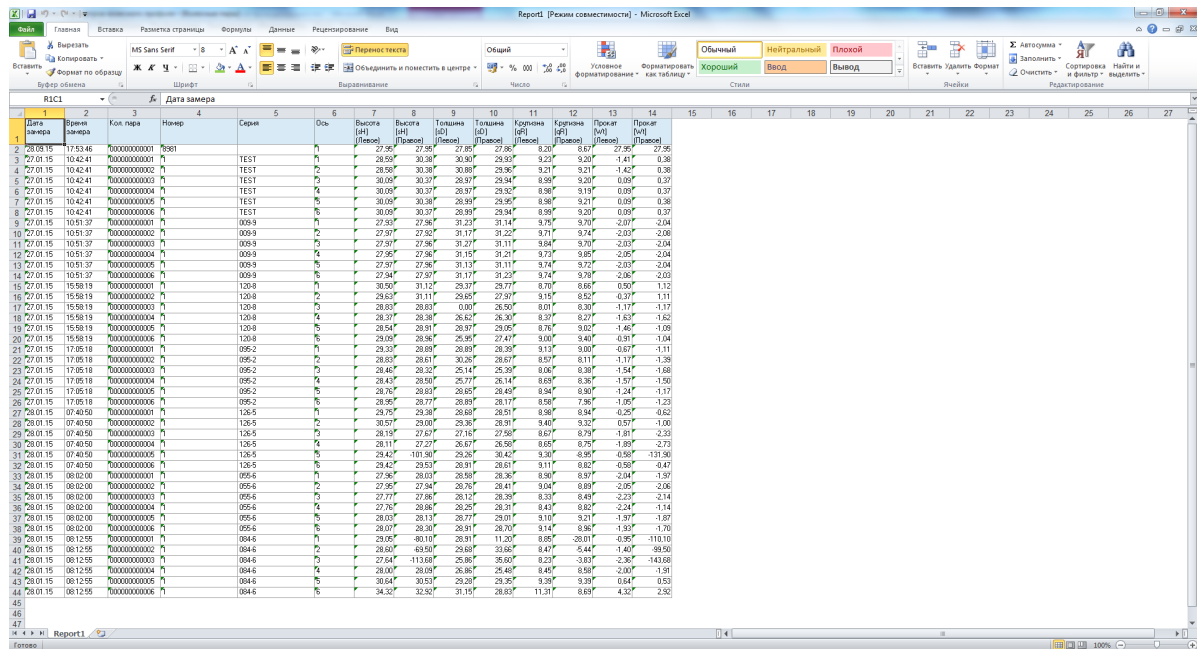
When staying in the mode of scanning and editing data, the user can prepare reports in **Excel**, **RTF**, **PDF** formats, or print out reports. When preparing the report, the sorting used at the moment, is taken into account.

To generate a report, press the **Report** button. The program will offer to select the following options:



### 26.3.1. Excel-format report

To prepare a report in Excel format, select **Report in Excel** and click **OK**.





















