



RIFTEK

Sensors & Instruments



HOT OBJECTS GEOMETRY CONTROL SYSTEM

RF038 Series

User's manual

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1. CE compliance

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

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

2. Laser safety

The system makes use of an c.w. 450 nm wavelength semiconductor laser. The maximum output power is 30 mW. The system belongs to the 3R laser safety class according to IEC/EN 60825-1:2014.

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

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

3. General information

The system is designed for non-contact measurement of geometric parameters of hot objects, mainly round and rectangular.

4. Basic technical data

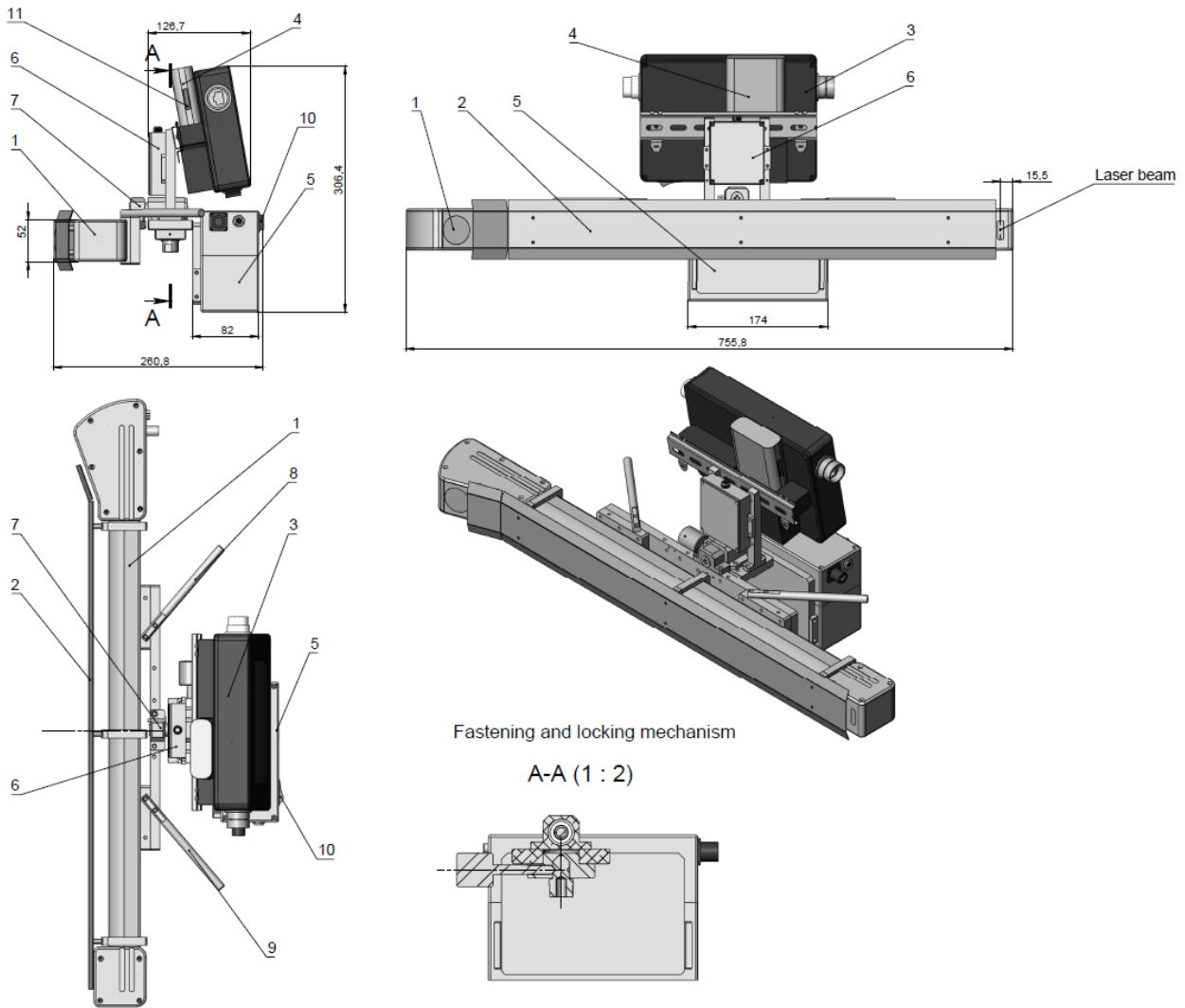
Parameter	Value
Controlled parameters	diameter, width
Measurement range, mm	from 16.5 to 170
Measurement error, mm	±0.3
Measurement time, s	3
Laser scanner type	RF627-1700/380-164/198
Nominal distance to object, mm	1900
Number of measurements before recharging the battery, not less	100
Number of saved measurements, not less	1000
Light source	blue semiconductor laser, 450 nm wavelength
Laser output power, mW	<30
Laser safety class	3R (IEC60825-1)
Interface	Wi-Fi
Power supply, V	3.7 V, Li-ion battery, 5400 mAh
Weight, kg	11

