



EDGE SENSORS

RF659 Series

User's manual

22, Logoisky tract, Minsk
220090, Republic of Belarus
tel/fax: +375 17 281 36 57
info@riftek.com
www.riftek.com

Contents

1.	Safety precautions.....	3
2.	CE compliance.....	3
3.	Laser safety.....	3
4.	General information.....	3
5.	Structure and operating principle.....	3
6.	Basic technical data.....	4
6.1.	Measuring head.....	4
6.2.	Controller.....	5
7.	Connection.....	6
8.	Operating procedure.....	7
9.	Working with parameters.....	7
9.1.	Settings menu.....	7
9.2.	Zero point.....	7
9.3.	'Technological elements ignoring' mode.....	8
9.3.1.	Detection threshold.....	8
9.3.2.	Analog output retention time.....	8
9.3.3.	Lock range of the mode.....	8
9.3.4.	Enabling/disabling the mode.....	8
9.4.	'Debris' parameters.....	9
9.4.1.	Contamination level threshold.....	9
9.4.2.	100% level of signal.....	9
9.5.	'Count direction' parameter.....	10
9.6.	'Analog output polarity and indication direction' parameter.....	10
9.7.	Logic output thresholds.....	11
9.7.1.	Lower threshold.....	11
9.7.2.	Upper threshold.....	11
9.8.	Resetting parameters.....	11
10.	Analog outputs.....	11
11.	Controller settings for working with transparent objects.....	12
11.1.	Setting algorithm.....	14
12.	LEDs and alarm outputs.....	19
12.1.	Output is off, LED is not lit.....	19
12.2.	Output is on, LED is lit.....	20
13.	Warranty policy.....	20
14.	Revisions.....	20
15.	Distributors	21

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.
- Sensor windows should be kept clean. Do not clean the glass with abrasive and aggressive cleaning agents.
- If the windows are accidentally touched with fingers, they should be wiped immediately.

3

2. CE compliance

The sensors 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

Continuous LED light source is installed in the sensor. Sensors belong to Class 1.

4. General information

The sensors are intended for non-contact measuring and monitoring the position of the edge (edges) of various objects, such as tapes, plates, substrates, etc.

5. Structure and operating principle

The sensor operation is based on the so-called 'shadow' principle, Fig.1. The sensor consists of controller and measuring head which consists of two modules – transmitter and receiver.

Transmitter module consists of LED (1) and lens (2). Receiver module includes a photo-detector array (3).

Radiation of the LED (1) is collimated by the lens (2) and directed to the photo-detector array (3). With an object placed in the collimated beam region, shadow image formed is scanned with the photo-detector array (3). Controller calculates the position of the edge of the object.