№	Дата замера	Время замера	Кол. пара	Номер	Серия	Ось	Высота (H) (mm)	Высота (H) (mm)	Толщина (D) (mm)	Толщина (D) (mm)	Кривизна (R) (mm)	Кривизна (R) (mm)	Профиль (P) (mm)	Профиль (P) (mm)
1	28.09.15	17:53:46	000000000001	881		1	27.96	27.96	27.85	27.85	8.20	8.20	27.96	27.96
2	27.01.15	10:42:41	000000000001		TEST	1	28.95	30.39	30.80	29.50	9.25	9.25	-1.47	0.38
3	27.01.15	10:42:41	000000000002		TEST	2	28.58	30.30	30.88	29.30	9.21	9.21	-1.42	0.38
4	27.01.15	10:42:41	000000000003		TEST	3	30.08	30.33	29.97	29.54	8.98	9.20	0.08	0.37
5	27.01.15	10:42:41	000000000004		TEST	4	30.08	30.33	29.97	29.50	8.98	9.19	0.08	0.37
6	27.01.15	10:42:41	000000000005		TEST	5	30.08	30.38	29.99	29.30	8.98	9.21	0.08	0.38
7	27.01.15	10:42:41	000000000006		TEST	6	30.08	30.33	29.99	29.54	8.98	9.20	0.08	0.37
8	27.01.15	10:51:37	000000000001		0089	1	27.80	27.80	31.22	31.14	9.70	9.70	-2.07	-2.04
9	27.01.15	10:51:37	000000000002		0089	2	27.90	27.80	31.17	31.22	9.71	9.74	-2.03	-2.04
10	27.01.15	10:51:37	000000000003		0089	3	27.90	27.80	31.27	31.11	9.84	9.74	-2.03	-2.04
11	27.01.15	10:51:37	000000000004		0089	4	27.80	27.80	31.15	31.21	9.72	9.85	-2.05	-2.04
12	27.01.15	10:51:37	000000000005		0089	5	27.90	27.80	31.13	31.11	9.74	9.72	-2.03	-2.04
13	27.01.15	10:51:37	000000000006		0089	6	27.94	27.80	31.17	31.22	9.74	9.74	-2.03	-2.03
14	27.01.15	15:58:19	000000000001		1204	1	28.90	31.13	29.37	29.77	9.70	8.86	0.07	1.13
15	27.01.15	15:58:19	000000000002		1204	2	28.63	31.11	29.85	29.97	9.15	8.50	0.37	1.11
16	27.01.15	15:58:19	000000000003		1204	3	28.93	28.93	30.00	29.50	8.91	8.30	-1.17	-1.17
17	27.01.15	15:58:19	000000000004		1204	4	28.37	28.38	28.67	28.30	8.27	8.27	-1.83	-1.82
18	27.01.15	15:58:19	000000000005		1204	5	28.54	28.91	28.97	29.08	8.76	8.62	-1.48	-1.08
19	27.01.15	15:58:19	000000000006		1204	6	28.08	28.94	28.97	27.47	9.08	9.40	-0.97	-1.04
20	27.01.15	17:05:18	000000000001		0952	1	29.30	28.80	28.80	28.30	9.13	9.00	-0.67	-1.11
21	27.01.15	17:05:18	000000000002		0952	2	28.83	28.81	30.28	28.67	8.57	8.11	-1.17	-1.38
22	27.01.15	17:05:18	000000000003		0952	3	28.48	28.30	28.14	28.30	8.68	8.54	-1.05	-1.23
23	27.01.15	17:05:18	000000000004		0952	4	28.43	28.50	28.77	28.14	8.68	8.38	-1.57	-1.50
24	27.01.15	17:05:18	000000000005		0952	5	28.76	28.83	28.85	28.49	8.94	8.90	-1.24	-1.17
25	27.01.15	17:05:18	000000000006		0952	6	28.96	28.77	28.89	28.17	8.98	7.90	-1.05	-1.23
26	28.01.15	07:49:50	000000000001		1265	1	29.75	29.38	28.68	28.91	8.98	8.84	-0.25	-0.62
27	28.01.15	07:49:50	000000000002		1265	2	30.57	29.00	29.36	28.91	9.40	9.32	0.57	-1.00
28	28.01.15	07:49:50	000000000003		1265	3	28.18	27.97	27.10	27.90	8.67	8.70	-1.81	-2.23
29	28.01.15	07:49:50	000000000004		1265	4	28.11	27.27	26.67	26.58	8.65	8.75	-1.89	-2.73
30	28.01.15	07:49:50	000000000005		1265	5	29.42	-181.98	29.26	30.42	9.30	8.95	4.58	-191.90
31	28.01.15	07:49:50	000000000006		1265	6	29.42	29.53	28.91	28.91	9.11	9.07	-0.80	-0.47
32	28.01.15	08:02:00	000000000001		0956	1	27.96	28.03	28.98	28.30	8.90	8.97	-2.04	-1.97
33	28.01.15	08:02:00	000000000002		0956	2	27.96	27.94	28.76	28.41	9.04	8.89	-2.05	-2.06
34	28.01.15	08:02:00	000000000003		0956	3	27.77	27.88	28.12	28.30	8.93	8.89	-2.25	-2.14
35	28.01.15	08:02:00	000000000004		0956	4	27.76	28.86	28.25	28.21	8.43	8.82	-2.24	-1.14
36	28.01.15	08:02:00	000000000005		0956	5	28.03	28.13	28.77	28.91	9.10	9.21	-1.97	-1.87
37	28.01.15	08:02:00	000000000006		0956	6	28.07	28.30	28.91	28.70	9.14	9.84	-1.93	-1.70
38	28.01.15	08:12:55	000000000001		0846	1	28.05	40.10	28.91	11.20	8.85	28.01	-0.95	-10.10
39	28.01.15	08:12:55	000000000002		0846	2	28.60	43.94	29.88	23.65	8.47	5.44	-1.40	-8.90
40	28.01.15	08:12:55	000000000003		0846	3	27.64	-113.88	25.88	8.60	8.20	-3.89	-2.84	-143.88
41	28.01.15	08:12:55	000000000004		0846	4	28.00	28.08	28.88	25.48	8.48	8.88	-2.00	-1.91
42	28.01.15	08:12:55	000000000005		0846	5	30.64	30.53	29.28	29.25	9.38	9.38	0.64	0.53
43	28.01.15	08:12:55	000000000006		0846	6	34.32	32.50	31.15	28.85	11.31	8.85	4.32	-2.85

### 26.3.2. Report for printout

To prepare the report for printout, select **Report for printout** and click **OK**. Data will be presented in the form of report ready for printout.