NOTE. Technical characteristics of the system can be changed for a specific task.

5. Structure and operating principle

The operation of the system is based on the principle of laser scanning of the object surface with a rocking 2D triangulation sensor.

The system contains a 2D triangulation sensor (laser scanner) 1 with a protective screen 2, a controller 3 with a power supply 4, a sensor power supply 5, a Wi-Fi router 6. Elements 1-6 are installed on the rocking mechanism 7 equipped with two handles 8, 9. See Figure 1.



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Figure 1

The measuring area of the scanner is shown in the figure below:

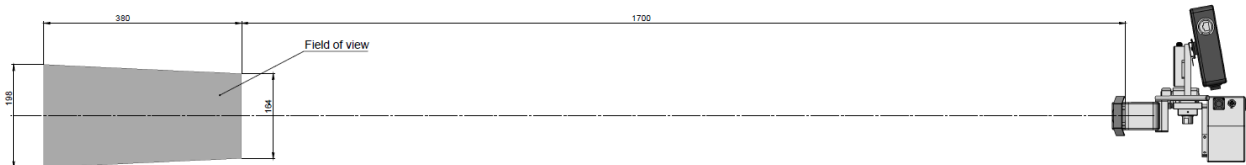
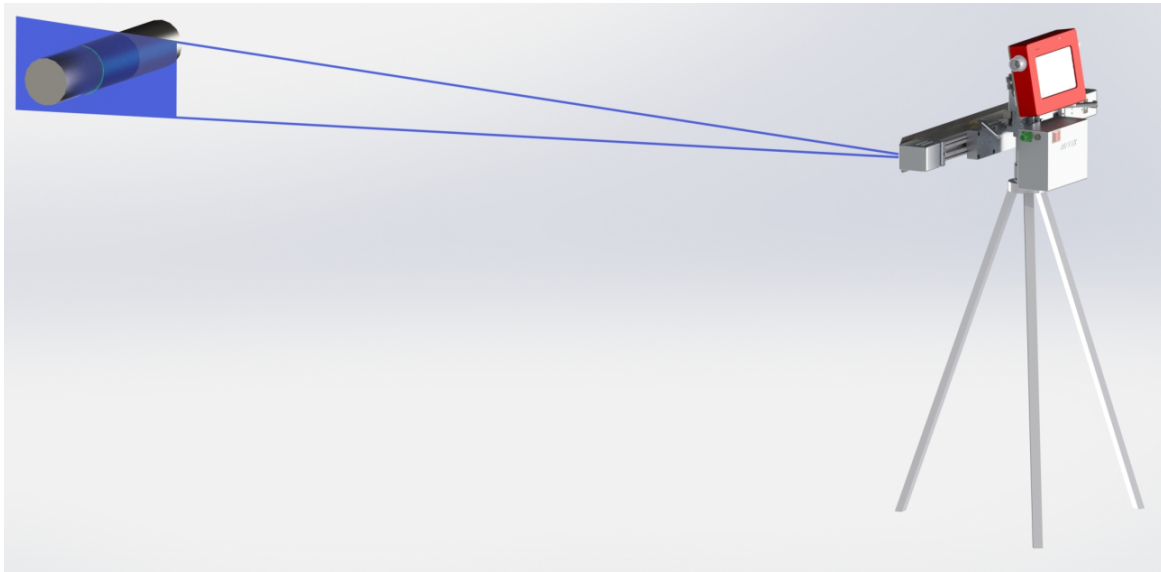


