



OPTICAL MICROMETER

RF651 Series

User's manual

Certified according to ISO 9001:2015



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1. Safety precautions

- Use supply voltage and interfaces indicated in the sensor 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 micrometer activation to achieve uniform micrometer warm-up.

2. CE compliance

The micrometers 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 micrometers make use of a LED. The micrometers belong to the 1 laser safety class.

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

- Avoid staring into the emitter during a prolonged time period.
- Do not disassemble the micrometer.

4. General information

The micrometers are intended for non-contact measuring and checking of diameters, gaps, displacement/position of the edges of objects.

The series includes 4 models with the measurement range from 25 to 100 mm.

5. Basic technical data

RF651-	25	50	75	100			
Measurement range, mm	25	50	75	100			
Minimum size of the object ¹ , mm	0.5	1	1.5	2			
Accuracy², μm	±5	±10	±15	±20			
Repeatability ³ , µm	1	2	3	5			
Maximum scanning frequency, Hz	2000	2000	2000	2000			
Maximum update frequency, Hz	500	500	500	500			
Light source		LI	ED				
Laser safety class		1 (IEC/EN 6	0825-1:2014)				
Output interface	•						
Digital	RS232 (max 921.6 kbit/s) or RS485 (max 921.6 kbit/s) or Ethernet & (RS32 or RS485)						
Analog	420 mA (load ≤ 500 Ohm) or 010 V						
Synchronization input, V	2.4 – 5 (CMOS, TTL)						
Logic output	three outputs, NPN: 100 mA max; 40 V max						
Power supply, V	24 (936)						
Power consumption, W	from 1.5 to 2						
Environment resistance:							
Enclosure rating	IP67						
Vibration	20 g / 101000 Hz, 6 hours for each of XYZ axes						
Shock	30 g / 6 ms						
Operation temperature, °C	-10+60						
Relative humidity, %	5-95 (no condensation)						
Housing material		alum	inum				
Weight (without cable), gram	600	2000	2600	4000			

1. When the base distance is equal to the measurement range.

2. Specified for controlling the border position of the "knife" type, when the distance between the transmitter and the receiver is equal to the double measurement range.

3. When the "Averaging" parameter is equal to 127.

6. Example of item designation when ordering

RF651-X/L-SERIAL-ANALOG-LOUT-IN-AL-CC-M-AK

Symbol	Description
Х	Measurement range, mm
L	The distance between the transmitter and receiver housings, fixed on the beam, mm
SERIAL	The type of serial interface: RS232 - 232 or RS485 - 485 or (Ethernet and RS232) – 232-ET or (Ethernet and RS485) – 485-ET
ANALOG*	Attribute showing the presence of 420 mA (I) or 010 V (U)
LOUT*	Attribute showing the presence of logical outputs
IN	Trigger input (input of synchronization) presence
AL	AL input
CC	Cable connector
Μ	Cable length, m
AK	Micrometer with protect air knife for windows

* It is possible to order modifications only with the logical output or with the analog output.

Example: RF651-25/50-232-I-IN-CC-3 – measurement range - 25 mm, distance between transmitter and receiver - 50 mm, RS232 serial port, 4...20 mA analog output, trigger input, cable connector, 3 m cable length.

Modifications:

Model	Parameters
RF651-25/L-SERIAL-ANALOG-LOUT-IN- AL-CC-M-AK	L – 50 mm100 mm (large base on request) SERIAL – 232, 485, 232-ET, 485-ET ANALOG – no, I, U LOUT – no, LOUT IN – no, IN AL – no, AL CC – CC M – 0.1 m10 m AK – no, AK
RF651-50/L-SERIAL-ANALOG-LOUT-IN- AL-CC-M-AK	L – 50 mm150 mm (large base on request) SERIAL – 232, 485, 232-ET, 485-ET ANALOG – no, I, U LOUT – no, LOUT IN – no, IN AL – no, AL CC – CC M – 0.1 m10 m AK – no, AK
RF651-75/L-SERIAL-ANALOG-LOUT-IN- AL-CC-M-AK	L – 50 mm225 mm (large base on request) SERIAL – 232, 485, 232-ET, 485-ET ANALOG – no, I, U LOUT – no, LOUT IN – no, IN AL – no, AL CC – CC M – 0.1 m10 m AK – no, AK
RF651-100/L-SERIAL-ANALOG-LOUT-IN- AL-CC-M-AK	L – 50 mm300 mm (large base on request) SERIAL – 232, 485, 232-ET, 485-ET ANALOG – no, I, U LOUT – no, LOUT IN – no, IN AL – no, AL CC – CC M – 0.1 m10 m AK – no, AK

7. 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 or LED 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).



8. Options for use of the device

8.1. One-coordinate systems

Ways of using the micrometer for gauging of technological objects are shown in Figure 2. Figure 2.1 – measuring of the edge position; Figure 2.2. – measuring of size or position; Figure 2.3. – measuring of the gap value or position; Figure 2.4. – measuring of internal or external dimension; Figure 2.5. – measuring of the size or position of large-size objects.



8.2. Multi-axis systems

Delivery of multi-axis measurement system (measured in several sections) is possible. Examples of the 2D and 3D coordinate systems are shown in Figures 3.1 and 3.2, respectively. An example of item designation when ordering 2D coordinate systems - RF651XY-X/L..., for systems with more axes - RF651.N-X/L..., where N is a number of coordinates in the system.







Figure 3.2.



9. Dimensions and mounting

Overall and mounting dimensions of micrometers are shown in Figure 4.



	A, mm	B, mm	C, mm	D, mm	E, mm	H, mm	H1, mm	K, mm	N, mm	K, mm	N, mm
RF651-25	51	139	62	25	13	28	42.5	30	30	30	30
RF651-50	91	120	134	50	20	31	45.5	40	80	30	60
RF651-75	128	132	132	75	15	31	45.5	40	80	40	80
RF651-100	165	165	150	100	20	31	45.5	40	80	40	80

Figure 4



10. Connection

Micrometers are equipped with cable connectors (CC option). Micrometers with the Ethernet interface contain two connectors.

10.1. Micrometers without Ethernet interface

Micrometers are equipped with Binder 702-8 connector. The connector location and pin numbers are shown in Figure 5.



Figure 5

Designation of contacts is given in the table below:

Model of Micrometer	Pin Number	Assignment
232 - U/I(LOUT) - IN-AL - CC	1	IN
	2	Gnd (power supply)
	3	TXD
	4	RXD
	5	Gnd (common for signals)
	6	AL (LOUT_max)
	7	U/I (LOUT_min)
	8	U+ (power supply)
485 - U/I(LOUT) - IN-AL - CC	1	IN
	2	Gnd (power supply)
	3	DATA+
	4	DATA-
	5	Gnd (common for signals)
	6	AL (LOUT_max)
	7	U/I (LOUT_min)
	8	U+ (power supply)

10.2. Micrometers with Ethernet interface

Micrometers contain an additional Binder 712-4 connector. The connector location and pin numbers are shown in Figure 6.