Preview



Railway

Department

Name

Railway N1

Department N1




Name

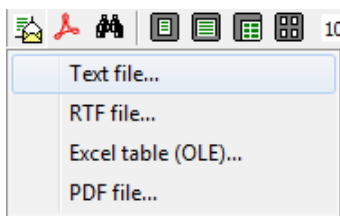
Report of values of geometric parameters of wheel sets

Identification parameters								Flange parameters						Tyre parameter					
								Thickness		Height		Gradient		Diameter			Thickness		
№	Series	Number	Date	W.p. num	Axle	Section	Run	Left	Right	Left	Right	Left	Right	Left	Right	Diff.	Left	Right	
1	SERIES	1	20.09.12	000000000001	1		0	31,92		30,02		10,29		0,00		0,00	0,00		
2	SERIES	1	20.09.12	000000000002	2		0	31,90	31,88	30,01	30,01	10,29	10,28	0,00	0,00	0,00	0,00	0,00	
3	SERIES	1	20.09.12	000000000003	3		0	31,91	31,94	30,01	30,01	10,33	10,33	0,00	0,00	0,00	0,00	0,00	
4	SER	1	20.09.12	000000000001	1		0	31,94		30,02		10,35		0,00		0,00	0,00		
5	SER	1	20.09.12	000000000002	2		0	31,91	31,88	30,02	30,02	10,32	10,30	0,00	0,00	0,00	0,00	0,00	
6	SSS	1	20.09.12	000000000001	1		0	31,92		29,95		10,20		0,00		0,00	0,00		
7	SSS	1	20.09.12	000000000002	2		0	31,93	31,93	29,95	29,96	10,20	10,20	0,00	0,00	0,00	0,00	0,00	
8	SSS	1	20.09.12	000000000003	3		0	31,96	31,94	29,96	29,95	10,24	10,24	0,00	0,00	0,00	0,00	0,00	
9	SSS	1	20.09.12	000000000004	4		0	31,92	31,93	29,96	29,96	10,18	10,22	0,00	0,00	0,00	0,00	0,00	
10	SER11	1	20.09.12	000000000001	1		0	31,94		29,92		10,19		0,00		0,00	0,00		
11	SER11	1	20.09.12	000000000002	2		0	31,94	31,95	29,93	29,93	10,20	10,19	0,00	0,00	0,00	0,00	0,00	
12	444	1	20.09.12	000000000001	1		0	31,92		30,01		10,37		0,00		0,00	0,00		
13	444	1	20.09.12	000000000002	2		0	31,89		30,01		10,34		0,00		0,00	0,00		
14	444	1	20.09.12	000000000003	3		0	31,91		30,01		10,35		0,00		0,00	0,00		

Page 1 of 1

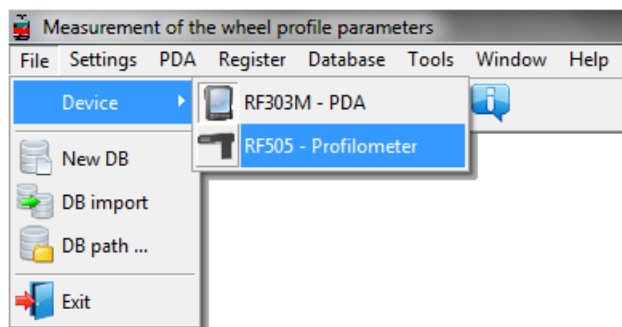
The top toolbar contains the following buttons for operating with reports:

- To printout the report, click .
- To save in PDF format, click .
- To save in Excel, RTF or PDF, click  and select the format you need:

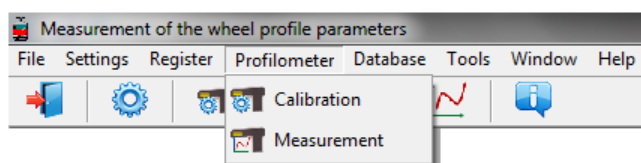


## 27. Taking measurements under PC control (without PDA)

The laser scanning module (RF505) can work under direct control of PC without PDA. To work under direct control of PC, it is necessary to select **File > Device > RF505-Profilometer** in the main menu.



After that in the main menu of the program the **PDA** item will be replaced with the **Profilometer** item.



