

**mm** FDRF25X series

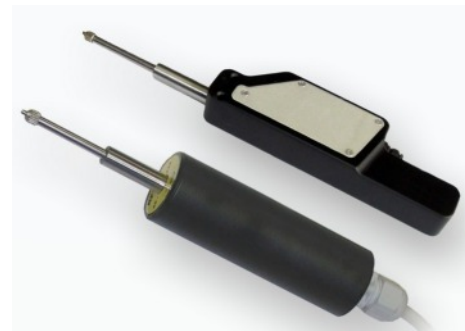
**Description**

The transducers are designed for contact measuring and checking of position, displacement, dimensions, surface profile, deformation, sorting and sensing of engineered objects.

Two different encoder types are provided:

**Model FDRF251** for industrial measurements (harsh environment)

**Model FDRF256** (option built-in display) for laboratory use

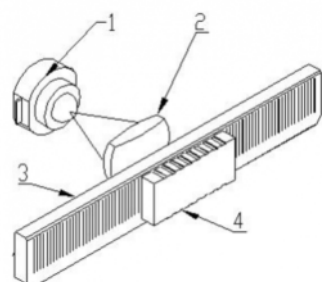


These types offer measurement ranges from 3 to 55 mm and are available with a max. resolution up to 0,1  $\mu\text{m}$ .

Custom-ordered configurations are also possible with specifications different from those shown below in the technical data table.

**Specifications**

Model	FDRF251-3	FDRF251-25	FDRF256-15	FDRF256-35	FDRF256-55
Measurement range, mm	3	25	15	35	55
Accuracy (at T=20°C), $\mu\text{m}$	$\pm 2$ , $\pm 1$ (for the sensors with "P" index)				$\pm 3$ , $\pm 2$ (for the sensors with "P" index)
Resolution, $\mu\text{m}$	0.1 or 0.5 or 1				
Output interface	digital	(RS485 and SSI or RS323) and (EncD5 or EncD10 – emulation of quadrature signals of incremental transducers)			
	analog	0...20 mA (<500 Ohm load) or 0...10 V			
Synchronization input	no		opto-isolated		
Logical outputs	two outputs, NPN: 100 mA max; 40 V max				
Indication	no		two-color LED (red/green)		
Power Supply, V	12...36				
Power consumption, W	0,75				
Enclosure rating	IP67			IP50	
Operating temperature, °C	-40...+50			-10...+50	
Weight (without cable), g	110		110	150	180
Size, figure #	2	3	4	5	6



**Operation principle of the absolute linear encoder**

The linear contact encoder measures position by using the principle of photoelectric scanning of a special scale that is connected with the measurement tip of the transducer. Radiation of LED 1 is collimated by lens 2 and is directed on the scale 3. The area image of the scale is examined by a CMOS array 4 and is analyzed by a signal processor that calculates the position of the scale.

Absolute encoders have a number of advantages when compared to incremental transducers: the absolute position of the gauge plug is determined immediately upon switch-on and it is not necessary to search for the reference mark. Also excluded is the probability of accumulation or loss of count pulse signals in case of impacts, vibrations and reverse motion.

■ Dimensions and mounting

Overall and mounting dimensions of the sensors are shown in Figures 1...4.  
Sensor package is made of anodized aluminium.

