



FDIMR-L-BT Series



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1. Safety precautions and measurement conditions

- The metering accuracy depends greatly on the wheel surface quality. Therefore it is necessary to carry out the check and presorting of the wheel flaws before measuring the distance.
- Prior to place the gauge is a need to clean the wheels parts that contact with gauge and the place of laser beam hit.
- Do not allow hitting gage on the wheel when placing. (See paragraph 10.2, Installation procedure).
- It is necessary to inspect the gauge supports periodically and to cleanse them
- To save the battery power the display extinguishes if there were no buttons pressings for 60 seconds, at that only blinking dot is shown. Pressing any button just turns on the display and does not act in any other way in this case.

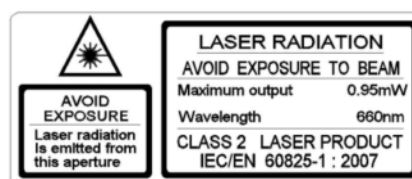
2. Electromagnetic compatibility

The back-to-back distance measuring gauge (FDIMR-L-BT Series) has been developed for use in industry and meets 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 device make use of an c.w. 660 nm wavelength semiconductor laser. Maximum output power is 1 mW. According to IEC 60825-1:2007 the device belong to the 2 laser safety class. The following warning label is placed on the laser body:



The following safety measures should be taken while operating the FDIMR-L-BT:

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

4. General information

Gauge is designed for measuring back-to-back distance of railway, metro and tram wheels in the course of checkup, examination, repair and formation of wheel sets. Measurements are made directly on rolling stock without wheel set roll-out.

5. Basic data and performance characteristics

Name of parameter	Value
Measurement range, mm	1345...1375 or on request (nominal distance ± 15 mm)
Measurement error, mm	$\pm 0,3$
Indication discreteness	0.1mm, 0.01mm * or 0.01 inch
Display	build-in, LED
Operating temperature, 0C	-15...+50
Weight, g	850
Dimensions	figure 1
Power supply	rechargeable batteries 4xAAA, 1.2V
Connection to PC	Bluetooth

6. Complete set to be supplied

Name	Quantity
Back-to-back distance measuring gauge, FDIRM-L-BT	1 piece
Charger	1 piece
Manual	1 piece
Case	1 piece
Calibration tools (option)	on request