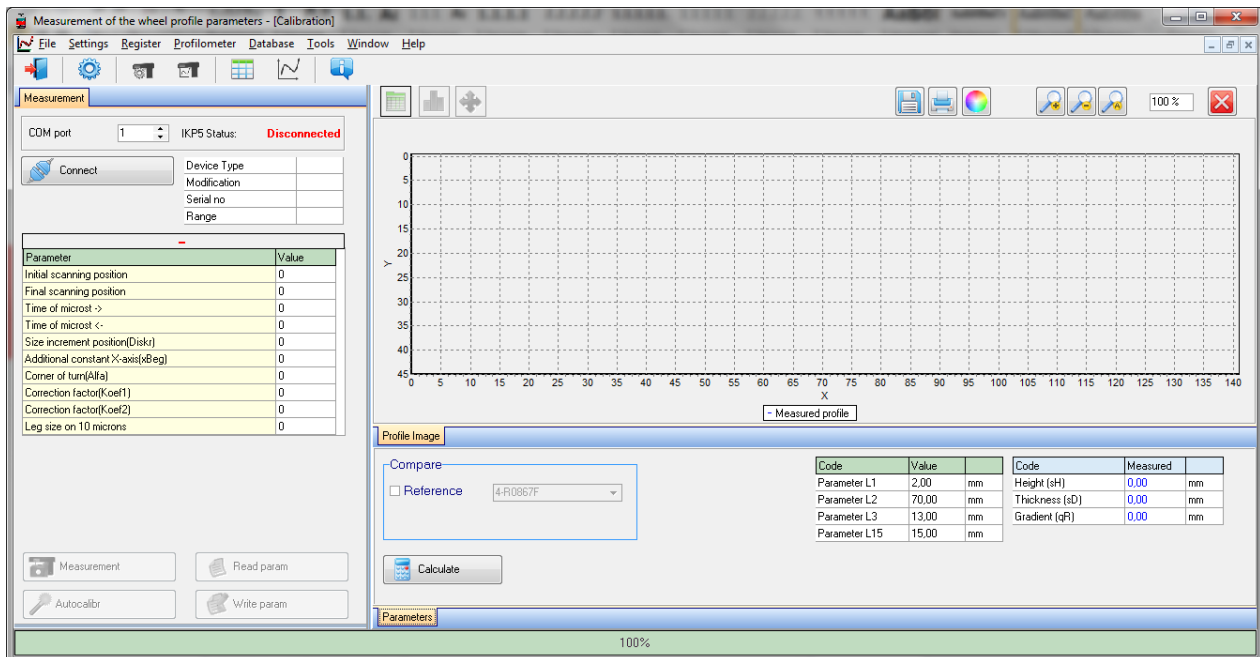
The menu contains two available items:

- Calibration
- Measurement

Before start to work with the profilometer, it is necessary to set the COM-port for Bluetooth-connection between the laser scanning module and PDA. The procedure is described in the user manual that comes with the Bluetooth-adapter.

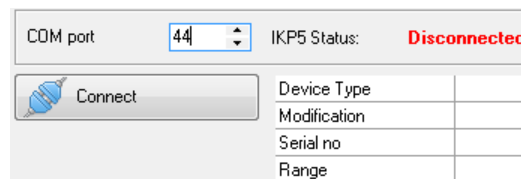
## 27.1. Calibration

For the calibration, select **Profilometer > Calibration**, or click the button .

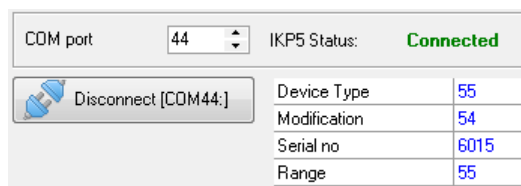


### 27.1.1. Installation of Bluetooth-connection

To connect, select the COM-port and click the **Connect** button.







If the connection is successful, the device will be identified, and calibration parameters will be obtained. The status will be changed to **Connected**.



The table of calibration parameters:

Parameter	Value
Initial scanning position	30
Final scanning position	2860
Time of microst ->	6
Time of microst <-	5
Size increment position(Diskr)	4935
Additional constant X-axis(xBeg)	5330
Corner of turn(Alfa)	63
Correction factor(Koef1)	0
Correction factor(Koef2)	0
Leg size on 10 microns	0

## Buttons:

 Measurement	Measurement
 Read param	Reading calibration parameters
 Write param	Writing calibration parameters
 Autocalibr	Automatic setting of calibration parameters

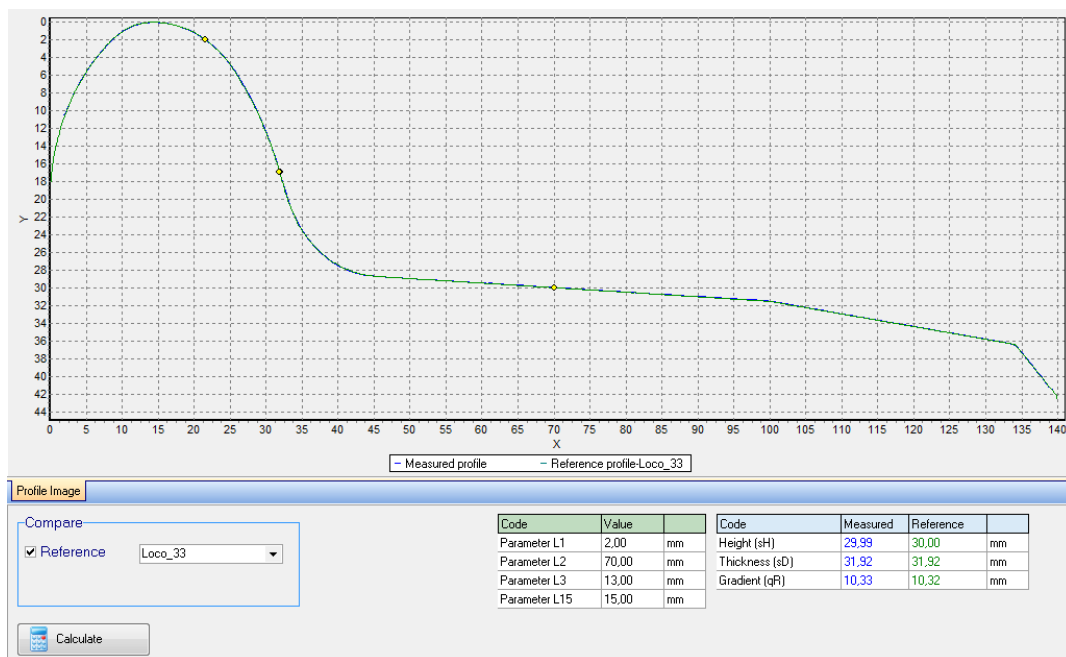


The **Auto calibration** button will be active, if at least one measurement of the profile is performed as well as the reference profile is selected.