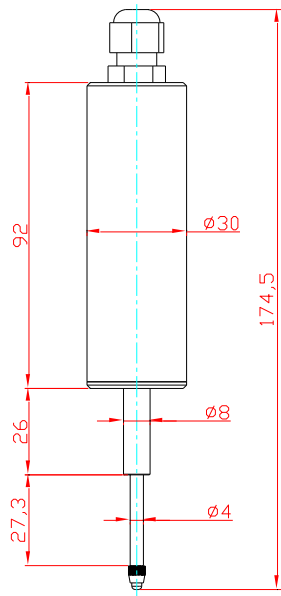


Figure 1

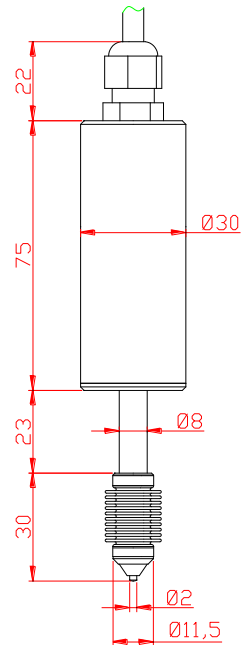


Figure 2

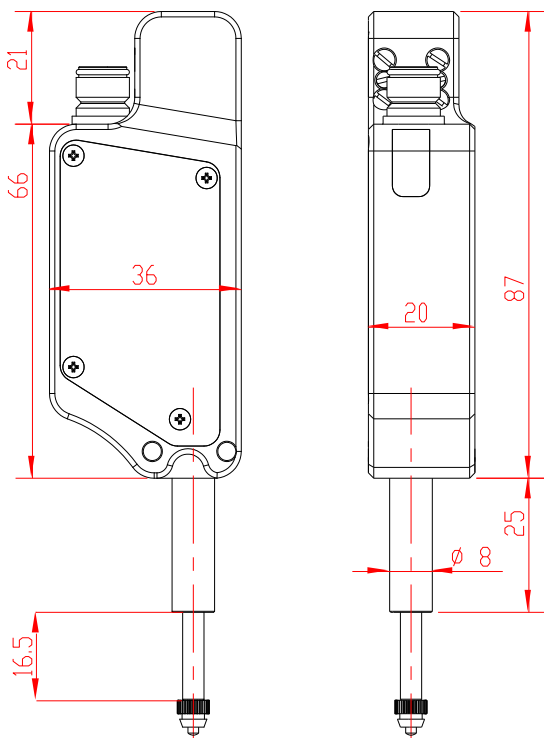


Figure 3

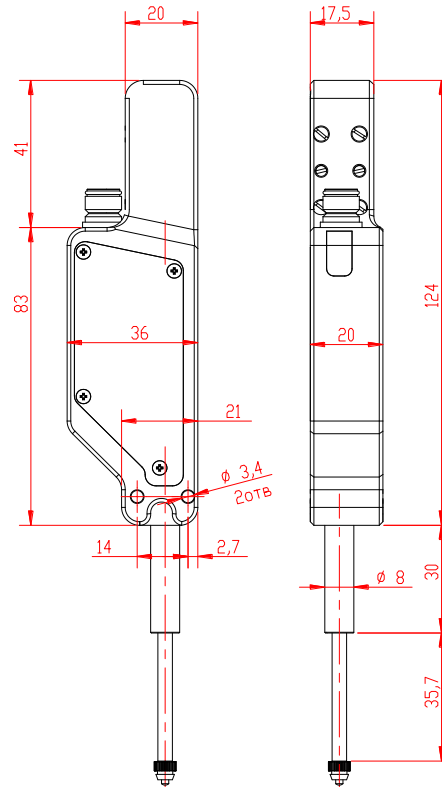


Figure 4

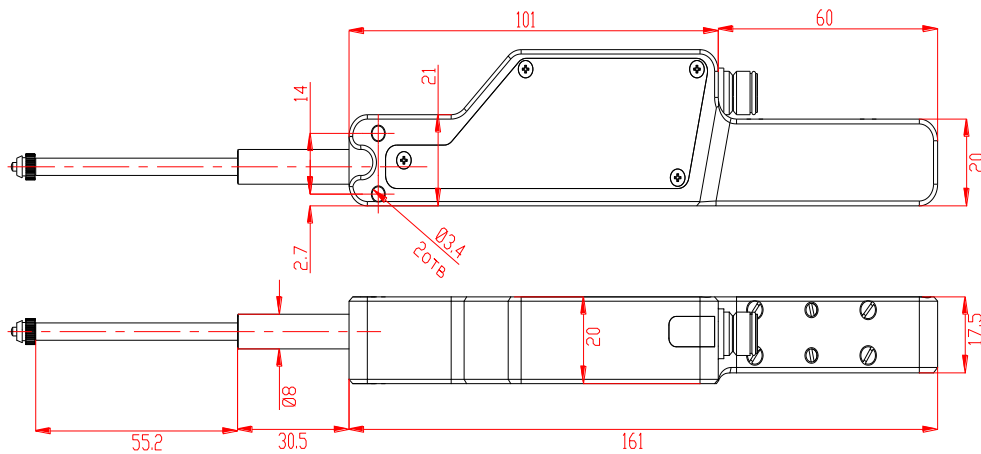


Figure 5

## ■ Operation modes and configuration parameters

### Configuration parameters

The nature of operation of the sensor depends on its configuration parameters (operation modes), which can be changed by transmission of commands through serial port. The basic parameters are as follows:

- Sampling mode

This parameter specifies one of the two result sampling options in the case where the sensor works in the data stream mode:

- Time Sampling;
- Trigger Sampling.

With *Time Sampling* selected, the sensor automatically transmits the measurement result via serial interface in accordance with selected time interval (sampling period).

With *Trigger sampling* is selected, the sensor transmits the measurement result when external synchronization input (IN input of the sensor) is switched and taking the *division factor* set into account

- Sampling period

If the Time Sampling mode is selected, the 'sampling period' parameter determines the time interval in which the sensor will automatically *transmit* the measurement result. The time interval value is set in increments of 0.01 MS.

