RIFTEK
Sensors & Instruments

LASER PROBES

RF609-Wi-Fi Series

User's manual

Contents

1. Safety precautions

- Use supply voltage and interfaces indicated in the probe specifications.
- In connection/disconnection of cables, the probe power must be switched off.
- Do not use the probe in locations close to powerful light sources.
- To obtain stable results, wait about 20 minutes after powering on to achieve uniform probe warm-up.

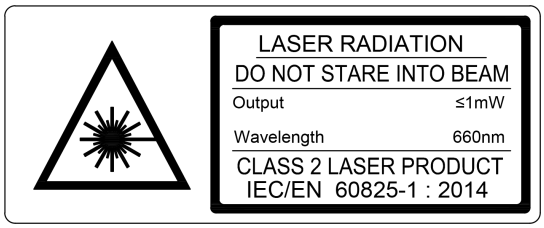
2. CE compliance

The probes have been developed for use in industry and meet the requirements of the following Directives:

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

3. Laser safety

The probes make use of an c.w. 660 nm (or 405 nm or 450 nm) wavelength semiconductor laser. Maximum output power is 1 mW. The probes belong to the 2 laser safety class. The following warning label is placed on the probe body:



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

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

4. General information

Laser probes are designed for non-contact measurement and control of the geometric parameters of holes.

It is also possible to order configurations other than those listed below.

5. Structure and operating principle

The main component of the probe is a laser sensor. Operation of the laser sensor is based on the principle of optical triangulation (Figure 1). The sensor contains a semiconductor laser (1) with the forming optics (2), the receiving lens (3), the CMOS array (4), and the controller (5).

Radiation of a semiconductor laser is focused by the lens onto the object (6). Radiation reflected by the object is collected by the lens onto the CMOS array. Moving the object (6 - 6') causes the corresponding shift of the image. A signal processor calculates the distance to the object from the position of the light spot on the CMOS array.

The laser sensor is characterized by a base distance (the distance from the probe body to the beginning of the working range) and the working range (the distance measurement range).

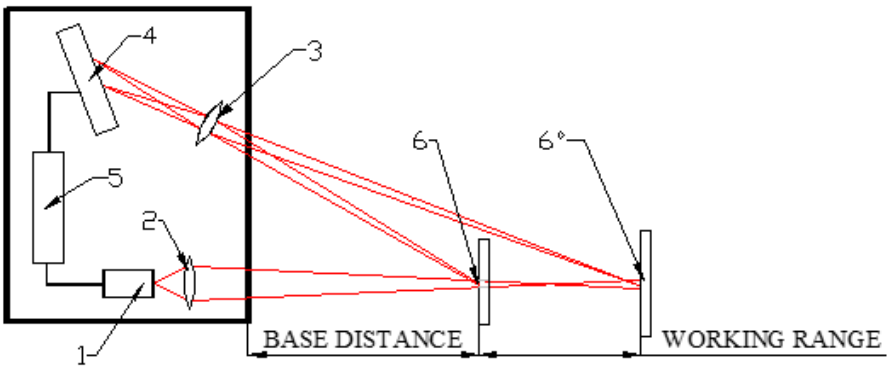


Figure 1

5.1. Measuring principle

The measuring principle is illustrated in Figure 2. The laser probe is inserted into the controlled hole. The probe (or the part) starts rotating at a constant speed. A triangulation laser sensor, which is built into the probe, measures the distance to the hole surface. The resulting set of coordinates is used to calculate the geometric parameters of the hole. Moving the probe along the hole allows you to get the geometric parameters of the hole in different sections and build a 3D model of the inner surface.