Figure 6

Designation of contacts is given in the table below:

Model of Micrometer	Pin Number	Assignment
ET	1	TX+
	2	TX-
	3	RX+
	4	RX-



11. Configuration parameters

The nature of operation of the micrometer depends on its configuration parameters (operation modes), which can be changed only by transmission of commands through serial port RS232 or RS485. The basic parameters are as follows:

11.1. Parameter of synchronization

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

- Asynchronous Transmission
- Synchronous transmission, Time sampling;
- Synchronous transmission, Trigger sampling.

With <u>Asynchronous Transmission</u> selected, the micrometer automatically transmits the measurement result via serial interface as it is ready.

With <u>Time Sampling</u> selected, the micrometer automatically transmits the measurement result via serial interface in accordance with selected time interval (sampling period).

With <u>Trigger sampling</u> selected, the micrometer transmits the measurement result when external synchronization input (IN input of the micrometer) is switched and taking the division factor set into account.

Note. The mode of operation of each of the interfaces can be set independently.

11.2. Sampling period

If the Time Sampling mode is selected, the 'sampling period' parameter determines the time interval in which the micrometer will automatically transmit the measurement result. The time interval value is set in increments of 0.1 ms. For example, for the parameter value equal to 100, data are transmitted through bit-serial interface with a period of 0,1*100 = 10 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 100th 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 micrometer 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 rate.

Note 3. It should be taken into account that micrometers differ in variation of parameters of the internal generator, and this affects the accuracy of time sampling period.

11.3. Method of results averaging

The averaging can operate in three modes:

- Off, no averaging
- Averaging over a number of results
- Averaging over the measurement time (5 ms)

When averaging over a number of results is selected, sliding average is calculated. The use of averaging makes it possible to reduce the output noise and increase the micrometer resolution.

11.4. Number of averaged values

This parameter specifies the number of source results to be averaged for deriving the output value.

Averaging over a number of results does not affect the data update in the micrometer output buffer.

Note. The maximum value is 127.

11.5. Measurement modes

The micrometer can operate in the following modes:

- Measurement of the position of one border (knife).
- The distance between borders A and B (measuring the size of the object or hole). Result = B - A.
- The position of the object (its center). Result = (B + A) / 2.
- Detection of the first two borders in the measurement range. The position of these borders is transferred. This mode is used for turning products (<u>https://www.youtube.com/watch?time_continue=70&v=4BB9Z9b3OM8</u>).
- Measurement of glass tubes. Detection of the first border and the last border, and calculation of the distance between them.
- Detection of all borders in the measurement range. The number of detected borders and their position are transferred. The maximum number of borders: 64 (for UART interface) and 7 (for Ethernet interface).
- Measurement of thin films. Detection of the film edge and calculation.

In addition, since it is possible to set the polarity and the border numbers, you can measure objects with a more complex shape.

11.6. Borders and polarity

The border means "light-shadow' transition or "shadow-light" transition which forms a shadow image of the object (Fig. 7). Measurement is only conducted in the case where the number of borders detected by micrometer corresponds to a given parameter. The polarity is the "light-shadow' transition or "shadow-light" transition. Borders can be set with the same polarity and with the different polarity.



Fi	qure	7
	3	



11.7. Numbers of borders under control

The measurement domain can include up to 128 borders, however, measurements can be made in relation to any two borders (hereinafter – borders A and B), whose numbers are specified by this parameter. Border numbers are counted in the direction of scanning. Direction of scanning is indicated on the body of receiver.

11.8. Nominal value and tolerances

The nominal value (dimension or position) can be transmitted as a parameter or preset by teaching. In the course of measurement, the micrometer controls sizes going beyond the permissible limits. Value of tolerances can be transmitted as parameters.

12. Description of RS232 and RS485 interfaces

12.1. RS232 port

The RS232 port ensures a "point-to-point" connection and allows the sensor to be connected directly to RS232 port of a computer or controller.

12.2. RS485 port

In accordance with the protocol accepted and hardware capability, the RS485 port makes it possible to connect micrometers to one data collection unit by a common bus circuit.

12.3. Modes of data transfer

Through these serial interfaces measurement data can be obtained by three methods:

- by single requests (inquiries);
- by automatic asynchronous data stream (results are transmitted as they become available);
- by automatic synchronous data stream (time sampling or trigger sampling).

12.4. Configuration parameters

12.4.1. Rate of data transfer through a serial port

This parameter defines the rate of data transmission via the bit-serial interface in increments of 2400 bit/s. For example, the parameter value equal to 4 gives the transmission rate of $2400^*4 = 9600$ bit/s.

Note. The maximum transmission rate for RS232/RS485 interfaces is 921,6 kbit/s.

12.4.2. Net address

This parameter defines the network address of the micrometer equipped with RS485 interface.

Note. Network data communications protocol assumes the presence of 'master' in the net, which can be a computer or other information-gathering device, and from 1 to 127 'slaves' (RF65x Series micrometers) which support the protocol.

Each 'slave' is assigned a unique network identification code – a device address. The address is used to form requests or inquiries all over the net. Each slave receives inquiries containing its unique address as well as '0' address which is broadcast-oriented and can be used for formation of generic commands, for example, for simultaneous latching of values of all sensors and for working with only one sensor (with both RS232 port and RS485 port).

12.4.3. Factory parameters table

Parameter	Value
Baud rate	115200
Net address	1
Mode of data transfer	request

12.5. Interfacing protocol

3 1

12.5.1. Serial data transmission format

Data message has the following format:

1 start-bit	8 data bits	1 odd bit	1 stop-bit

12.5.2. Communication sessions types

The communication protocol is formed by communication sessions, which are only initiated by the 'master' (PC, controller). There are two kinds of sessions with the following structure:

- 1) "request", ["message"] ["answer"], square brackets include optional elements
- 2) "request" "data stream" ["request"]

12.5.3. Request

'Request' (INC) is a two-byte message, which fully controls the communication session. The 'request' message is the only one of all messages in a session where most significant bit is set at 0, therefore, it serves to synchronize the beginning of the session. In addition, it contains the device address (ADR), code of request (COD) and, optionally, the message [MSG].

'Request' format:

	Byte 0	Byte 1				yte 1	[Bytes 2N]
INC0(7:0)			INC1(7:0)			C1(7:0)	MSG
0	ADR(6:0)	1 0 0 0 COD(3:0)		COD(3:0)			

12.5.4. Message, MSG

'Message' is a data burst that can be transmitted by 'master' in the course of the session.

All messages with a 'message' burst contain 1 in the most significant digit. Data in a message are transferred in tetrads. When byte is transmitted, lower tetrad goes first, and then follows higher tetrad. When multi-byte values are transferred, the transmission begins with lower byte.

The format of two 'message' data bursts for transmission of byte DAT(7:0):

	DAT(7:0)								
Byte 0				Byte 1					
1	0	0	0	DAT(3:0)	1	0	0	0	DAT(7:4)

12.5.5. Answer

'Answer' is data burst that can be transmitted by 'slave' in the course of the session. All messages with a message burst contain 1 in the most significant digit. Data in a message are transferred in tetrads. When byte is transmitted, lower tetrad goes first, and then follows higher tetrad. When multi-byte values are transferred, the transmission begins with lower byte.