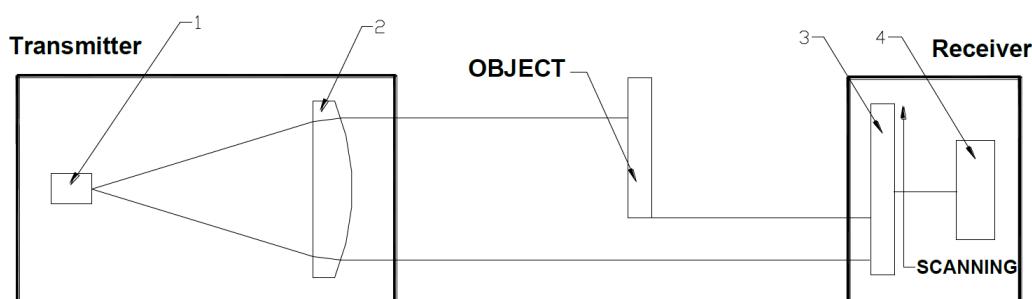


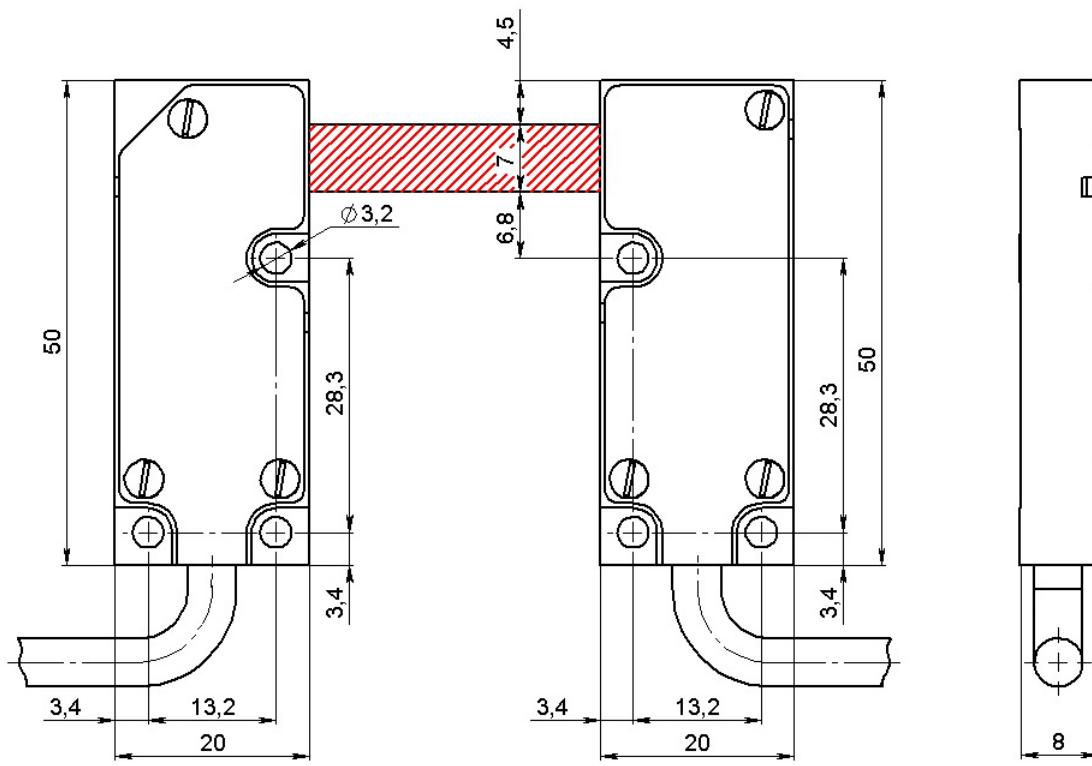
Figure 1



6. Basic technical data

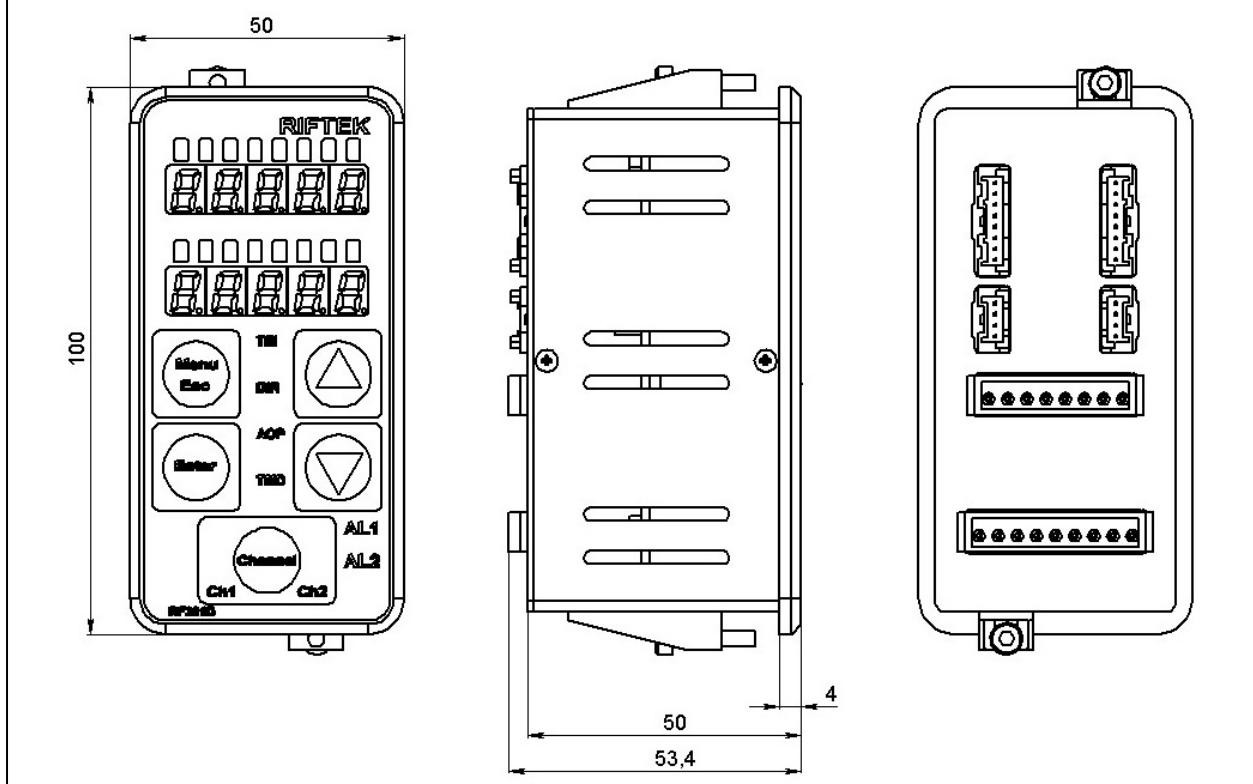
6.1. Measuring head

Type	RF659
Distance between transmitter and receiver, mm	30
Measurement range, mm	7
Accuracy, um	± 20
Repeatability, um	1
Temperature dependence	0.1% range/C°
Light source	LED
Power supply, V	5
Power consumption, W (transmitter/receiver)	0.5
Environment resistance	Enclosure rating
	Vibration
	Shock
	Operation temperature, °C
	Relative humidity, %
Housing/window material	aluminum / glass
Weight with cable (cable length of 300 mm), gram	30 – transmitter, 30 – receiver
Overall and mounting dimensions	see the figure