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### 27.1.2. Calibration of the profilometer

- Place the profilometer on the calibration block.
- Select the reference profile from the list (**Compare > Reference**).
- Perform the measurement (the **Measurement** button )
- Perform the calibration (the **Auto calibration** button)
- Save calibration parameters (the **Write param.** buton).



Calibration parameters can be set manually. To do it, click left mouse key on the field of the required parameter value, and enter the new one.



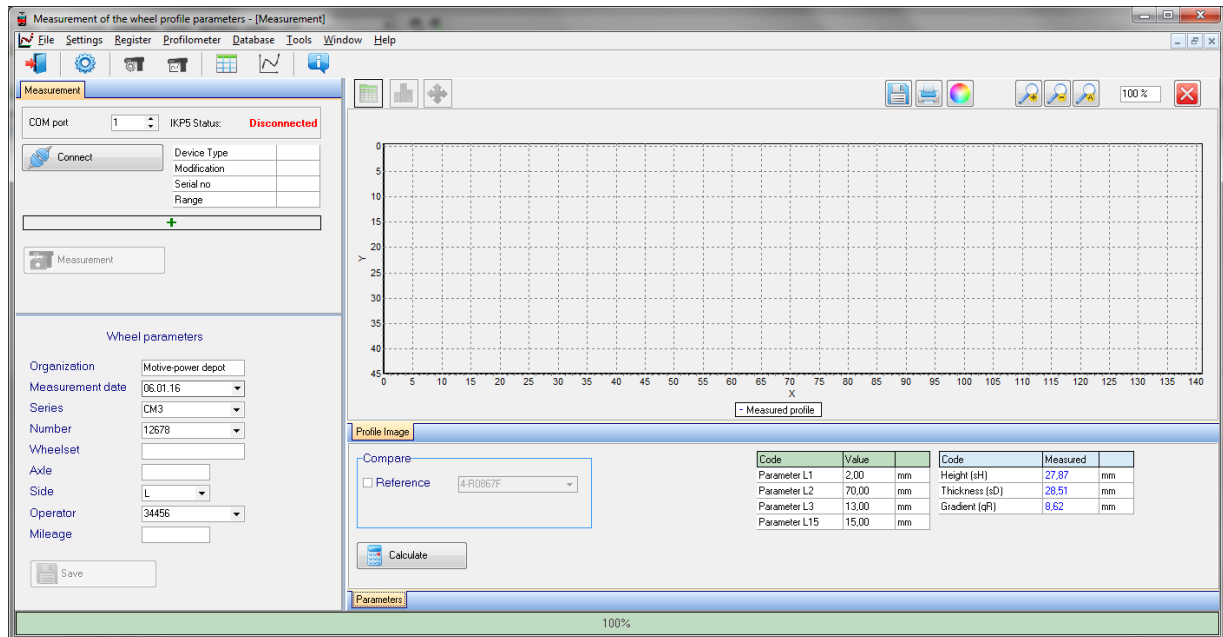
**Attention!** Writing incorrect values of some parameters can lead to the incorrect work of the device.

Buttons functions, opportunities of the work with profiles, and the calculation of required parameters are described in par. [22](#).



## 27.2. Measurement by using PC

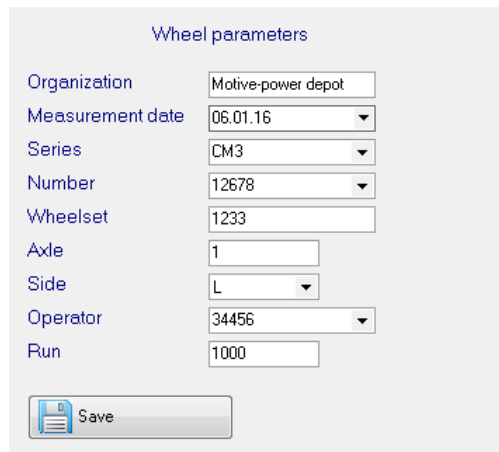
To measure, select **Profilometer > Measurement**, or click the button .



After establishing the Bluetooth-connection (see par. [27.1.1](#)), the **Measurement** button will be active.

### 27.2.1. Saving the data

- Place the profilometer on the wheel
- Perform the measurement (the **Measurement** button)
- Enter the identification parameters of the wheelset



The 'Wheel parameters' form contains the following fields:

- Organization: Motive-power depot
- Measurement date: 06.01.16
- Series: CM3
- Number: 12678
- Wheelset: 1233
- Axle: 1
- Side: L
- Operator: 34456
- Run: 1000

At the bottom is a 'Save' button.