Examples of measuring systems:

https://riftek.com/eng/products/~show/instruments/laser_systems_for_inner_diameter_measurement

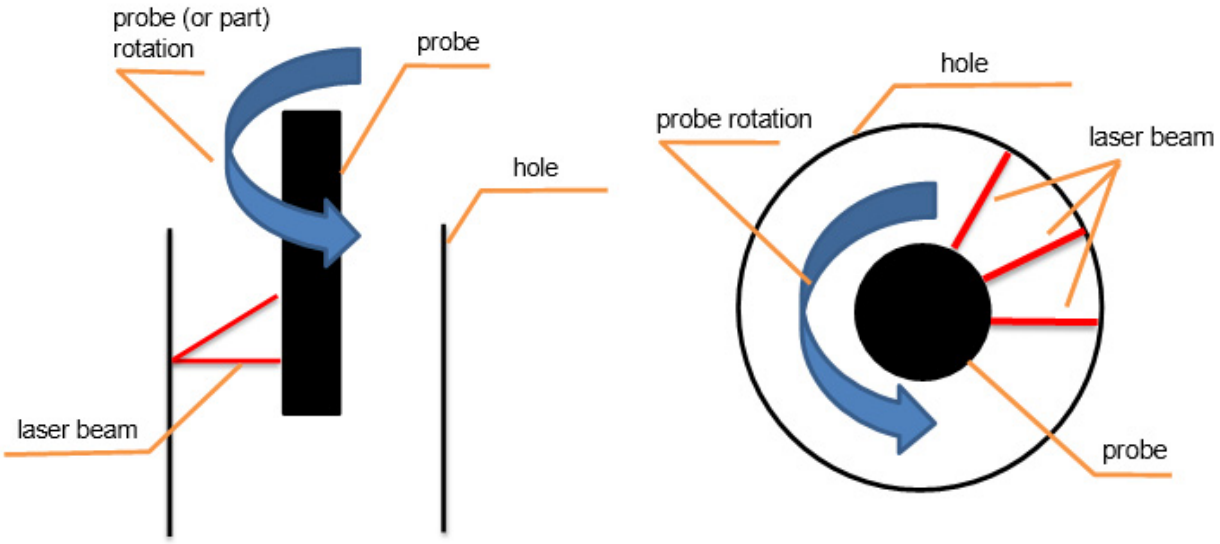


Figure 2

6. Basic technical data

RF609-Dmin/Dmax-L-Wi-Fi	-9/19-	-16/48-
Diameter of the laser sensor body, mm	8.5	15
Range of controlled diameters, mm	9.2 ... 19	16 ... 48
Depth of controlled holes, mm	on request	
Base distance of the laser sensor, mm	0.1	0.5
Working range of the laser sensor, mm	5	16
Laser sensor linearity, %	±0.05 of the range	
Max. measurement frequency, Hz	9400	
Light source	red semiconductor laser, 660 nm wavelength for both models; blue or UV semiconductor laser, 450 or 405 nm wavelength (BLUE version) only for 16/48 model	
Output power, mW	≤1	
Laser safety class	2 (IEC60825-1)	
Output interface	Wi-Fi	
Power supply, V	3.7 V, Li-ion battery, 4 mAh	
Power consumption, W	1 ... 1.5	
Environmental resistance:		
Enclosure rating	IP67	
Vibration	20 g / 10…1000 Hz, 6 hours for each of XYZ axes	
Shock	30 g / 6 ms	
Operating ambient temperature, °C	-10…+60	
Permissible ambient light, lx	10000	
Relative humidity, %	5-95 (no condensation)	
Storage temperature, °C	-20…+70	
Housing material	aluminum, brass	
Weight, gram	650	700

NOTE: Parameters of probes (range of controlled diameters, length) can be changed upon request.

7. Example of item designation when ordering

RF609(BLUE)-Dmin/Dmax-L-Wi-Fi

Symbol	Description
(BLUE)	Blue laser option (405 nm or 450 nm). Only for 16/48 probes.
Dmin	Minimum controlled diameter, mm.
Dmax	Maximum controlled diameter (when the probe is placed along the hole axis), mm.
L	Probe length (prior consultation with the manufacturer is required).
Wi-Fi	Wi-Fi interface.