When 'answer' is transmitted, the message contains:

- SB-bit, characterizes the updating of the result. If SB is equal to '1', this means that the sensor has updated the measurement result in the buffer. If SB is equal to '0', then non-updated result has been transmitted (see. Note 1, p.<u>11.2.</u>). When transmitting parameters, SB=0;
- two additional bits of cyclic binary batch counter (CNT). Bit values in the batch counter are identical for all sendings of one batch. The value of batch counter is incremented by the sending of each burst and is used for formation (assembly) of batches or bursts as well as for control of batch losses in receiving data streams. The format of two 'answer' data bursts for transmission of byte DAT(7:0):

DAT(7:0)								
Byte 0				Byte 1				
1 SB CNT(1:0) DAT(3:0)				1	SB	CNT(1:0)	DAT(7:4)	

12.5.6. Data stream

'Data stream' is an infinite sequence of data bursts or batches transmitted from 'slave' to 'master', which can be interrupted by a new request. In transmission of 'data stream', one of the 'slaves' fully holds the data transfer channel, therefore, when 'master' produces any new request sent to any address, data streaming process is stopped. In addition, there is a special request to stop data streaming.

12.5.7. Request codes and list of parameters

Request codes and list of parameters are presented in Chapter <u>14</u>.

13. Analog and logical outputs

13.1. Modes of data transfer

Analog outputs can be in one of the following modes:

- No transmission.
- Automatic asynchronous data stream (results are transmitted as they become available)
- Automatic synchronous data stream (time sampling or trigger sampling)

13.2. Current output 4...20 mA

The connection scheme is shown in Figure 8. The value of load resistor should not be greater than 500 Ohm. To reduce noise, it is recommended to install RC filter before the measuring instrument. The filter capacitor value is indicated for maximum sampling frequency of the micrometer (2 kHz) and this value increases in proportion to the frequency reduction.





13.3. Voltage output 0...10 V

The connection scheme is shown in Figure 9. To reduce noise, it is recommended to install RC filter before the measuring instrument. The filter capacitor value is indicated for maximum sampling frequency of the micrometer (2 kHz) and this value increases in proportion to the frequency reduction.





13.4. Configuration parameters

13.4.1. Range of the 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.

13.5. Logical outputs operation mode

Logical outputs of the micrometer are used to signal that the size under control is within or outside the tolerances selected. Logics of operation of the outputs can be changed, i.e. activate either low or high logical level. See par. <u>14.2.</u>, parameter 81h. Wiring diagram of logical outputs is shown in Figure 10:







14. Request codes and list of parameters

14.1. Request codes

Request code	Description	Message (size in bytes)	Answer (size in bytes)
01h	Device identification		 device type (1) firmware version (1) serial number (2) base distance (2) range (2)
02h	Reading of parameter	- code of parameter (1)	- value of parameter (1)
03h	Writing of parameter	- code of parameter (1) - value of parameter (1)	
04h	Storing current parameters to FLASH- memory	- constant AAh (1)	- constant AAh (1)
04h	Recovery of parameter default values in FLASH-memory	- constant 69h (1)	- constant 69h (1)
05h	Latching of current result	—	—
06h	Inquiring of result	_	- result (2)
07h	Inquiring of a stream of results	_	- stream of results (2)
08h	Stop data streaming	_	_

14.2. List of parameters

Code	Description	Values
00h	Switching ON/OFF the sensor	1 - laser ON, measuring (by default);0 - laser OFF, the sensor is in the energy-saving mode.
01h	Switching ON/OFF the analog output	1 - ON; 0 - OFF.
02h	Control of averaging, sampling, AL-output modes	<pre>x,x,M,C,M1,M0,R,S - control byte (x bits - not used, M bit - the averaging mode, C bit - CAN interface, M0 and M1 bits - logical output, R bit - analog output, S bit - sampling mode). M bit: 0 - averaging the measured values by quantity (by default); 1 - averaging the measured values by time (5 ms); C bit: 0 - request (by default); 1 - synchronization by time, or by external input. M1:M0 bits: 00 - out-of-range indication mode (by default); 01 - mutual synchronization mode; 10 - mode of results reset. 11 - mode of switching ON/OFF a laser R bit: 0 - window mode (by default); 1 - full mode. S bit: 0 - time sampling mode (by default); 1 - trigger sampling mode</pre>
03h	Network address	1 127 (by default 1)
04h	Rate of data transfer through a	1192 (by default, 4). The rate of data transfer in increments of
	serial port	2400 bit/s. For example, the parameter value equal to 4 gives



Code	Description	Values
		the transmission rate of 2400*4 = 9600 bit/s.
05h	Reserved	
06h	Number of averaged values	1128 (by default, 1).
07h	Reserved	
08h	Low byte of sampling period	1) 1…65535 (by default, 500).
09h	High byte of sampling period	Time interval in increments of 0.01 ms, that a sensor uses to transmit results automatically on the data stream request (sampling priority = 0); 2) 165535 (by default, 500). Division factor for synchronization input (sampling priority = 1).
0Ah	Low byte of the maximum accumulation time	265535 (by default, 3200). The maximum accumulation time in increments of 1 $\mu s.$
0Bh	High byte of the maximum accumulation time	
0Ch	Low byte of the beginning of analog output range	In percents (by default, 0). The point within the range of the micrometer, at which the
0Dh	High byte of the beginning of analog output range	analog output takes the minimum value.
0Eh	Low byte of the end of analog output range	In percents (by default, 100). The point within the range of the micrometer, at which the
0Fh	High byte of the end of analog output range	analog output takes the maximum value.
10h	Delay time	0255. The delay time in increments of 5 ms.
11h	Measurement type	 1 (by default) – Measuring the position of one border (knife); 2 – Distance between borders A and B (measuring the size of the object). Result = B – A. (Numbers of borders A and B are set by parameters 0x12h and 0x14 h). 3 – Position of the object – (B+A)/2. 4 – Detection of the first two borders in the measurement range. 5 – Distance between borders of a glass object. 6 – Detection of all borders in the measurement range. The maximum number of borders: 64 (for UART interface) and 7 (for UDP interface). 7 – Position of the film edge.
12h	Number of the border under control (Border A Number)	0-127 (by default, 0x01h). A – a serial number of border A.
13h	Polarity of the border under control (Border A Polarity)	0-1 (by default, 0x00h).
14h	Number of the border under control (Border B Number)	0-127 (by default, 0x01h). B – a serial number of border B.
15h	Polarity of the border under control (Border B Polarity)	0-1 (by default, 0x01h).
16h	Reserved	
17h	Low byte of a zero point	04000h (by default, 0).
18h	High byte of a zero point	
191Ch	Reserved	
20h	Rate of data transfer through the CAN interface	10200 (by default, 25). Rate of data transfer in increments of 5000 baud. For example, value '50' sets the rate of 50*5000 = 250000 baud.
22h	Low byte of the standard identifier	07FFh (by default, 7FFh). The standard identifier of the CAN interface.
23h	High byte of the standard identifier	



