



mm FDRF656 Series

Description

Optical Micrometers:
Laser/LED based for diameter, edge and gap measurement



Optical Micrometers are devices providing non-contact measurement of diameter of wires, rods and cylinders as well as gaps, edge positions and other dimensional characteristics of geometric objects. ALTHERIS offers both Laser and LED based optical micrometers.

These micrometers determine with high precision the dimension and position of an object by using the “shadow” measurement principle. Collimated laser light (the rays are parallel) is transmitted by the system lens arrangement towards a receiver. The edges of the shadow in the beam’s curtain are accurately measured in the receiver’s detector array.

Features

- Measuring ranges: 6, 25 mm
- Linearity starting at $\pm 0,5\mu\text{m}$
- Max measurement frequency: 800Hz
- Analogue and digital output
- IP67 enclosure (FDRF656-25)

Basic technical data

Model FDRF656-	6	25
Measurement range, mm	$\pm 1 \times 6$	$\pm 5 \times 25$
Distance between receiver and emitter, mm	35	210
Linearity ¹ , μm	$\pm 0,5$	± 1
Max. measurement frequency, Hz	800	
Light source	light diode	
laser safety Class	1 (IEC60825-1)	
Output interface	digital	RS232 (max. 460,8 kbit/s) or RS485 (max. 460,8 kbit/s)
	analog	4...20 mA ($\leq 500 \Omega$ load) or 0...10 V
Synchronization input	2,4 – 5 B (CMOS, TTL)	
Logic output	programmed functions, NPN: 100 mA max; 40 V max for output	
Power supply, V	24 (13 ...38)	
Power consumption, W	1,5..2	
Environment resistance	Enclosure rating	IP67 (RF656-25)
	Vibration	20g/10...1000Hz, 6 hours, for each of XYZ axes
	Shock	30 g / 6 ms
	Operation temperature, °C	-10...+60,
	Permissible ambient light, lx	7000
	Relative humidity	35-85%
Housing material	aluminum	
Weight (without cable), gram	1200	1200

¹ Typical data obtained when a knife edge was used to interrupt the laser beam

■ Example of item designation when ordering

FDRF656-X-SERIAL-ANALOG-IN-LOUT-CC-M

Symbol	Description
X	Base distance (6 or 25), mm
SERIAL	The type of serial interface: RS232-232 or RS485-485
ANALOG	Attribute showing the presence of 4...20 mA (I) or 0...10V (U)
IN	Trigger input (input of synchronization) presence
LOUT	Availability of programmed logical output*
CC	Cable gland - CG, or cable connector - CC
M	Cable length, m

Example. FDRF656-25-232-I-IN-CG – operating range – 25 mm, RS232 serial port, 4...20mA, trigger input, cable connector, 3 m cable length.

*When ordering micrometer with logical outputs (LOUT), the micrometer goes only with cable gland (CG).

■ Structure and operating principle

The micrometer operation is based on the so-called 'shadow' principle, Fig.1. The micrometer consists of two blocks – transmitter and receiver. Radiation of a semiconductor laser 1 is collimated by a lens 2. With an object placed in the collimated beam region, shadow image formed is scanned with a CCD photo-detector array 3. A processor 4 calculates the position (size) of the object from the position of shadow border (borders).