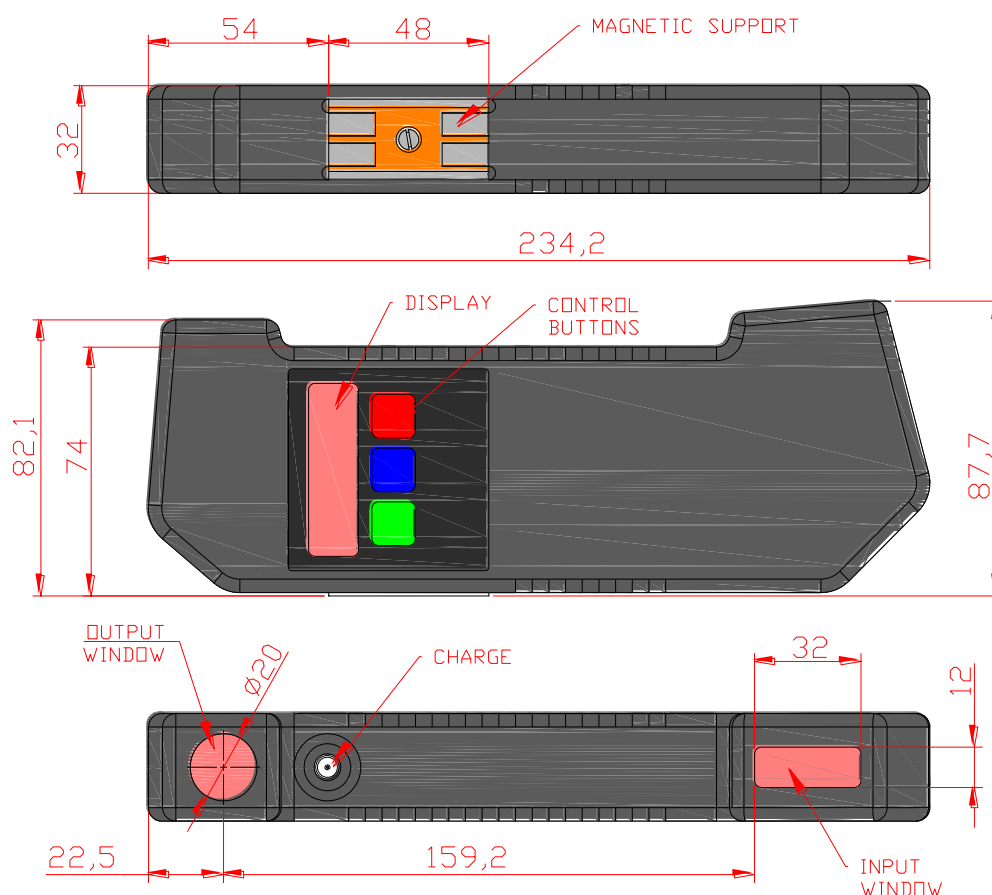


Figure 1

7. Example of item designation when ordering

FDIMR-L-BT-D

Symbol	Name
D	Nominal back-to-back distance, mm
Example: FDIMR-L-BT-1360 - nominal back-to-back distance – 1360 mm	

8. Design

The gauge (fig.1) contains magnetic support to place the gauge onto the internal surface of the wheel.

There are a digital numeric display and control buttons on the front panel of the gauge. Output window for laser radiation, input window, "Charge" connector for charging device connection are placed on the side panel of the gauge.

9. Operation principle

The method of back-to-back distance measurement is based on the direct measurement the distance by laser triangulation sensor in-built onto the gauge.

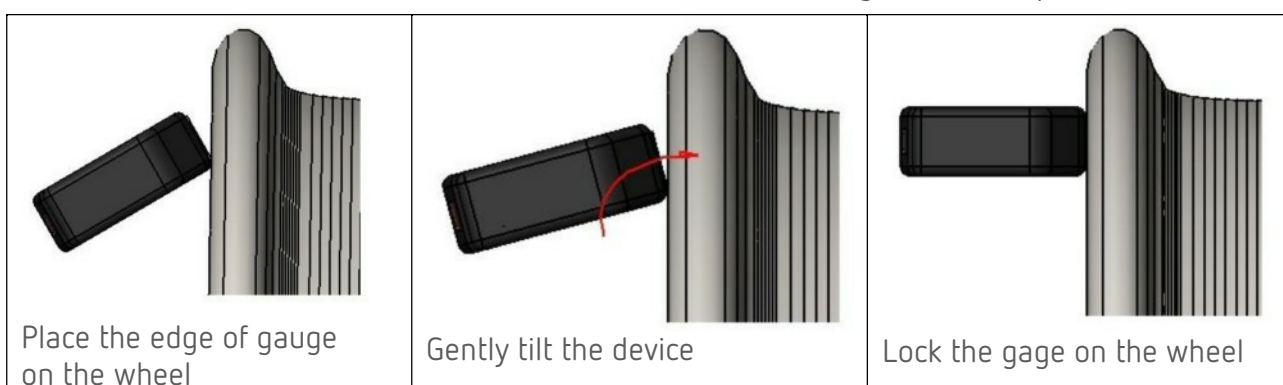
10. Working with the gauge

10.1. Gauge turn-on

Press **Red** button to turn on the power. The display shows "ErrP" message if the accumulator battery voltage became lower than the control level. For such a case it is necessary to change batteries.

10.2. Installation procedure.

To avoid device shock on the wheel refer to the following installation procedure:



10.3. Single measurement

To perform measurement, it is necessary to:

- turn the power on (press Red button). The display shows " - - - - ";
- place the gauge on the inner surface of the wheel;
- make sure that the magnetic support is tight against the surface of the wheel;
- press Green button.
- in a 1 second the display will show the value back-to-back distance.