Code	Description	Values
24h	0th byte of the extended identifier	01FFFFFFh (by default, 1FFFFFFh). The extended identifier of the CAN interface.
25h	1st byte of the extended identifier	
26h	2nd byte of the extended identifier	
27h	3rd byte of the extended identifier	
28h	Identifier of the CAN interface	1 - extended identifier; 0 - standard identifier.
29h	CAN interface ON/OFF	1 - CAN interface enabled; 0 - CAN interface disabled.
0x39h	Analog output operation mode	0 (by default) - window mode; 1 - deviation mode.
6Ch	0th byte of the destination IP address	by default, FFFFFFFh = 255.255.255.255
6Dh	1st byte of the destination IP address	
6Eh	2nd byte of the destination IP address	
6Fh	3rd byte of the destination IP address	
70h	0th byte of the gateway IP address	by default, C0A80001h = 192.168.0.1
71h	1st byte of the gateway IP address	
72h	2nd byte of the gateway IP address	
73h	3rd byte of the gateway IP address	
74h	0th byte of the subnet mask	by default, FFFFF00h = 255.255.255.0
75h	1st byte of the subnet mask	
76h	2nd byte of the subnet mask	
77h	3rd byte of the subnet mask	
78h	0th byte of the source IP address	by default, C0A80003h = 192.168.0.3
79h	1st byte of the source IP address	
7Ah	2nd byte of the source IP address	
7Bh	3rd byte of the source IP address	
81h	Mask of logical outputs polarity	 x,x,x,x,x,c,b,a – byte that specifies polarity of logical outputs; x bits – not used; a bit: 0 — logical output LowLimit – normally open (by default); 1 — logical output LowLimit – normally closed; b bit: 0 — logical output NormLimit – normally open (by default); 1 — logical output NormLimit – normally closed; c bit: 0 — logical output VormLimit – normally closed; c bit: 0 — logical output UpLimit – normally open (by default); 1 — logical output UpLimit – normally closed; c bit: 0 — logical output UpLimit – normally closed;
82h	1st byte of the lower border of the logical output	by default, 10000



Code	Description	Values
83h	2nd byte of the lower border of the logical output	
84h	1st byte of the upper border of the logical output	by default, 20000
85h	2nd byte of the upper border of the logical output	
86h	1st byte of the diameters correction	by default, 0
87h	2nd byte of the diameters correction	
88h	ETHERNET interface ON/OFF	0 - ETHERNET interface disabled; 1 - ETHERNET interface enabled in the UDP mode.
A0h	1st byte of the division factor for results calculation	by default, 50000
A1h	2nd byte of the division factor for results calculation	

NOTES:

- All values are given in binary form.
- The range is given in millimeters.
- On special request (05h), the current result can be latched in the output buffer where it will be stored unchanged up to the moment of arrival of request for data transfer. This request can be sent simultaneously to all micrometers in the net in the broadcast mode in order to synchronize data pickup from all micrometers.
- When working with the parameters, it should be borne in mind that when power is OFF the parameter values are stored in nonvolatile FLASH-memory of the sensor. When power is ON, the parameter values are read out to RAM of the sensor. In order to retain these changes for the next power-up state, a special command for saving current parameter values in the FLASH-memory (04h) must be run.
- Parameters with the size of more than one byte should be saved starting from the high-order byte and finishing with the low-order byte.

WARNING! It is forbidden to carry out the configuration of sensors included in the RS485 network.

14.3. Factory parameters by default

The parameters are stored in nonvolatile memory of the micrometer. Correct changing of the parameters is carried out by using the parametrization program supplied with the micrometer, or by the user's program.

14.4. Examples of setting the measurement mode

The following parameters are used for setting the measurement mode:

- Out Data Format (11h);
- Border A Number (12h);
- Border A Polarity (13h);
- Border B Number (14h);
- Border B Polarity (15h).
- Measuring the position of one border (knife)

Out Data Format – 1 Border A Number – 1 Border A Polarity – 0



Border B Number – 1 Border B Polarity – 1

• The distance between borders A and B

Finding the diameter of the object: Out Data Format – 2 Border A Number – 1 Border A Polarity – 0 Border B Number – 1 Border B Polarity – 1

Finding the gap dimensions: Out Data Format – 2 Border A Number – 1 Border A Polarity – 1 Border B Number – 1 Border B Polarity – 0

• The position of the object (a center of the object/gap)

Out Data Format – 3 Border A Number – 1 Border A Polarity – 0 Border B Number – 1 Border B Polarity – 1

How to configure the measurement mode using the software, see p. <u>16.4.</u> The description of the "Border" and "Polarity" terms is given in p. <u>11.6</u>.

14.5. Example of measurement request

An example of forming the packets with requests and answers: Network address – 1. Measurement range = 25 mm. Scaling = 50000. **Request** [2 bytes]: 0x01, 0x86. (0x01 – 1st byte – network address) **Answer** [4 bytes]: InData[0], InData[1], InData[2], InData[3] An example of forming a packet with measurement (4 bits from each received byte): Y=InData[0]&0x0F)|(InData[1]&0x0F)<<4|(InData[2]&0x0F)<<8|(InData[3]&0x0F)

<<12;

Measurement results will be in mm. **Result** = Y* Measurement range / Scaling **Example**: Y = 0x1234 (4660) Result = 4660 * 25 / 50000 = 2,33 mm

15. Ethernet packet

Address	Name	Length	Туре	Example
0	Name	2	char	0x5246
2	Sensor type	1	word	651 (656)
4	Packet length	1	word	36
6	Data offset	1	byte	20
7	Number of measurements in the packet	1	byte	1
8	Packets counter	1	word	

Address	Name	Length	Туре	Example
10	Version	1	byte	
11	Serial number	1	word	2515
13	Measurement range	1	word	100
15	Scaling factor	1	word	50000
17	Data output format	1	byte	1, 2 or 3
18	Sign of the 1st border	1	byte	0
19	Number of borders	1	byte	1
20	Data	1	word	
22	Status	1	byte	
23-36	Data, status or NULL			

16. Parameterization program

16.1. Function

The RF65X-SP software is intended for:

- 1) Testing and demonstration of work of RF651 series micrometers;
- 2) Setting of the micrometer parameters;
- 3) Reception and gathering of the micrometer data signals.
- The download link:

https://riftek.com/media/documents/rf65/RF65x_SP_Cortex_User.zip

16.2. Obtaining connection to micrometer

Once the program is started, the main window emerges:

RF65X-SP(Setup proc	gram: rel.2.0)			
UART Baud rate:	115200 🔻	Connect Stream start	0.000	
COM Port / USB :	COM4 -	Meanine Zero	0.000 mm	
Net number of device	: 1 🕶	1100501C		
Model:	none	Base distance:	none mm	
Serial number:	none	Measuring range:	none mm	
	_	THOROUGE. THOME		

To obtain connection, it is necessary to follow these steps:

- select COM-port whereto the sensor is connected (logical port if the sensor is connected via USB-adapter)
- select transmission rate (Baud rate) at which the sensor will work (115200, by default)
- select the sensor network address (1, by default)
- press **Connect** button

If the selected parameters correspond to the parameters of the micrometer interface, the program will identify the micrometer, read and display its configuration parameters:



RF65X-SP(Setup program:	rei.2.0)		
UART Baud rate: 11520	Disconnect	Stream start	
COM Port / USB : COM4			0 000 mm
Net number of device: 1	✓ Measure	Zero	0.000 mm
	ly i		
Parameter	Value	<u> </u>	
Sensor Un/Urr	Un O		
Analog Uutput Un/Ulf	Un Adroop		
UART Baud Hate	115200		
UAH I Network Address	1		
UART Control of Sample	lime		
AL Control	Uut_of_Range		
Analog Window Control	Window		
Number of Averaged Values	1		
Mode of Averaged Values	Sample		
Sampling Period	5000		
Max Integration Time	4000		
Analog Window Begin	0		
Analog Window End	400		
Lock Time of Result	10		
Zero Point	0		
. CAN On/Off	Off		
. CAN Node ID	08		
. CAN Baud Rate	125000		
. CAN Standard Identifier	7FF		
. CAN Extended Identifier	1FFFFFFF		
. CAN Identifier	Standart		
. CAN Mode	Remote		
. LAN Destination IP Address	255.255.255.255		
. LAN Gateway IP Address	192.168. 0. 1		
. LAN Subnet Mask	255.255.255.0		
. LAN Source IP Address	192.168. 0. 3		
. LAN Mode	UDP		
.Out Data Format	2		
.Border A Number	1		
.Border A Polarity	0		
.Border B Number	1	-	Ô
-			
Model: 6P	5	Baco die	tanga: 100 mm
Sorial number: 25	2017	Moocurir	
Senal number. 33	F F	Measurir lelease: 21	igrange. ovinin
		A-1	

16.3. Setting and saving parameters of the micrometer

The part of RF65x application, which has become an active, allows to edit and to put in RAM and FLASH memory of micrometer the appropriate parameters.

Configuring the micrometer is done by selecting the appropriate item from the proposed drop-down menu, or by entering the absolute value of the desired parameter (all parameters are entered in decimal form, the user must follow the correct input of a specific parameter). After selecting the desired value from the drop-down menu or after entering the absolute value, it is necessary to write them to RAM. To do it, you need to press the right mouse key on the table of parameters. The pop-up window will appear. In this pop-up window, select Load (to save the selected item) or Load All (to save all settings).

RF65X-SP(Setup program	m: rel.2.0)				×
UART Baud rate: 11	5200 -	Disconnect Stree	are start		
COM Port / USB : 00	ома 🚽 🛏		amotan	1 0 000 mm	
Net number of device:		Measure Z	Zero	0.000 mm	
Parameter	Value	1			
Sensor On/Off	V dicio				_
Analog Output On/Off	On	Load			
LIABT Baud Bate	115200	Read			
LIABT Network Address	1	Comment			
UART Control of Sample	Time	Compare			
AL Control	Out of I	Load All			
Analog Window Control	Window	Read All			
Number of Averaged Values	1	Compare All			
Mode of Averaged Values	Sample				
Sampling Period	5000	Write To FLASH			
Max Integration Time	4000	Default			
Analog Window Begin	0	Multi- A- Ch-			
Analog Window End	400	write to file			
Lock Time of Result	10	Read from file			
Zero Point	0				
. CAN On/Off	Off		-		
. CAN Node ID	08				
. CAN Baud Rate	125000				
. CAN Standard Identifier	7FF				
. CAN Extended Identifier	1FFFFFF	F			
. CAN Identifier	Standart				
. CAN Mode	Remote				
. LAN Destination IP Address	255.255.	255.255			
. LAN Gateway IP Address	192.168.	0. 1			
. LAN Subnet Mask	255.255.	255. 0			
. LAN Source IP Address	192.168.	0. 3			
. LAN Mode	UDP				
.Out Data Format	2				
Border A Number	1				
Border A Polanty	0				
Border B Number	!		-	0	
Model:	65	E	Base dist	stance: 100 mm	
Serial number:	33317	N	4easurin	ing range: 50 mm	
		Release:	21		

In the pop-up window there are two items: Write To FLASH and Default. The Write To FLASH item allows to save the current parameters from the RAM of micrometer to the non-volatile memory. The Default item allows to restore factory settings of the micrometer.