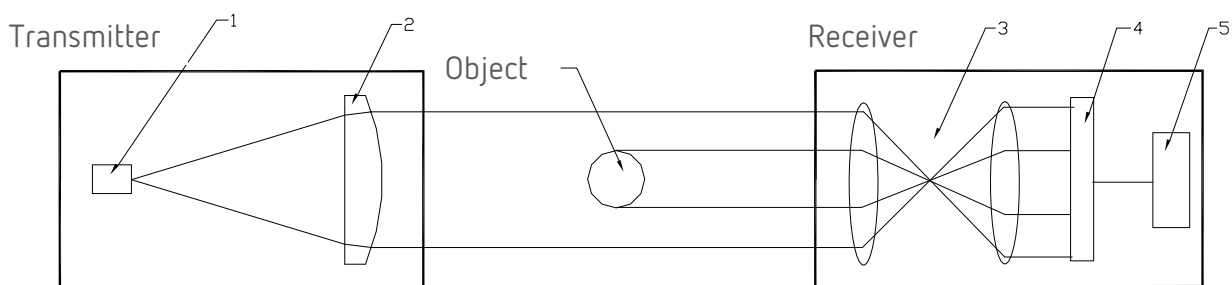
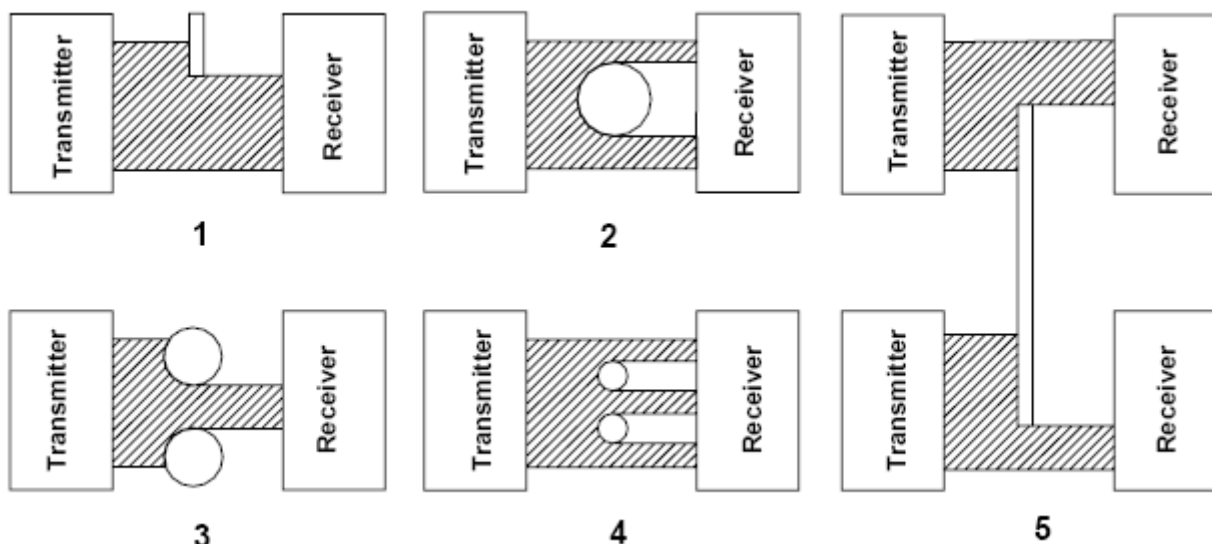


Figure 1

■ Ways of using

Ways of using the micrometer for gauging of technological objects are shown in Fig. 2.

Fig.2.1 – measuring of the edge position; Fig.2.2. – measuring of size or position; Fig.2.3. – measuring of the gap value or position; Fig.2.4. – measuring of internal or external dimension; Fig.2.5. – measuring of the size or position of large-size objects.



■ Safety precautions

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

■ Electromagnetic compatibility

The micrometers 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.

■ Overview of our range of Laser optical sensors



Laser triangulation sensors. FDRF60x Series

- dimensions and displacements measurement;
- 2 mm to 2,5 m ranges;
- $\pm 1 \mu\text{m}$ accuracy;
- 180 kHz sampling frequency;
- sensors on the base of **BLUE** and **IR** lasers;
- High Speed sensors (HS);



The series includes four lines of models:

FDRF603 - universal sensors with 2 to 1250 mm operating ranges;

FDRF603HS - high speed sensors;

FDRF600 - large-base and long range sensors;

FDRF605 - compact value sensors.

Laser 2D scanners. FDRF620HS (DHS)



- 2D/3D Measurements;
- 5 mm to 1500 mm ranges;
- 0,05% of F.S. linearity;
- 1000 profiles/s sampling rate;
- scanners on the base of **BLUE** and **IR** lasers;

Optical micrometers. FDRF65x Series

- diameter, gaps and displacements measurement;
- 6 mm to 60 mm ranges;
- $\pm 0.5 \mu\text{m}$ accuracy;
- 1000 Hz sampling rate;



The series includes two lines of models:
FDRF651 - direct through beam micrometers with 25 and 59 mm ranges, and accuracy $\pm 5 \mu\text{m}$;
FDRF656 – high precision through beam micrometers with telecentric lens, 5 and 25 mm. ranges and accuracy $\pm 0,5 \mu\text{m}$;