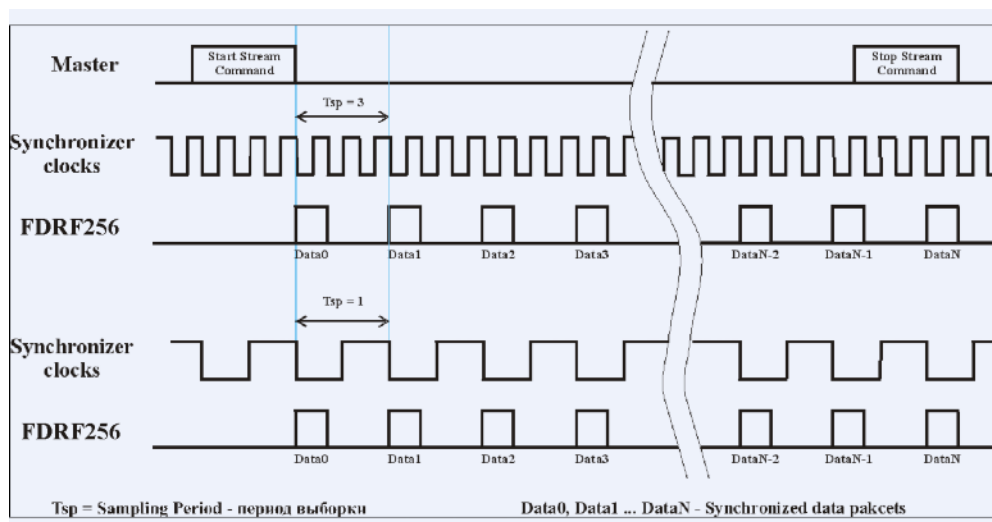
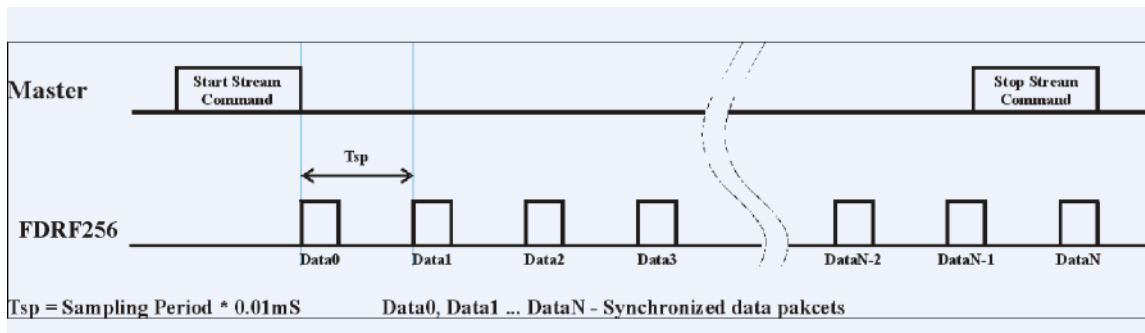
*For example*, for the parameter value equal to 100, data are transmitted through bit-serial interface with a period of  $0,01 \cdot 100 = 1$  MS.

If the Trigger Sampling mode is selected, the 'sampling period' parameter determines the division factor for the external synchronization input.

*For example*, for the parameter value equal to 100, data are transmitted through bit-serial interface when each 100<sup>th</sup> synchronizing pulse arrives at IN input of the sensor.

Note 1. It should be noted that the 'sampling mode' and 'sampling period' parameters control only the transmission of data. The sensor operation algorithm is so built that measurements are taken at a maximum possible rate determined by the integration time period, the measurement results is sent to buffer and stored therein until a new result arrives. The above-mentioned parameters determine the method of the readout of the result form the buffer.

Note 2. If the bit-serial interface is used to receive the result, the time required for data transmission at selected data transmission rate should be taken into account in the case where small sampling period intervals are used. If the transmission time exceeds the sampling period, it is this time that will determine the data transmission



### Data stream transfer with external synchronization

**Line correction parameter** is intended for correction of encoder linearity (parameter changing can decrease encoder accuracy).

**Zero position parameter** is intended for assign of sensor's Zero Point

### Range of analog output

While working with the analog output, resolution can be increased by using the 'Window in the operating range' function which makes it possible to select a window of required size and position in the operating range of the sensor within which the whole range of analog output signal will be scaled.

**Note.** If the beginning of the range of the analog signal is set at a higher value than the end value of the range, this will change the direction of rise of the analog signal.

### Analog output scaling

This parameter is intended for analog output calibration (parameter changing can decrease analog output accuracy).