UART Burding Long Long Long Long Long Long Long Lo	RF65X-SP(Setup prog	ram: rel.2.0)		•	= _	
COM Hory USB: With with with with with with with with w	UART Baud rate:	115200 💌 🦳	Disconnect	Stream start		
Net mumber of device: Image: Constraint of the second hold in the se	COM Port / USB :	COM4 -	0.000,000	ouodinoidii	0 000 mm	
Parameter Value Series 07.011 III Series 07.011 III Luff Elsevic Addetti 1 Luff I Hennic Adverged Value Serged Samod Period 0 Model Averged Value Serged Manice galvaged Value Serged Model Averged Value Serged Model Averged Value Serged Model Averged Value Ninkee Jange Value Model Averged Value Serged Model Averged Value Writee To FLASH Writee To FLASH Writee To FLASH Writee To FLASH Writee To FLASH Cold Addref Meride TFF Cold Addref Meride TFF Cold Addref Meride TFF Cold Addref Meride 10 <	Net number of device:	: 1 V	Measure	Zero		
Series DoUbit 0 UART Exercited and series 11500 UART Reset Addet 1 UART Exercited and series 1 UART Advect of Sarole 0 UART Advect of Sarole 0 Accreted 0 Accreted 0 Analog Wride Torie Load All Analog Wride Torie Load All Read Advect 1000 Write To FLASH Default Analog Wride Torie 0000 UART Exercited Sarole 0 UART Exercited Sarole 000 Carl Bordin 0 Carl Bordin 0 <	Parameter	Value				
Analog Quad Dr.Olf On Lead Analog Quad Dr.Olf On Read UAFT Buekhad 1500 Compare Alcored Out_OL Load All Alcored Out_OL Load All Analog Vridos Conductor Nonker of AverageV Value See Nonker of AverageV Value See Out_OL Analog Vridos Conductor Write See Default Conductor Default Default Default Conductor Default Default Default Conductor Default Default Default Conductor Default Default Default Conductor Default	Sensor On/Off	On	-			
UAR I Banka Alla 11500 Read UAR I Menico Additi of Sample Tempare Compare Accorditi of Sample Tempare Load All Analog Wridew Control Wridew Sample Pried Load All Sample Pried Sompare All Organization Wridew Sample Pried Dod Wridew Former All Organization Analog Wridew Bogin O O Write to file Analog Wridew Bogin O O Write to file Analog Wridew Bogin O O Participation Com Nordon Do OF Participation Participation Com Nordon Do OF Participation Participation Cold Moder Mergen Standard Participation Standard Participation Participation Cold Nordon Do OF O Participation Participation Cold Nordon Hordon Participation Standard Standard Participation Participation Cold Nordon Hordon Participation Standard Standard Standard Cold Nordond Standard	Analog Output On/Off	On	Load			
UAR1 Norwick Addess 1 CuR1 Convid 30% Tomage ALC Arrowick 30% Tomage Auder More Control Out, et analog Window Control Load All Compare All Namber of Averaged Values Samely Samely Print Samely Compare All Namber of Averaged Values Samely Samely Print Samely Compare All Namber of Averaged Values Samely Samely Print Samely Compare All Nami regard Values Samely Samely Print Samely Compare All Nami regard Values Samely Compare All Note All Averaged Values Can Notov End Con Notov	UART Baud Rate	115200	Read			
UARI Control User, all User, all A Control User, all Load All Analog VArkow Control Virtek Table All Number of Aneroged Value 5 annelo Deck. It Sample of Pend 000 Dedut Analog VArkow Expend 00 Dedut Analog VArkow Expend 00 Dedut Cask Toor Offic 01 Dedut Dedut Cask Toor Offic 07 Dedut Dedut CAN Norbit 07 Dedut Dedut CAN Norbit 10 Dedut Dedut CAN Social Flore 55255.55.55.55.55.55.55.55.55.55.55.55.5	UART Network Address	1	Compare			
AL Conto Dur.ed. Edda All Audeo Marchano Marchano All Sample Mado Sample Mado Mode of Averaged Value Sample Mado Sample Mado Sample Mado Sample Mado Sample Mado Made of Averaged Value Sample Mado Sample Mado Made of Averaged Value Sample Mado Sample Mado Made of Averaged Value Sample Mado Mado Marchange Value Mado Mado Call Marchane 12000 Mado CAll Marchan 125000 Mado CAll Marchane 125000 Mado Mado Mado 125000 Mado Lan Modo 125000 Mado Modard Parkano 125000 Mado Lan Modo <t< td=""><td>UART Control of Sample</td><td>Time</td><td>compare</td><td></td><td></td><td></td></t<>	UART Control of Sample	Time	compare			
Analog Window Control Window Read All Compare All Nober of Averaged Values Sample Compare All Compare All Nober of Averaged Values Sample Winte To FLASH Winte To FLASH Analog Window Begin 0 Defautt Ninte To FLASH Analog Window Defautt 10 Defautt Ninte To FLASH Analog Window Defautt 10 Defautt Ninte To FLASH Analog Window Defautt 10 Defauttoring FEFFF CAN Nobel D 0 Read All Standad Johnifer CAN Honder B 10 LAN Source IP Addres 18218, 0, 3 LAN Source IP Addres 18218, 0, 3 L LAN Source IP Addres <td>AL Control</td> <td>Out_of_</td> <td>Load All</td> <td></td> <td></td> <td></td>	AL Control	Out_of_	Load All			
Number of Averaged Values 1 Compare All Sampling Period 5000 Unite: To ELASH Max Integration Time 4000 Default Analog Vindow Endin 4000 Unite: To ELASH Analog Vindow Endin 4000 Write: To ELASH Analog Vindow Endin 4000 Write: To ELASH Analog Vindow Endin 4000 Write: To ELASH Con Kindow Endin 4000 Write: To ELASH Zeno Front 0 Write: To ELASH CAN Howde To 1 Read from file CAN Howde To 1 Read from file CAN Howde To 1 Com Nodo To CAN Howde To 1 Com Nodo To CAN Howde To 15555.555.555.555.555.555.555.555.555.5	Analog Window Control	Window	Read All			
Mode of Values Sample Vinte To FLASH Sampling Period 000 Default Analog Window Begin 0 Write to File Rade To Reauti 10 Write to File Can Port 0 Exact from file Can Port 0 Can Port 0 CAN Nov0ff 07 0 Can Port 0 CAN Nov0ff 08 0 0 0 CAN Standel Bomileri TFFFFF 0 0 0 CAN I Standed Idemilieri TFFFFF 0 0 0 LAN Stander Maces 25525255 0 0 0 LAN Stander Maces 12:18.0.0.3 1 0 0 And Standel Stander 12:88.0.3 1 0 0 Bader A Polateri 1 0 0	Number of Averaged Value:	s 1	Compare	All		
Sampling Penid 5000 Write To FLASH Max Integration Time 4000 Default Analog Window Rejn 0 Image Window Rejn 0 Analog Window Rejn 0 Regration Time 4000 Analog Window Rejn 0 Regration Time 4000 Can Window Rejn 0 Regration Time Regration Time Zano Print 0 Regration Time Regration Time CAN Work DD 08 Regration Time Regration Time CAN Standard Identifier TFF Regration Time Regration Time CAN Hoaden Brenze Standard Stande Standard Stande Standard Stande CAN Hoaden Stande Standard Stande Standard Stande Standard Stande CAN Hoaden Stande Standard Stande Standard Stande Standard Stande CAN Hoaden Stande Standard Stande Standard Stande Standard Stande CAN Hoaden Stande Standard Stande Standard Stande Standard Stande LAN Gadeward Phaderes 192 (Standard Stande) Reasard Stande Standard Stan	Mode of Averaged Values	Sample	· ·			
Main Registion Time 4000 Default Analog Virdow Regin 0 Write to file Analog Virdow Regin 0 Write to file Rade Virdow Regin 0 Write to file Zan Point 0 Exad Itom file Can Norbit 0 Image: Standard Identifier Fife CAN Norbit 0 Image: Standard Identifier Fife CAN Raude Rade 12500 Image: Standard Identifier Fife CAN Raude Rade 12500 Image: Standard Identifier Fife CAN Raude Rade 12500 Image: Standard Identifier Fife CAN Raude Identifier Fife Image: Standard Identifier Fife CAN Hander 12 Image: Standard Identifier Fife CAN Standard Identifier Fife Image: Standard Identifier <	Sampling Period	5000	Write To	FLASH		