Figure 2

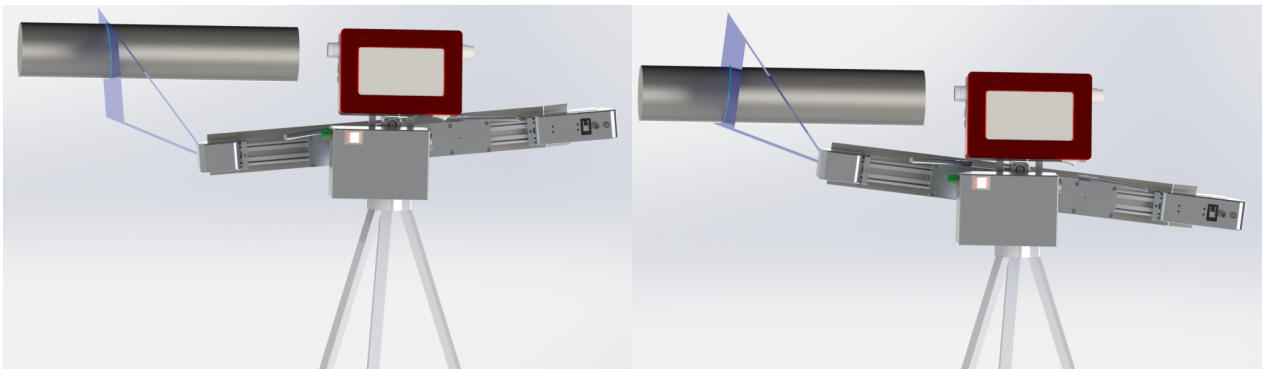
The system operates as follows.

The system is installed on a tripod in the horizontal plane of the object at such a distance that the object is located in the measuring area of the scanner ("Field of View" in Fig. 2).

**Figure 3**

The laser radiation of the scanner (in the form of a line) is projected onto the controlled object. The resulting image of the contour (section profile) of the object is analyzed by the controller that calculates either the diameter of the round object or the width of the rectangular object.

To eliminate the measurement error caused by the non-perpendicularity of the laser line with respect to the axis of the object, measurements are made repeatedly when rocking the scanner around the horizontal axis using handles 7, 8. During the rocking process, the scanner captures a number of object profiles located at different angles to the object axis. The controller analyzes the obtained profiles and selects a profile perpendicular to the axis of the object, which characterizes its true size.

**Figure 4. Two extreme positions of the scanner when it is rocking around the horizontal axis**

6. Complete set to be supplied

The package includes the system and two chargers (one for the controller battery and the other for the scanner battery).

7. Intended use

7.1. Preparation for use

System preparation includes:

- Visual inspection.
- Charging the batteries.
- Installation.

7.1.1. Visual inspection

- Check the equipment for completeness and absence of damage.
- Check the rocking mechanism for smooth progress.
- Check the condition of the windows of the laser scanner and, if necessary, cleanse them with a soft cloth.

7.1.2. Charging the batteries

The charging time is about 6 hours.

7.1.3. Installation

- Install the system in the control zone in accordance with Fig. 3.
- Press the controller power button on the battery.
- Press the scanner power button on the battery.
- After 5 seconds, a Wi-Fi connection should be established between the scanner and the controller. Connection establishment indication - information in the program window.

The system is ready to operate.