For viewing the result of measurement with indication discreteness of 0.01mm (it is accessible only in a mode of direct indication) it is necessary to press **Blue** button,

thus displayed result will be shifted to the left on one digit. Next pressing **Blue** button will lead to return of indication to a starting position:

10.4. Measurement with averaging

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

To carry out measurements it is necessary to

- turn the power on (press **Red** button). •The •display •shows •“- - - - -”;
- place the gauge;
- make sure the magnetic support is tight against the inner surface of the wheel;
- press **Green** button;
- display shows the value of pressing counter “n x”, •where x – quantity of averaged values;
- in a 1 second display shows an average value of the back-to-back distance;
- move the gauge to a new position and repeat the measuring.

(The total quantity of measurements averaged in this way can run up to 9999.)

- Press **Red** button to reset averaging result at switching to another wheel.

For viewing the result of measurement with indication discreteness 0.01mm (it is accessible only in a mode of direct indication) it is necessary to press **Blue** button, thus displayed result will be shifted to the left on one digit. Next pressing **Blue** button will lead to return of indication to a starting position.

10.5. Gauge turn-out

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

11. Indication parameters setup

11.1. Image brightness set-up

To change the display brightness it is necessary to:

- turn the power on (press **Red** button);
- press **Blue** button and keep it pressed for more than three seconds;
- display will show “Up”;
- press **Blue** button one more time, the image brightness set-up will be displayed •“brt”
- choose the necessary brightness value by **Green** button pressings;
- to save the changed parameters press **Red** button •the •display •shows •“SAUE” message, press the **Green** button to confirm saving and **Red** to cancel saving of the changed parameters;

At brightness choosing one should take into account that increased brightness enhances power consumption and decreases the period till battery recharge moment.

11.2. Millimeters-Inches display set-up

To change the mode it is necessary to:

- turn the power on (press **Red** button);

- press **Blue** button and keep it pressed for more than three seconds;
- display will show "Up";
- press **Blue** button again until the either "SI" or "Inch" message appears on the display. "SI" – measuring results will be shown in mm, "Inch" – measuring results will be shown in inches;
- choose the necessary value by **Green** button pressings;
- to save the changed parameters press **Red** button the display shows "SAUE" message, press the **Green** button to confirm saving and **Red** to cancel saving of the changed parameters

NOTE: Discreteness of inch indication is two digits after point. The separation point is indicated at the top side of the screen in the reverse indication regime

11.3. Image rotation

Image rotation depending on gauge position is done automatically after Measurement button pressing.

12. Device calibration

This section contains the description of the modes for the check of device efficiency and calibration. As erroneous actions in this mode can lead to invalid measurement results, only specially trained personnel should perform such operations.

12.1. Calibration conditions

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

To perform calibration the following means are necessary:

- Calibration tool RF260.90.000 fig.3;

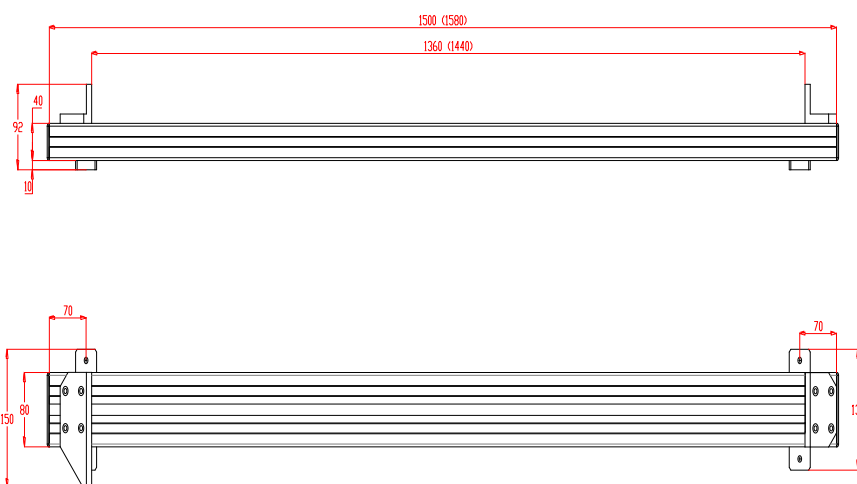


Figure 3

* - the length of calibration tool is checked with accuracy of 0,01 mm.