Analog Window Begin 0 Mandog Window Begin 0 Lock Tme of Result 10 Caki Row Time 0 Caki Row Time 0 Caki Row Time 0 CAN Row Time 10 CAN Row Time 11 CAN Row Time 12 Nameder 12 CAN Row Time 1 CAN Row Time 1 CAN Row Time 1 Row Time 1 Row Time 1 Model 0 Row Time 1 Nameder 12 Row Time 1 Row Time 1 Row Time 1 Row Time 1	Max Integration Time	4000	Default			
Analog Windswith ad 400 Wint to the life Lock Time of Result 0 Read from file Car No Volt 0 - CAR NovVolt 0 - CAR NovVolt 0 - CAR NovVolt 0 - CAR NovVolt 0 - CAR Standal dentifier FFFFF - CAR Extended Identifier FFFFFF - CAR Mode Identifier FFFFFF - CAN Gatenzy IP Address 2552 526 55 - LAN Start Made 2552 526 50 - LAN Start Made 2552 526 0 - LAN Start Made 1258 0 3 LAN Start Made 1258 0 3 LAN Made UP P - Out Das Format 2 - Boder A Polativ 0 - Model Rescuring range: 50 mm	Analog Window Begin	0	101-20-0-0	m.,		
Lack Tree of Reault 10 Read from file 2n Orbit 0 CAN Don'Off 0ff CAN Nodo ID 08 CAN Abad D 08 CAN Abad D 08 CAN Abad D 08 CAN Abad D 08 CAN Baar Rae 12000 CAN Standard Montifier 7FF CAN Hoarden Standard Homitifier 7FF CAN Hoarden Standard Jonitifier Standard Jonitifier CAN Hoarden Standard Jonitifier Standard Jonitifier CAN Hoarden IP Address 255.255.255.0 LAN Stander Make 2 Badder P Address 1 LAN Mode 10 Model Number 1 Badder P Number 1 Model S Number 1 Model R Number 1 <	Analog Window End	400	write to	nie .		
Zaro Proit 0 CAN Ox00ff 0ff CAN Ox00ff 0ff CAN Ox00ff 0ff CAN Source To Address 125000 CAN Standard Identifier FFF CAN Istandard Identifier FFF CAN Istandard Identifier FFF CAN Istandard Identifier FFF LAN Roders 125255 255 LAN Address 25255 255 LAN Address 125255 255 LAN Address 12218 0. 1 LAN Address 12218 0. 3 LAN Address 12218 0. 3 LAN Mode UPP Da Da As Format 2 Border A Number 1 Border A Number 1 Model Mace Noder 10 Border A Number 1 Strial number: 83817 Basee distance: 100 mm	Lock Time of Result	10	Read from	n file		
CAN OxO'fh Off CAN Norbit 0 CAN Norbit 0 CAN Baad Rate 125000 CAN Baad Rate 125000 CAN Standard Identifier TFFF CAN Kandard Identifier Standard CAN Kandard Identifier TFFFFF CAN Kandard Identifier Standard CAN Kandard Identifier TFFFFF CAN Kandard Identifier TSFFFF CAN Kandard Identifier TSFFFFF CAN Kandard Mathewa 255.255.255.0 LAN Standard Mathewa 25.255.255.0 LAN Standard Mathewa 12.255.255.0 LAN Standard Mathewa 26.256.255.255.0 LAN Standard Mathewa 27.256.256.0 LAN Standard Mathewa 1 Badder A Number 1 Badder A Number 1 Badder B Number 1 Model: 65 Based IStance: 100 mm Serial number: 3317	Zero Point	0				
CAV Node ID 08 CAV Node ID 08 CAV Back Rele 125000 CAV Standard Identifier 7FF CAV Extended Identifier 1FFFFFF CAV Identifier Stradat CAV Stradates 1252:552:55:0 LAN Sacce IP Address 122:180:0 3 LAN Mode UDP Our Data Format 2 Border A Polarity 0 Border A Number 1 Border A Number 1 Model! 65 Base distance: 100 mm Medesuring range: 50 mm	. CAN On/Off	Off				
CAN Bader Allow 125000 CAN Bader Allowitier FFF . CAN Extended Identifier FFFFFF . CAN Identifier Standard . CAN Honder Allowitier Standard . CAN Honder Allowitier Standard . CAN Honder Allowitier Standard . CAN Gateway IP Address 252,552,555 . LAN Succe IP Address 192,158.0 . LAN Succe IP Address 10 . Du Das Format 2 . Boder A Polarity 0 . Boder A Polarity 0 . Boder A Polarity 0 . Sender A Number 1 . Sender A Number 1 . Sender Allowity 0 . Base distance: 100 mm . Measuring range: 50 mm	. CAN Node ID	08				
CAV Standard Johnifer FF CAV Estended Identifier FFFFF CAN Identifier Standard CAN Identifier Standard CAN Identifier FFFFFF CAN Identifier FFFFFF CAN Identifier FFFFFF CAN Identifier FFFFFF LAN Standard Machan Estimated Identifier LAN Standard Machan 25,255,255,255 LAN Standard Machan 12,188, 0, 1 LAN Standard Machan 25,255,255,255 LAN Standard Machan 20,2188, 0, 3 LAN Standard Machan 2 Bodar A Number 1 Bodar A Number 1 Model 0 Model: 65 Base distance: 100 mm Measuring range: 50 mm	. CAN Baud Rate	125000				
CAM Edended Identifier IFFFFFF CAM Identifier Standat CAM Identifier Standat LAN Edentification IP Addets 255.255.255.255.0 LAN Gatoway IP Addets 192.168.0.1 LAN Gatoway IP Addets 192.168.0.3 LAN Mode UPP Du D bas format 2 Boder A Polatity 0 Boder A Polatity 0 Boder A Polatity 0 Boder A Number 1 Seriel Number 1 Boder A Polatity 0 Boder A Polatity 0 Boder B Number 1 Total Construction of Polatity 0 Boder A Polatity 0 B	. CAN Standard Identifier	7FF				
CAV Indemifier Standat CAV Index Standat CAV Index Randa LAN Destination IP Address 255.255.255.255 LAN Submet Name 152.168.0.1 LAN Submet Name 255.255.255.0 LAN Submet Name 122.188.0.3 LAN Submet Name 1 Bodre A Number 1 Bodre A Number 1 Nother Name 1 Model: 65 Serial number: 38317 Measuring range: 50 mm	. CAN Extended Identifier	1FFFFF	FF			
CAN Node Renote LAN Destination IP Address 255 255 255 255 255 LAN Sateway PAddress 125 168 0.0 LAN Sateway PAddress 120 168 0.0 LAN Sateway PAddress 120 168 0.0 LAN Sateway PAddress 100 P Baddre A Polarity 0 Baddre A Number 1 Baddre A Polarity 0 Baddre	. CAN Identifier	Standar	t			
LAN Decimation IP Address 255.255.256.1 LAN Submers 121.188.0.1 LAN Submers 122.188.0.3 LAN Source IP Address 122.168.0.3 Boder A Polativy 0 Boder A Polativy 0 Boder B Number 1 Model: 65 Base distance: 100 mm Serial number: 33317 Measuring range: 50 mm	. CAN Mode	Remote				
LAN Gavemy/PAddress 192.168.0.1 LAN Sucher Mask 255.255.0 LAN Souce IP Address 192.168.0.3 LAN Mode UDP Out Date Format 2 Boder A Number 1 Boder A Polarity 0 Boder A Number 1 Stroker B Number 1 Model: 65 Base distance: 100 mm Serial number: 33317 Rebase: 21 50 mm	. LAN Destination IP Addres	ss 255.255	5.255.255			
LAN Scarce IP Address 192,188, 0, 3 LAN Scarce IP Address 192,188, 0, 3 Data Number 1 Social Number 1 Model: 65 Serial number: 33817 Base distance: 100 mm Serial number: 33817 Bese distance: 50 mm	. LAN Gateway IP Address	192.168	3. 0. 1			
LAN Soace IP Addess 192.168.0.3 LAN Mode UDP Out Data Format 2 Boder A Number 1 Boder B Number 1 Model: 65 Base distance: 100 mm Serial number: 33317 Rebaser: 21 50 mm	. LAN Subnet Mask	255.255	5.255. 0			
LAN Mode UDP Dur Dats Format 2 Border A Polenty 0 Border 8 Number 1 Model: 65 Base distance: 100 mm Serial number: 33317 Relatic: 50 mm	. LAN Source IP Address	192.168	3. 0. 3			
Ou De se Format 2 Border A Number 1 Border A Number 0 Border B Number 1 Model: 65 Base distance: 100 mm Serial number: 33317 Measuring range: 50 mm	. LAN Mode	UDP				
Border A Number 1 Border A Polarity 0 Border B Number 1 Model: 65 Base distance: 100 mm Serial number: 33317 Rebase: 21	.Out Data Format	2				
Bander A Polenty 0 Bander A Number 1 Bander B Number 1 Model: 65 Base distance: 100 mm Serial number: 33317 Measuring range: 50 mm	.Border A Number	1				
Border 8 Number 1 0 Model: 65 Base distance: 100 mm Serial number: 33317 Measuring range: 50 mm	.Border A Polarity	0				
Model: 65 Base distance: 100 mm Serial number: 33317 Measuring range: 50 mm Reference: 21	.Border B Number	1		-	Ó	
Model: 65 Base distance: 100 mm Serial number: 33317 Measuring range: 50 mm Release: 21						
Serial number: 33317 Measuring range: 50 mm Release: 21	Model:	65		Base di	stance: 100 mm	
Release 21	Serial number:	33317		Measur	na range: 50 mm	
	oonamamber.	00017	R	elease: 21	ngrango. oo min	