7.2. Operating the system

The measurement process is fully automated and operation of the system is reduced to the work with the software.

7.2.1. Main program window

The main program window:



The left part of the window is the parameters area, the central part is the object profile display area, the right part is the results area.

The parameters area contains (from top to bottom): the current time, the operating frequency of the scanner (profiles per second), the name of the file for recording the result, the number of the machine / measurement position (**Machine number**), the number of measurement positions (**Machine amount**), the option button for selecting the shape of the controlled object, the button for switching the window view (**Normal screen** / **Full screen** (with the line of Windows programs)).

The profile display area shows: the measurement result (**Result:**), the field of view of the laser scanner (gray lines), the object profile (red) and the circle (blue) for circular objects.

The measurement result is displayed in tabular form in the results area.

Columns:

- 1 - measurement number;
- 2 - result;
- 3 - time;
- 4 - machine number;
- 5 - object shape.

The **Clean table** button is designed to clear the results table both on the screen and in the memory of the controller.

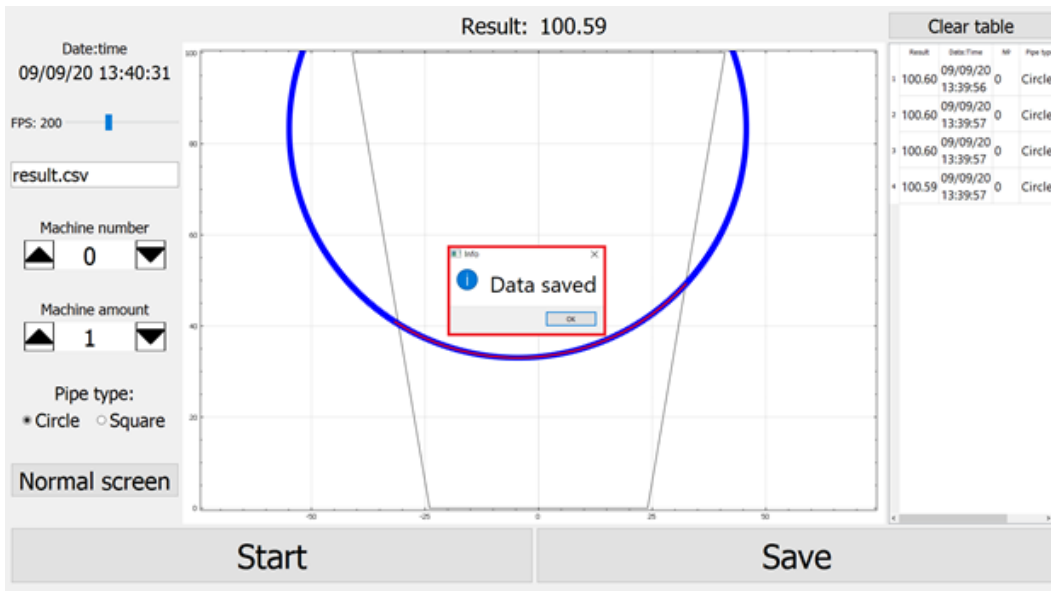
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7.2.2. Measurement

To make measurements, follow these steps:

- set the scanner performance parameter within 200 profiles/s;
- set the **Machine amount** parameter;
- set the **Machine number** parameter;
- select the shape of the object: **Circle** or **Square**;
- tilt the scanner to the extreme position;
- click the **Start** button;
- rock the scanner several times from one extreme position to another;
- click the **Stop** button;
- at the top of the display area, you will see the result (diameter or width) - **Result:**;
- click the **Save** button to save the result to the database.

If the result is successfully saved to the database, you will see the following message:



When moving to the next measurement position, change the **Machine number** parameter and make measurements according to the procedure described above.

8. Warranty policy

Warranty assurance for the Hot Objects Geometry Control System RF038 Series - 24 months from the date of putting in operation; warranty shelf-life - 12 months.

9. Revisions

Date	Revision	Description
20.09.2020	1.0.0	Starting document.

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