Example. RF609-9/19-100-Wi-Fi – Laser Probe with a red semiconductor laser, range of controlled diameters - 9...19 mm, probe length - 100 mm, Wi-Fi interface.

8. Complete set to be supplied

Designation	Name
RF096-Dmin/Dmax-L-Wi-Fi	Laser scanning module.
RF096.40	Charging device.
RF096.42	Data cable.
	Wi-Fi module.
	User's manual.
RF096.33	Case.

The probe comes in the special case that protects the device against any possible damage during transportation.

9. Dimensions and mounting

9.1. Overall and mounting dimensions

Overall and mounting dimensions of the probes are shown in Figures 3.1.-3.2. The probe contains a connector for connecting a charger, a shank for installation in a collet chuck, a power button and an operation indicator. The length of the probe can be changed upon request.

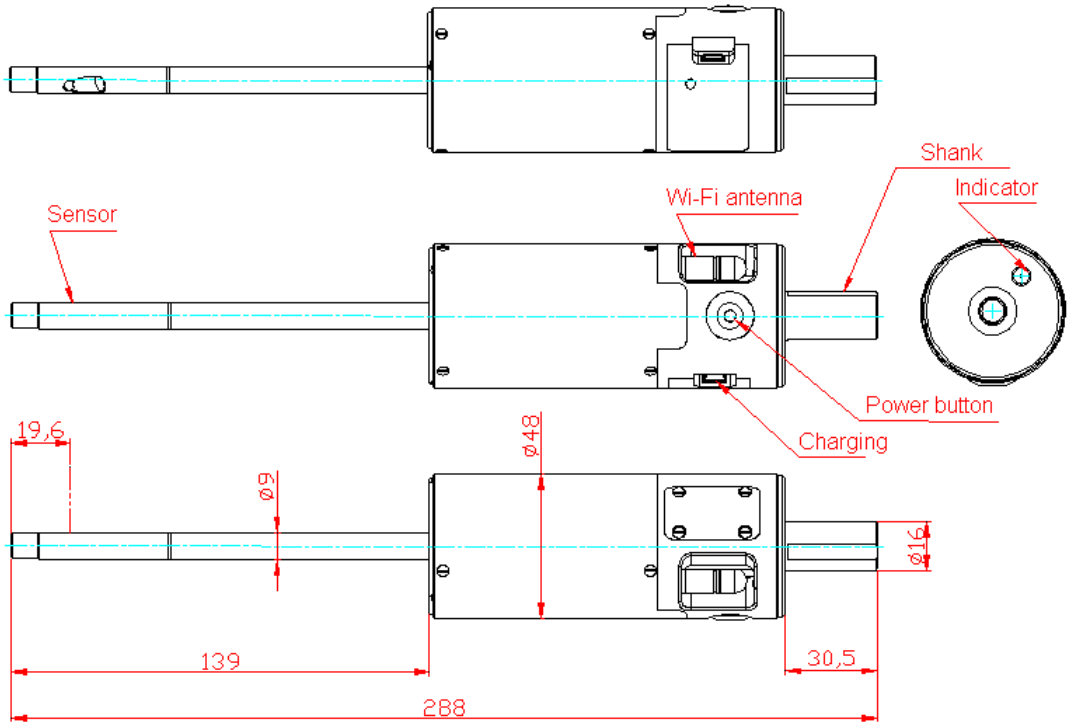


Figure 3.1. RF609-9/19-139-Wi-Fi.