12.2. Get into operational modes

- To get into the operational modes it is necessary to turn-off the device (press **Red** button more then 3 seconds).
- Keeping **Green** button in pushed position turn-on the device (press **Red** button).
- Display shows "CLbr.0" message (the mode of calibration of the sensor's "0").

- To get into this mode press **Green** button (see. p.11.3).
- To get out the mode of calibration press **Red** button.

12.3. Calibration of the sensor zero

- Zero calibration mode being enabled, the display shows the length of calibration tool.
- If editing of the length value is not required, go to the next step. To edit the length value, press the **Blue** button, and the digit to be edited starts blinking. Changing over between the digits is made by pressing the **Blue** button while changing of values is made by pressing the **Green** button. When editing is finished, press the **Red** button and confirm or cancel saving of the parameter by pressing the **Green** button or **Red** button, respectively.
- Press the **Green** button, and the length value starts blinking, which means that the device must be placed onto calibration tool. The magnetic support of the gauge must be tightly fitted to the flat plates of calibration tool.
- Press the **Green** button, and the display shows current reading of the sensor in its own coordinate system.

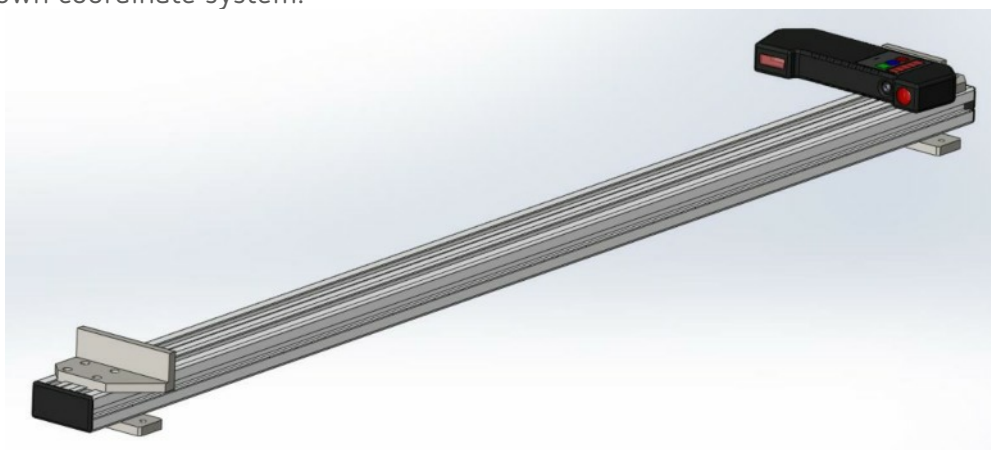


Figure 4

- If readings of the sensor are sufficiently stable, press the **Blue** button. Sensor zero position is calculated in the device coordinate system, and a prompt appears to save calibration results. Press the **Green** or **Red** button to confirm or cancel saving of the results, respectively.

13. Charging of built-in accumulator battery

To charge accumulator battery it is necessary to connect charging device to the power grid 85-250V and to a battery compartment on the top panel of the gauge. The period of charging is 15 hours.

14. Warranty policy

Warranty assurance for the FDIR-L-BT Series Back-to-back measurement gauge - 24 months from the date of putting in operation; warranty shelf-life - 12 months.

15. Annex 1. Measurement instruments for railway transport



Laser wheel profilometer. FDKP Series

A laser profilometer is designed for the measuring of:

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

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



Portable laser rail profilometer. FPRP Series

The main functions of FPRP 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. FDK 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.



Disc brakes profile gauge, FBD Series

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

The main functions of FBD 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.