- To save results, click **Save**
- The measured profile will be saved to the database

Buttons functions, opportunities of the work with profiles, and the calculation of required parameters are described in par. [22](#).

## 28. Annex 1. Charging procedure

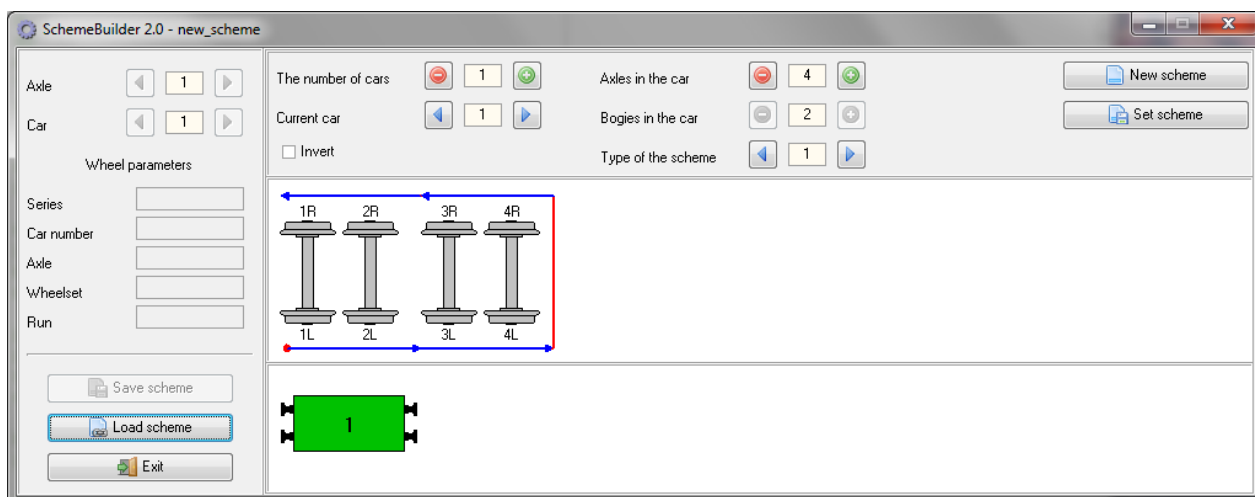
- Switch off the PDA (laser module).
- Connect the charging device and PDA (laser module)
- Connect the charging device and 220V
- Time of charging – 4 hours, until blue LED is lit.
- Disconnect the charging device and 220V
- Disconnect the charging device and PDA (laser module)



**Attention!** Please follow the sequence of these points.

## 29. Annex 2. Program for making measurement schemes

To create the measurement schemes, use the special program **SchemeBuilder.exe**. When the program is started, the main window appears on the screen:



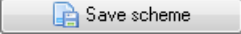
To form the scheme:

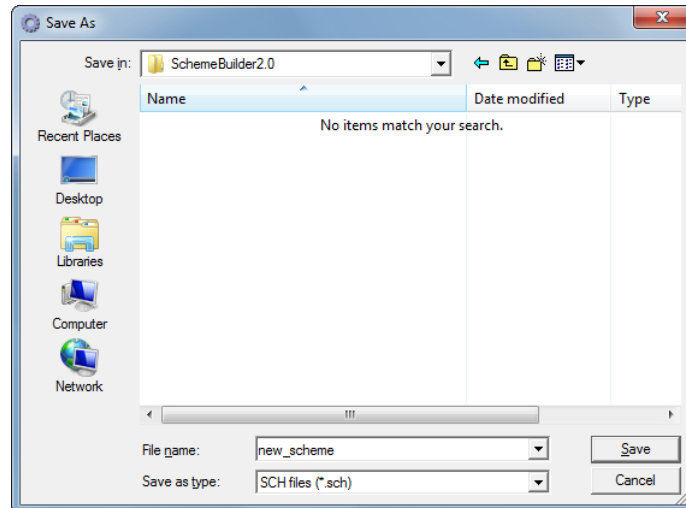
- Enter the number of cars
- Enter the number of axes in every car
- If the measurement of the car is performed in the reverse order, tick the box ☐ Invert
- Select the type of the scheme
- Click the button to accept
- Next, enter parameters of all wheelsets sequentially for each car

Wheel parameters	
Series	Series
Car number	1234
Axle	1
Wheelset	11
Run	

- The fields **Axle** and **Car** are used to navigate through the scheme

Axle	◀	1	▶
Car	◀	1	▶

- Click the **Save scheme** button 
- Enter the name of the scheme in the dialog box window

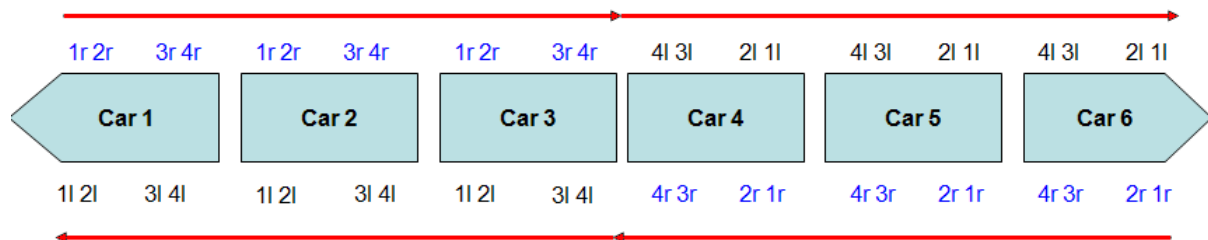


The program allows to edit the existing scheme. To edit the scheme, click the **Load scheme** button and select the \*.SCH file. After loading, you can edit and save the wheelset parameters.