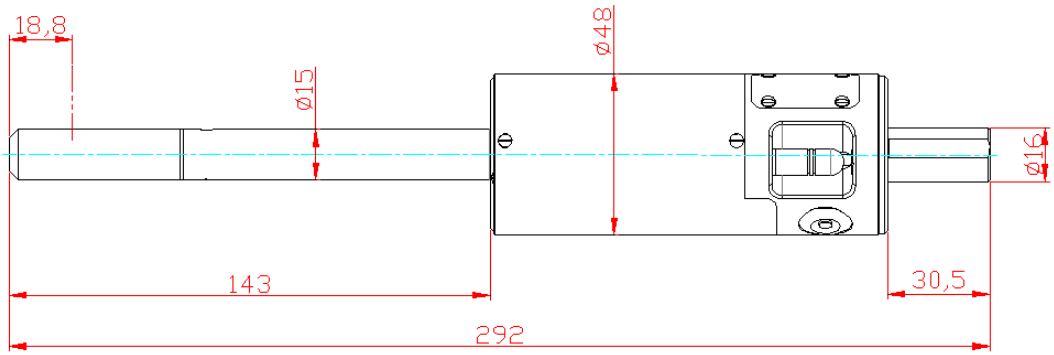


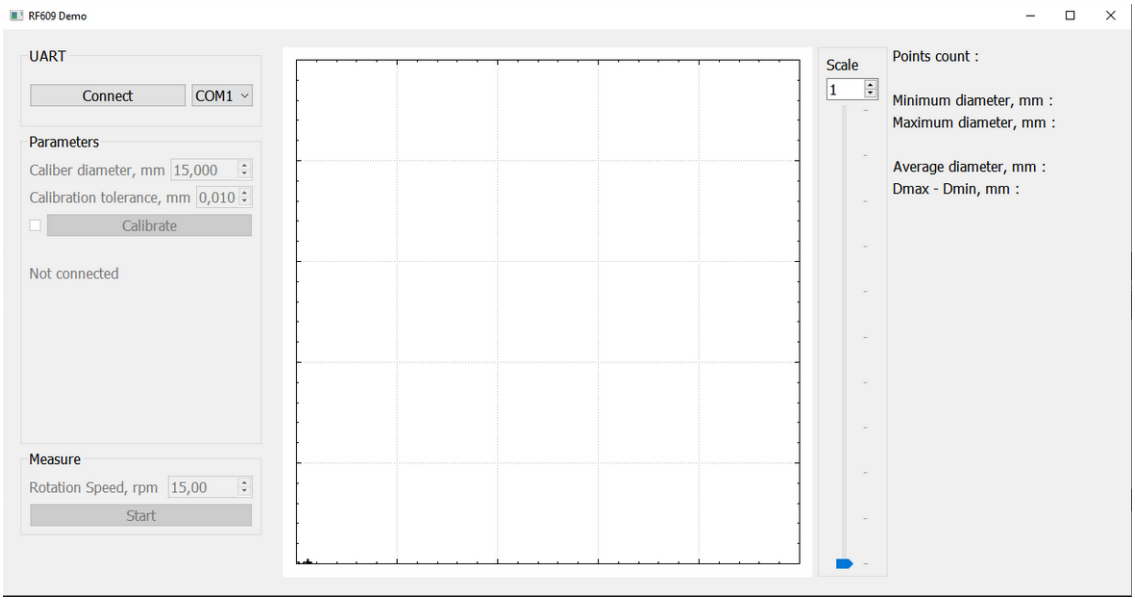
Figure 3.2. RF609-16/48-143-Wi-Fi.

