mm FDRF651 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: 5, 25, 59 mm
- Linearity starting at ± 5µm
- Fast measurement response
- Up to 1000 mm distance transmitter-receiver
- Analogue and digital output
- IP67 enclosure

Basic technical data and performance characteristics

Model		FDRF651-25	FDRF651-25TWIN	FDRF651-5
Measuring range, mm		25	59[1]	5
Distance between transmitter and receiver, L, mm		0...1000		
Linearity[2], um		±10 (L ≤ 50 mm), ±15 (50 mm< L ≤ 200 mm), ±20 (200 mm< L ≤ 250 mm), ±30 (250 mm < L)		±5 (L ≤ 50 mm), ±10 (50 mm< L ≤ 200 mm), ±15 (200 mm< L ≤ 250 mm), ±25 (250 mm < L)
Maximum sampling rate, Hz		1000		5000
Laser type		1 mW, wavelength 660 nm or LED		
Output signal	digital	RS232 or RS485 (max 460800 bit/s)		
	analog	4...20 m (<500 Ω load) or 0...10 V		
External synchronization input		2,4 – 5 V (CMOS, TTL)		
Logical outputs		3 outputs, NPN: 100 mA max; 40 B max		
Power Supply, V		5 (4,5...9) or 12 (9...18) or 24 (18...36)		
Power consumption, W		1,5		
Enclosure rating		IP67		
Operating temperature, °C		-10...+50		
Size		figure 3	figure 4	figure 5
Weight (without cable), g		200 (transmitter); 150 (receiver)	400 (transmitter); 300 (receiver)	30 (transmitter); 70 (receiver)

[1] With central dead zone of 9 mm (figure 4)

[2] Typical data obtained when a knife edge was used to interrupt the laser beam

11.2015 | version 20130425

Example of item designation when ordering

FDRF651-25-I-uart-an-ttl-out-vv-

Symbol	Description
L	distance between transmitter and receiver (mm)
UART	type of the serial interface (232 or 485 or CAN)
AN	attribute showing the presence of Current Loop (I) or U output
TTL	trigger input (input of synchronization)
OUT	attribute showing the presence of 3 logical outputs
VV	supply voltage
CC	Cable gland – CG or socket + cable - CC (Binder 702, IP67)

For example: FDRF651-100-232-I-12-CC – distance between transmitter and receiver – 100 mm, serial port - RS232, 4...20 mA output available, supply voltage 12V (9...18V), socket + cable.
Cable lengths are agreed with the ordering customer separately.

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).

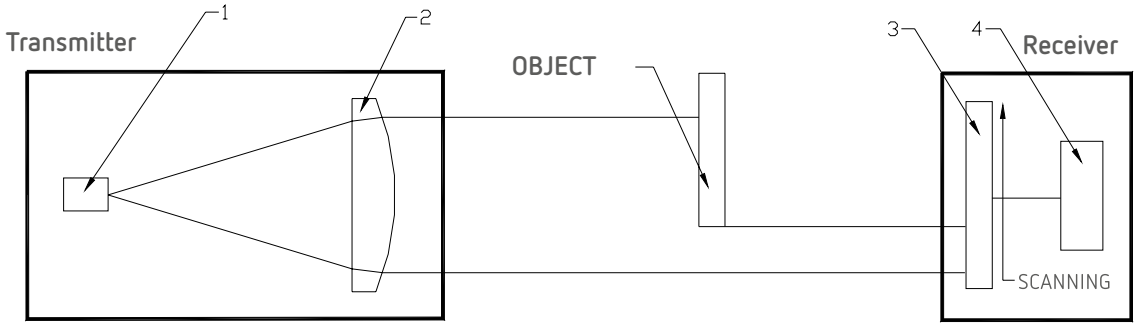

Figure 1.

Ways of using 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.