### Logical outputs thresholds

**LowLimit** sets the switching threshold for the logical output **LowLimitOC**. If the measured value is less than **LowLimit**, the output of **LowLimitOC** is set to active logical level, otherwise **LowLimitOC** is set to inactive logical level (polarity of the active and inactive logical levels is specified by the **Out Logic Polarity** parameter). The **UpLimit** parameter sets switching threshold for the logical output **UpLimitOC**. If the measured value is higher than

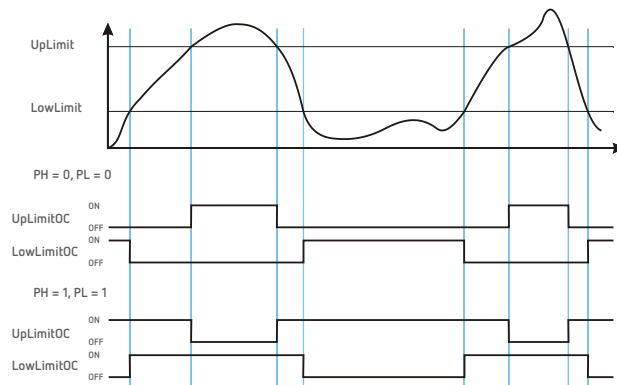
**UpLimit**, the **UpLimitOC** output is set to active logical level, otherwise **LowLimitOC** is set to inactive logical level (polarity of the active and inactive logical levels is specified by the **Out Logic Polarity** parameter).

### Polarity og logical outputs

This sets polarity of the active and inactive states of the logical level outputs **LowLimitOC** and **UpLimitOC**.

The Figure shows logical outputs switching diagrams depending on the state of polarity bits: **HP** – output polarity bit **UpLimitOC** and **LP** – output polarity bit **LowLimitOC**. The **ON** state – output transistor is open, the **OFF** state – output transistor is closed.

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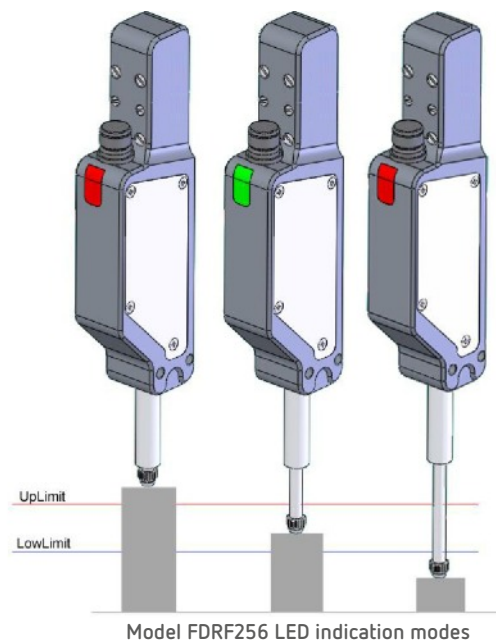


**NOTE!** To change parameters of the sensor use "FSRF25x-SP" setup software.

### ■ Indication modes

The FDRF256 sensors are equipped with a LED display offering two indication modes: **Red** and **Green**. The display operation is directly connected with the values of the **LowLimit** and **UpLimit** parameters. The LED display is in the "green" indication mode if the measurement result lies in the range  $\text{LowLimit} < \text{Result} < \text{UpLimit}$ , i.e., the measurement result is not beyond the set limits.

The LED display is in the "red" indication mode if the measurement result lies in the range  $\text{Result} < \text{LowLimit}$ , or  $\text{UpLimit} < \text{Result}$ , i.e., the measurement result is beyond any set limit.



■ Ordering example

FDRF25X.P-L-D-UART-EncDxAN-IN-LOUT-M

Symbol	Description
X	Model (1 or 6)
P	Increased accuracy
L	Measurement range, mm
D	Resolution, $\mu\text{m}$
UART	Type of the serial interface (RS232, 232 or RS485 and SSI, 485)
EncDx	Period of quadrature signal, EncD5 – 5 $\mu\text{m}$ , EncD10 – 10 $\mu\text{m}$
AN	Attribute showing the presence of Current Loop (I) or Voltage (U) output
IN	Trigger input (input of synchronization) (for RF256 sensors only)
LOUT	Attribute showing the presence of 2 logical outputs
M	Cable length, m

Note: when working in the EncD mode using the SSI, as well as analog outputs is impossible

**Example: FDRF256-55-0.1-232-I-IN-CC-3, RF256 sensor with standard accuracy; 55 mm measurement range; 0,1  $\mu\text{m}$  resolution; serial port – RS232; 4...20 mA analog output; IN – synchronization input presents; 3 m cable length.**