To transfer the scheme file to PDA, use the procedure described in par. [23.1.5](#).

**Clarification.** The measurement scheme is a text file with extension .sch. User can create and edit such file by using any text processor.

**Example:**



Scheme\_EXAMPLE

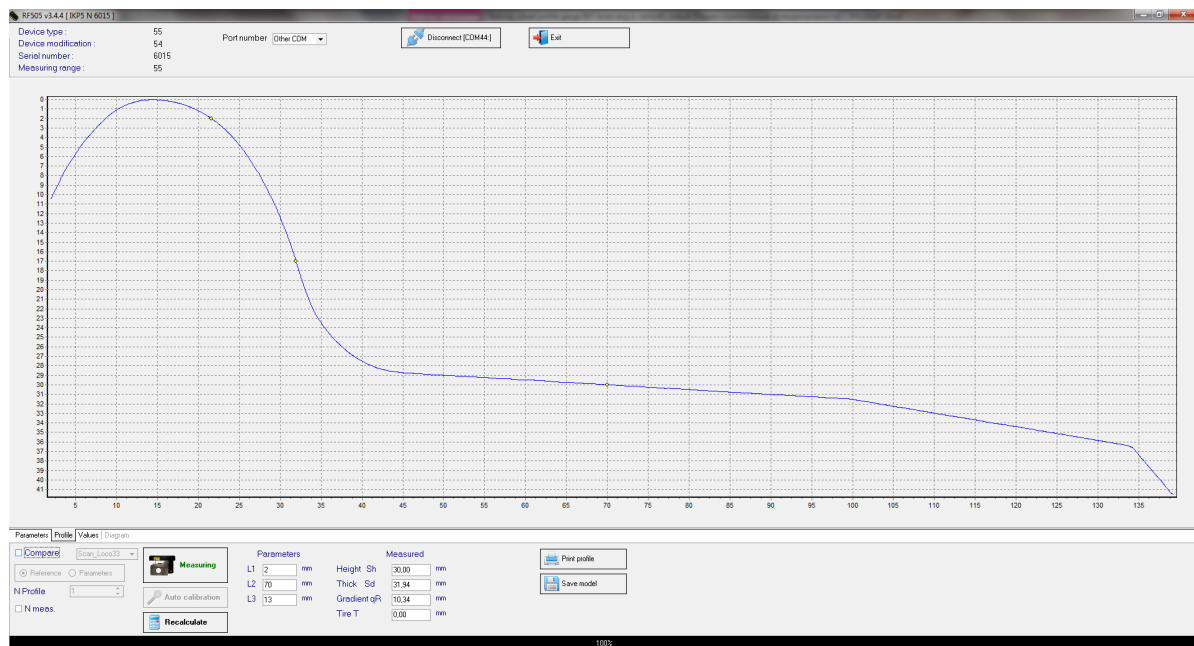
```
{
1d-|SM 3|7102|1l|11|SU11|111|1r|11|SU11|111|2l|12|SU12|112|2r|12|SU12|112|3l|13|SU13|113|3r|13|SU13|113|4l|14|SU14|114|4r|14|SU14|114|;
2d-|SM 3|7202|1l|21|SU21|211|1r|21|SU21|211|2l|22|SU22|212|2r|22|SU22|212|3l|23|SU23|213|3r|23|SU23|213|4l|24|SU24|214|4r|24|SU24|214|;
3d-|SM 3|7302|1l|31|SU31|311|1r|31|SU31|311|2l|32|SU32|312|2r|32|SU32|312|3l|33|SU33|313|3r|33|SU33|313|4l|34|SU34|314|4r|34|SU34|314|;
4i-|SM 3|7402|4r|44|SU044|414|4l|44|SU44|414|3r|43|SU43|413|3l|43|SU43|413|2r|42|SU42|412|2l|42|SU42|412|1r|41|SU41|411|1l|41|SU41|411|;
5i-|SM 3|7502|4r|54|SU54|514|4l|54|SU54|514|3r|53|SU53|513|3l|53|SU53|513|2r|52|SU52|512|2l|52|SU52|512|1r|51|SU51|511|1l|51|SU51|511|;
6i-|SM 3|7602|4r|64|SU064|614|4l|64|SU64|614|3r|63|SU63|613|3l|63|SU63|613|2r|62|SU62|612|2l|62|SU62|612|1r|61|SU61|611|1l|61|SU61|611|;
}
```

Where:

- 1d – coaches arranged in direct order (1 – sequence number)
- 1i – coached arranged in the reverse order (1 – sequence order)
- SM3 – coach series
- 7102 -number
- 1l – sequence number of wheel pair and the side (l- left/r-right)
- 11 – axle number
- SU11 – name of wheel set
- 111 – running distance of wheel set



- To perform the measurement, pass to the **Profile** tab and click **Measurement**. After measuring, the display will show the measured profile and the calculated geometric parameters of the profile: Height (Sh), Thickness (Sd), Slope (qR). Parameters are measured at support points L1, L2, L3.