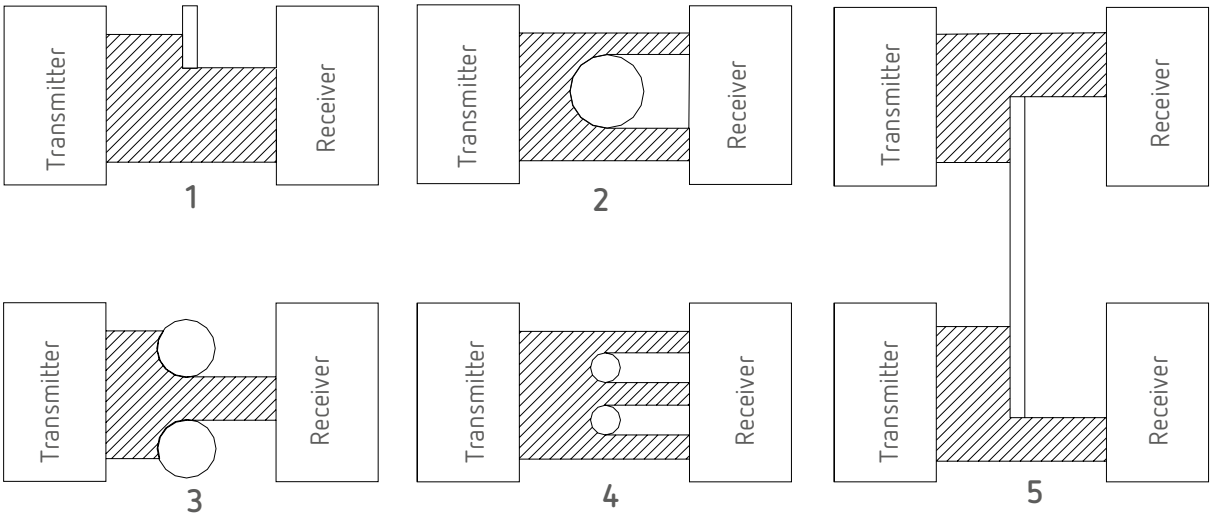

Figure 2.

11.2015 | version 20130425

Overall and mounting dimensions

- Overall and setup dimensions of the RF651-25 micrometer are shown in Fig.3, RF651-5 – in Fig. 4. Bodies of the receiver and transmitter are made of anodized aluminum. On the front panel of the body there is a window, on the opposite face there are power supply and interface connectors. Transmitter and receiver are mounted on the rail. The rail have fastening holes allowing setup of the device on equipment.
- The micrometer is set up in such a way that the light beam leaving the transmitter falls onto the receiver window. No foreign objects should be located on the radiation propagation path.
- To obtain reliable results, the micrometer must be warmed up for 20 minutes after power is switched on.

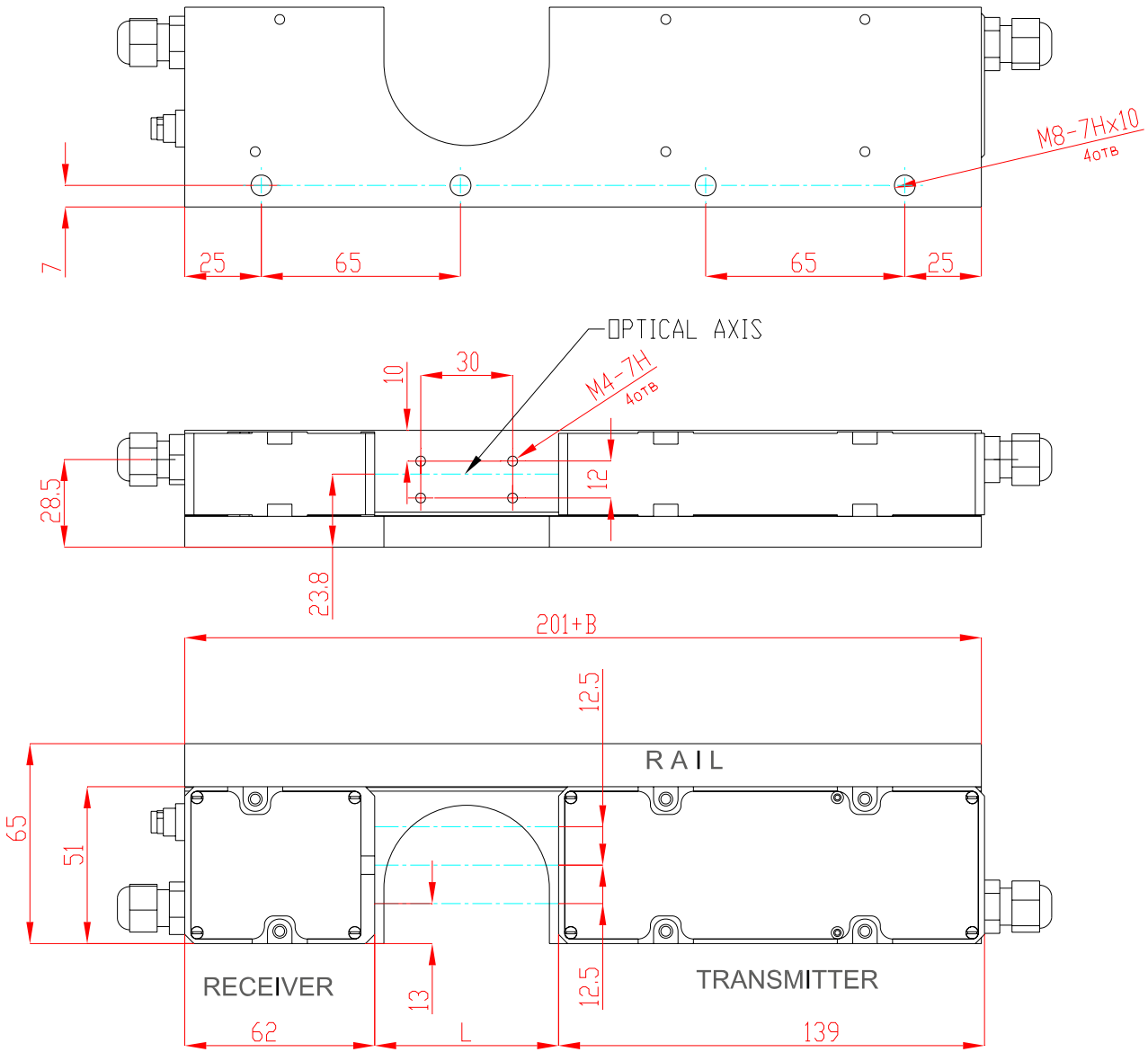

Figure 3.