9.2. Overall demands for mounting

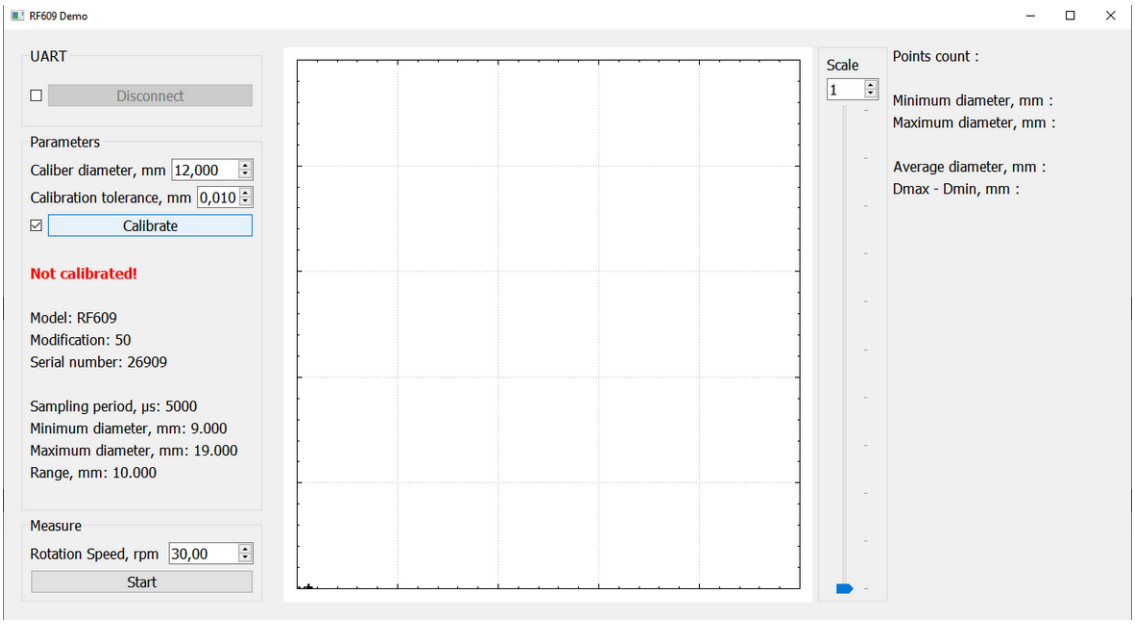
Use the shank to install the probe in the collet chuck, see Figures 3.1. and 3.2. The diameter of the controlled hole must match the working range of the probe.

10. Operating procedure

- Charge the probe battery by connecting it to the charging device.
- Install the probe in the collet chuck.
- Connect the Wi-Fi module to the USB port of a computer.
- Switch on the probe by pressing the power button, see Figure 3.1.
- Start the software on the computer.
- The main program window appears on the screen:



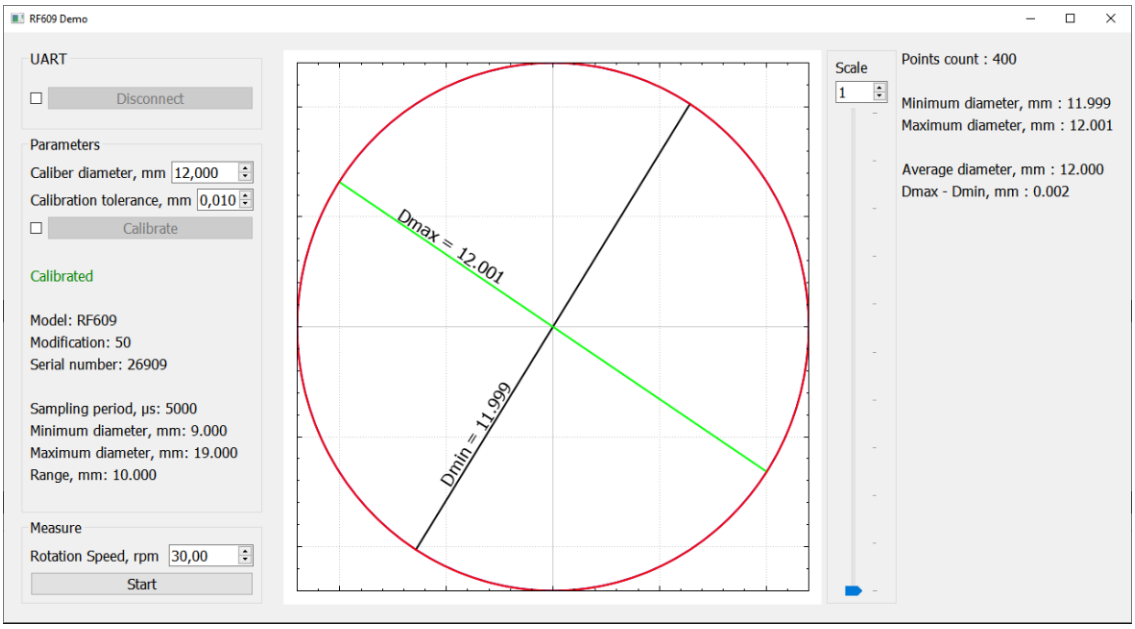
- To connect to the probe, click the **Connect** button. If the connection is successful, the probe parameters will be displayed:



- In the **Rotation Speed** field, set the rotation speed of the probe or the measured part.
- In the **Caliber diameter** field, enter the diameter of the master template.
- In the **Calibration tolerance** field, set the tolerance for the calibration accuracy.

Calibrate the probe:

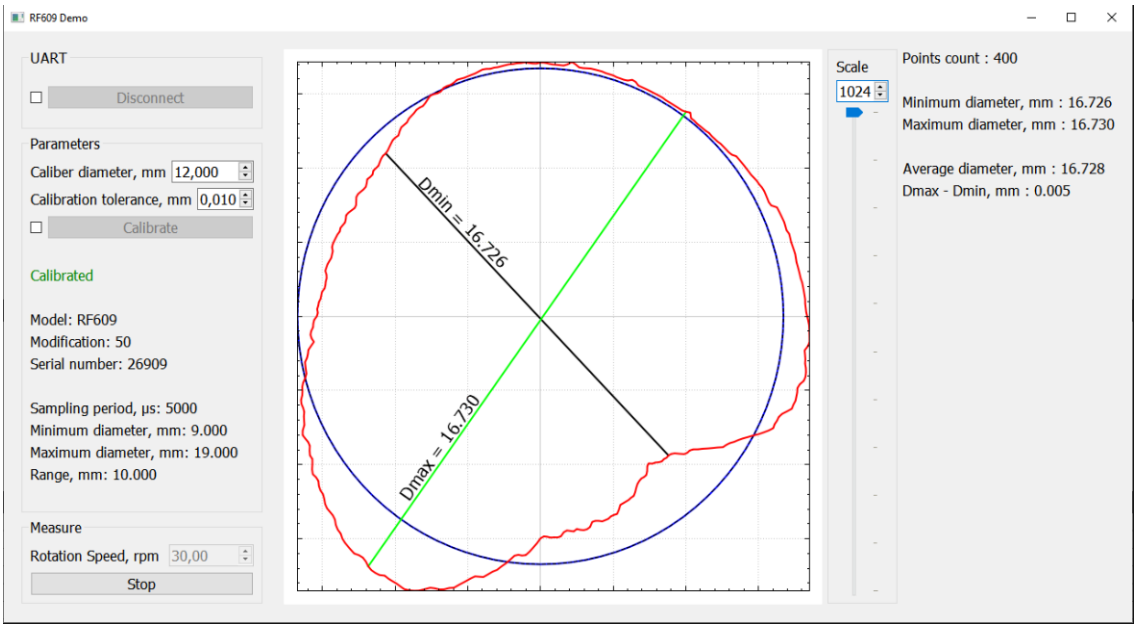
- Start rotating the part or the probe.
- Insert the probe into the master template.
- Click the **Calibrate** button. The calibration and verification cycles will be performed sequentially. If the calibration is successful, the "Calibrated" message will be displayed:



- If the calibration fails, a corresponding message appears. The process must be repeated until a satisfactory result is obtained.

To make measurements:

- Insert the probe into the controlled hole.
- Start rotating the part or the probe.
- Click the **Start** button.
- After completion of the measurement cycle, the software will display the result in graphical and numerical form.
- To change the display scale, use the **Scale** spinner.



- To stop the measurement cycle, click the **Stop** button.

11. Warranty policy

Warranty assurance for Laser Probes RF609-Dmin/Dmax-L-Wi-Fi – 24 months from the date of putting in operation; warranty shelf-life – 12 months.

12. Revisions

Date	Revision	Description
20.12.2020	1.0.0	Starting document.