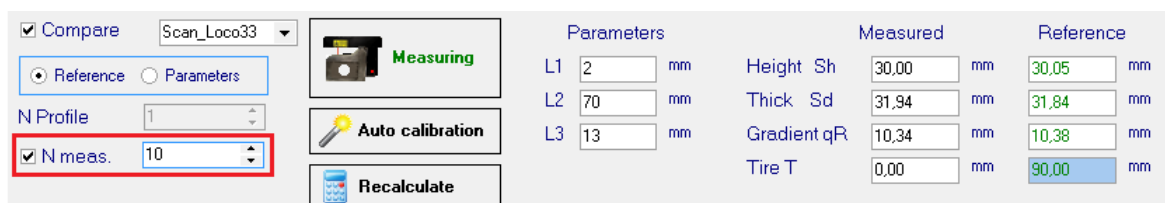


- To compare with the reference, tick the **Compare** box and select the required reference profile in the **Reference** drop-down list.

## 30.2. Testing

To carry out automatic testing, do the following steps:

- Tick the **N Meas.** box (number of measurements)
- Specify the number of measurements (5-10)
- Uncheck the **Calibr.** box, if it is ticked
- Click the **Measuring** button



Parameters	Measured	Reference
L1 2 mm	Height Sh 30.00 mm	30.05 mm
L2 70 mm	Thick Sd 31.94 mm	31.84 mm
L3 13 mm	Gradient qR 10.34 mm	10.38 mm
	Tire T 0.00 mm	90.00 mm

- The scanning module will make the specified number of measurements whose results will be entered to the table (the **Data** tab). The first three columns will present measured values of height (Sh), thickness (Sd), and flange slope (qR), while the other three columns will present deviations of the measured values from the reference values (d\_Sh, d\_Sd, d\_qR). The **Diagram** tab is intended for displaying the diagram of values/deviations of the measured profile from the selected reference. Deviation of the flange height and thickness from the reference values must not be more than 0.1 mm.
- If deviations exceed the permissible value, it is necessary to perform calibration of the scanning module.

### 30.3. Calibration

To carry out automatic calibration, do the following steps:

- Select the reference profile from the list
- Perform the measurement (the **Measuring** button)
- Perform the calibration (the **Auto calibration** button)
- When scanning is completed, perform the testing procedure in accordance with [30.2](#). In case of positive result, pass to the **Parameters** tab and save parameters (the **Write parameters** button)

Parameters			
Initial position of scanning :	<input type="text" value="30"/>	Correction coefficient(KoefY) :	<input type="text" value="10022"/>
Final position of scanning :	<input type="text" value="2860"/>	Correction coefficient(Koef1) :	<input type="text" value="71"/>
Time of a microstep :	<input type="text" value="6"/> <input type="text" value="5"/>		
Size increment positions:	<input type="text" value="4935"/>		
Additional constant on an axis X:	<input type="text" value="5387"/>		
Corner of turn(Alfa) :	<input type="text" value="95"/>		

- If parameters have incorrect values (negative or zero) for any reason, it is necessary to restore factory settings by pressing the **Load Default** button. After that, recalibrate the profilometer.

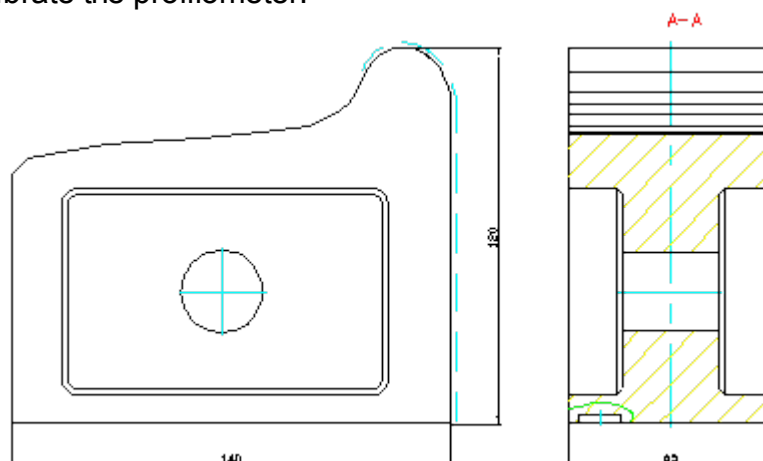


Figure 1A

## 31. Warranty policy

Warranty assurance for the Laser Profilometer - 24 months from the date of putting in operation; warranty shelf-life - 12 months.

## 32. Distributors

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## 33. 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.



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### 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.