On success, the program will show the following message:

RF65X-SP(Setup program: r	el.2.0)	
UART Baud rate: 115200		
COM Port / LISB : COM4	Ulsconnect Stream sta	- 0.000 mm
Not number of device: 1	Measure Zero	
rivernumber of device.		
Parameter	Value	
Sensor Un/Ult	Un	
Analog Output On/Off	On	
UART Baud Rate	115200	
UART Network Address	1	
UART Control of Sample	Time	
AL Control	Out_of_Range	
Analog Window Control	Window	
Number of Averaged Values	1	Rf65X-SP
Mode of Averaged Values	Sample	
Sampling Period	5000	
Max Integration Time	4000	Restore OK
Analog Window Begin	0	
Analog Window End	400	
Lock Time of Result	10	OK
Zero Point	0	
. CAN On/Off	Off	
. CAN Node ID	08	
. CAN Baud Rate	125000	
. CAN Standard Identifier	7FF	
. CAN Extended Identifier	1FFFFFFF	
. CAN Identifier	Standart	
. CAN Mode	Remote	
. LAN Destination IP Address	255.255.255.255	
. LAN Gateway IP Address	192.168. 0. 1	
. LAN Subnet Mask	255.255.255.0	
. LAN Source IP Address	192.168. 0. 3	
. LAN Mode	UDP	
.Out Data Format	2	
.Border A Number	1	
.Border A Polarity	0	
.Border B Number	1 -	ò
-		
Model: 65	Raca	distance: 100 mm
Sorial number: 22	217 Moor	
Senamunuer. 33	Release: 21	uningrange. ovinin
	10000000 61	

In order for the changes to take effect, you must end the connection session and reboot the micrometer by turning OFF/ON the power supply.



16.4. Setting the measurement modes

For more information about the measurement modes, please refer to par. <u>14.2.</u> (11h parameter) and par. <u>14.4.</u>

• Measuring the position of one border (knife)

UART Baud rate: 1152	200 -	Disconnect	Stream sta
COM Port / USB : COM	4 🔻		7
Net number of device:	1 ▼]	Measure	Zero
Parameter	Value		-
Analog Window Control	Wind	w	
Number of Averaged Values	1		
Mode of Averaged Values	Samp	le	
Sampling Period	5000		
Max Integration Time	4000		
Analog Window Begin	0		
Analog Window End	100		
Lock Time of Result	10		
Zero Point	0		
. CAN On/Off	Off		
. CAN Node ID	08		
. CAN Baud Rate	12500	00	
. CAN Standard Identifier	7FF		
. CAN Extended Identifier	1FFFF	FFFF	
. CAN Identifier	Stand	lart	
. CAN Mode	Remo	te	
. LAN Destination IP Address	255.2	55.255.255	
. LAN Gateway IP Address	192.1	68. 0. 1	
. LAN Subnet Mask	255.2	55.255. 0	
. LAN Source IP Address	192.1	68. 0. 3	
. LAN Mode	UDP		
.Out Data Format	1		
.Border A Number	1		
.Border A Polarity	0		
.Border B Number	1		
.Border B Polarity	1		
LOut Mask	0		
LOut Down Limit	1500)	
LOut Up Limit	2500)	
Dia Correction	-1050		
CulcDivCoef	5000)	-

• The distance between borders A and B Finding the diameter of the object:

2
1
0
1
1

Finding the gap dimensions:

.Out Data Format	2
.Border A Number	1
.Border A Polarity	1
.Border B Number	1
.Border B Polarity	0

• The position of the object (a center of the object/gap)

.Out Data Format	3
.Border A Number	1
.Border A Polarity	0
.Border B Number	1
.Border B Polarity	1

17. Working with micrometer

- Place an object into the working range of micrometer.
- To get single result, press the Measure button.
- To get continuous data stream, it is necessary to set the synchronization mode and to press the **Stream start** button. The measurement result will be shown on the display.
- To reset dimensions of the object, press the **Zero** button. This mode is used to measure the deviation of the object from the specified size or position.



- To save all received data to a file, you need to press the right mouse key in the working area and select **Save data to file** in the pop-up window.
- It is possible to specify the position and zoom of the graph: selecting of the **Auto Scaling** option puts it into the active (passive) state that allows you to position and scale the graph automatically (manually).
- To clear the measurement field, it is necessary to select Clear.





18. Examples of stream setting

18.1. Data transfer by request

Measurement data are transmitted on request from the PC:



18.2. Synchronous data transfer

• Time Sampling

To work in this mode, you need to change 2 parameters: **UART Control of Sample** (to the **Time** mode) and **Sampling Period** (see p. <u>11.2</u>).



• Trigger Sampling

To work in this mode, you need to change 2 parameters: **UART Control of Sample** (to the **Trigger** mode) and **Sampling Period**.



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If you need to get results stream automatically after turn on the micrometer, make it's configuration and press **Write to FLASH** button.



18.3. Setting the logical outputs

The following parameters are used for setting the logical outputs. The **LOut Mask** parameter sets the logic state: high active level or low active level. The **LOut Down Limit** parameter sets the lower trigger limit, and the **LOut Up Limit** parameter sets the upper trigger limit.



RF65X-SP DEBUG (Setup pro	ogram: rel.2.0)			
UART Baud rate: 115200	Disconnect Str	eam start	0.000	
COM Port / USB : COM4		7	0.000 mm	
Net number of device: 1	Measure	Zero		
Parameter	Value	^		
. CAN Baud Rate	125000			
. CAN Standard Identifier	7FF			
. CAN Extended Identifier	1FFFFFFF			
. CAN Identifier	Standart			
. CAN Mode	Remote			
. LAN Destination IP Address	255.255.255.255			
. LAN Gateway IP Address	192.168. 0. 1			
. LAN Subnet Mask	255.255.255.0			
. LAN Source IP Address	192.168. 0. 3			
. LAN Mode	UDP			
.Out Data Format	1			
.Border A Number	1			
.Border A Polarity	0			
.Border B Number	1			
Border B Polarity	1			
LOut Mask	0			
LOut Down Limit	15000			
LOut Up Limit	25000			
Dia Correction	-1250			
CulcDivCoef	50000			
Bottom Analog Level	80			
Top Analog Level	57675	_		
Mode of Run	Line			
Device Type	65			
Serial Number	6314			
Base Distance	56			
Measuring Range	10			
Scale Video CCD	17000			
Level 0 Video CCD	19000			
Length CCD	512			
Exposition	75	-	ò	
Model: 65		Baco dict	tanco: 56 mm	
Sorial pumber: 62	1.4	Moneurin	tance, Johnn	
Selial Humbel: 03	14 Beleas	measunn m 21	grange. romm	
	TIOIOda	о. шт		

19. **RF65X-SDK**

Optical Micrometers are supplied together with SDK.

Download link: https://riftek.com/media/documents/software/RFDevice_SDK.zip

The SDK allows the user to develop his own software products without going into details of the micrometer communications protocol.

20. Warranty policy

Warranty assurance for Optical Micrometers RF651 Series - 24 months from the date of putting in operation; warranty shelf-life - 12 months.