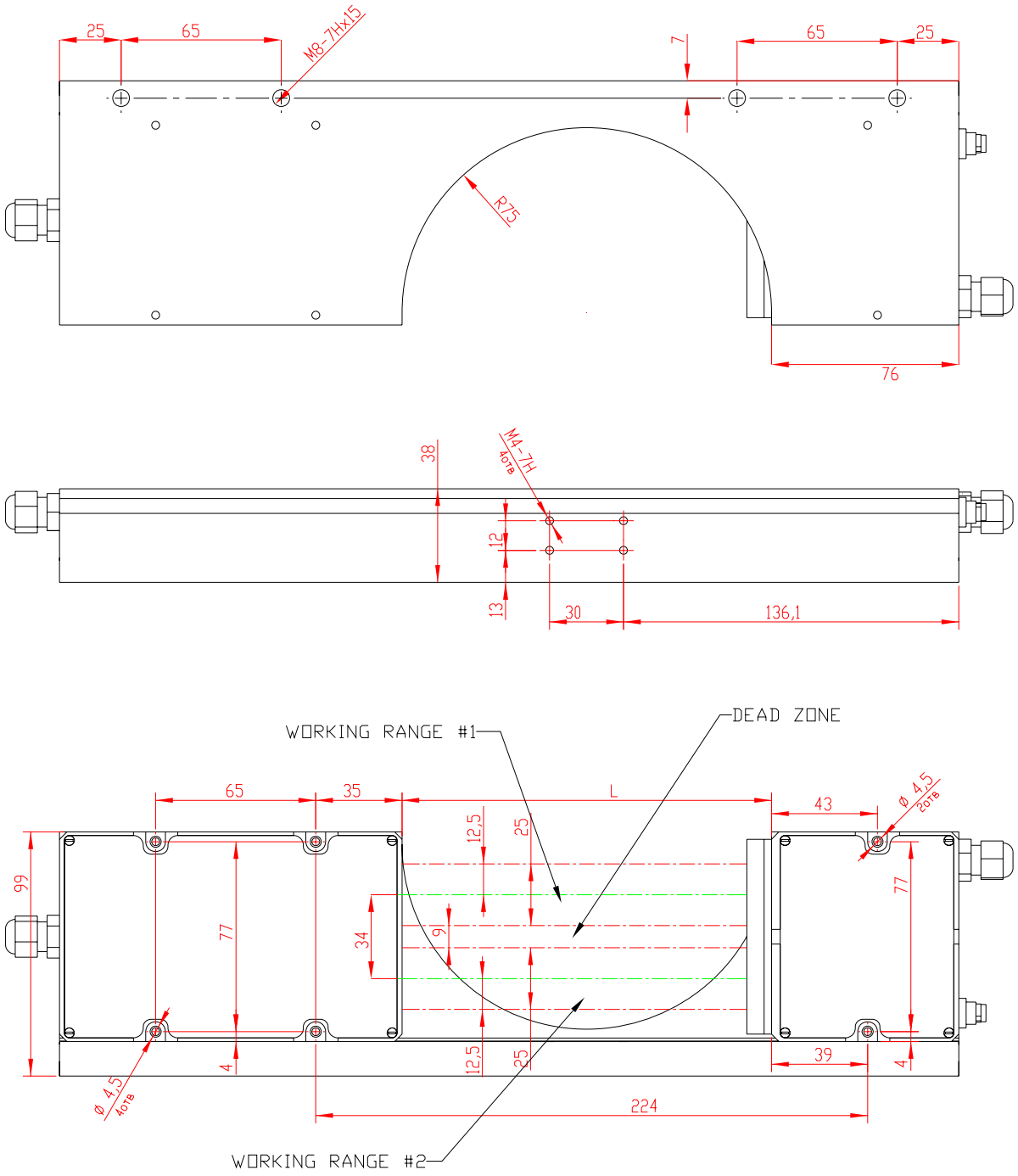
25
65
M8-7Hx15
7
65
25
R75
76
38
M4-7H
4 DEEP
12
13
30
136,1
WORKING RANGE #1
DEAD ZONE
65
35
L
43
Ø 4,5
2 DEEP
99
77
34
9
12,5
25
4
39
224
WORKING RANGE #2

Figure 4.

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;
- ±1 µm 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.

11.2015 | version 20130425

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;
- ±0.5 µm 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 ±5 µm;
FDRF656 – high precision through beam micrometers with telecentric lens, 5 and 25 mm. ranges and accuracy ±0,5 µm;

11.2015 | version 20130425