6.2. Controller

Type	RF301D
Number of connected heads ("transmitter" - "receiver" pairs)	2
Cycle of result updating, Hz	1500
Digital indication	two five-digit displays
Resolution of digital indication, μm	1, 10
Digital output	RS485*
Analog outputs	two isolated channels, $\pm 5\text{V}$ (± 10), load $> 10 \text{ kOhm}$
Resolution of analog outputs, μm	2
Logic outputs	eight isolated channels of npn - open collector
Power supply, V	24
Power consumption, W	1.5
Housing material	aluminum
Weight, g	200
Overall and mounting dimensions	see the figure



* - RS485 is used to diagnose and configure the controller and measuring heads, as well as to update the software.

7. Connection

The back side of the controller contains connectors for measuring heads, 8-pin connector for power, analog outputs and RS485 interface, and 9-pin connector for logical outputs (Fig. 2).

Spring connector 1, numbering 'left to right'	Designation
1	+24V
2	GND
3	Isolated Analog Output 1
4	Isolated Analog Output 2
5	AGND
6	DATA+ (RS485)
7	DATA- (RS485)
8	GND

Spring connector 2, numbering 'left to right'	Designation
1	Isolated Alarm1 Channel 1
2	Isolated Alarm2 Channel 1
3	Isolated Threshold Low1
4	Isolated Threshold High1
5	Isolated Alarm1 Channel 2
6	Isolated Alarm2 Channel 2
7	Isolated Threshold Low2
8	Isolated Threshold High2
9	Isolated GND

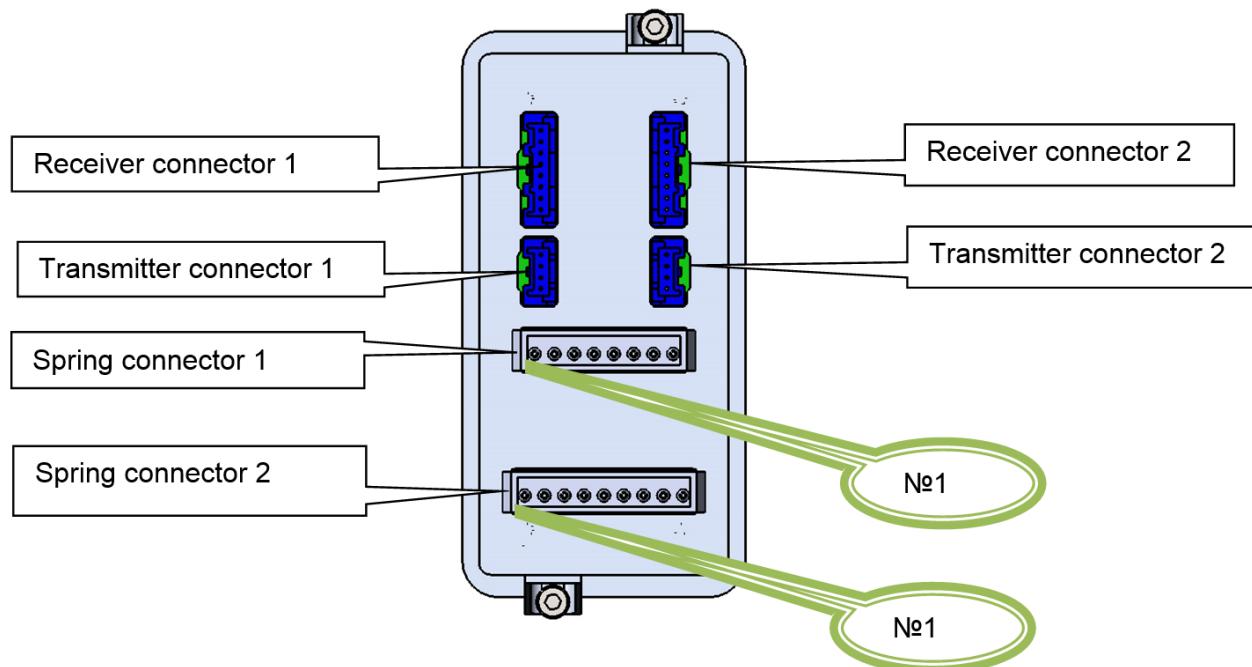


Figure 2

8. Operating procedure

Connect the measuring heads to the controller. Apply supply voltage to the controller. Values measured by channel 1 and channel 2 respectively are shown on digital indicators. LED indicators show the position of the object in the measurement area, i.e. lit areas and areas shaded by the object.

9. Working with parameters

Parameter control buttons and LED indicators are placed on the front panel of the controller, Fig. 3.

7

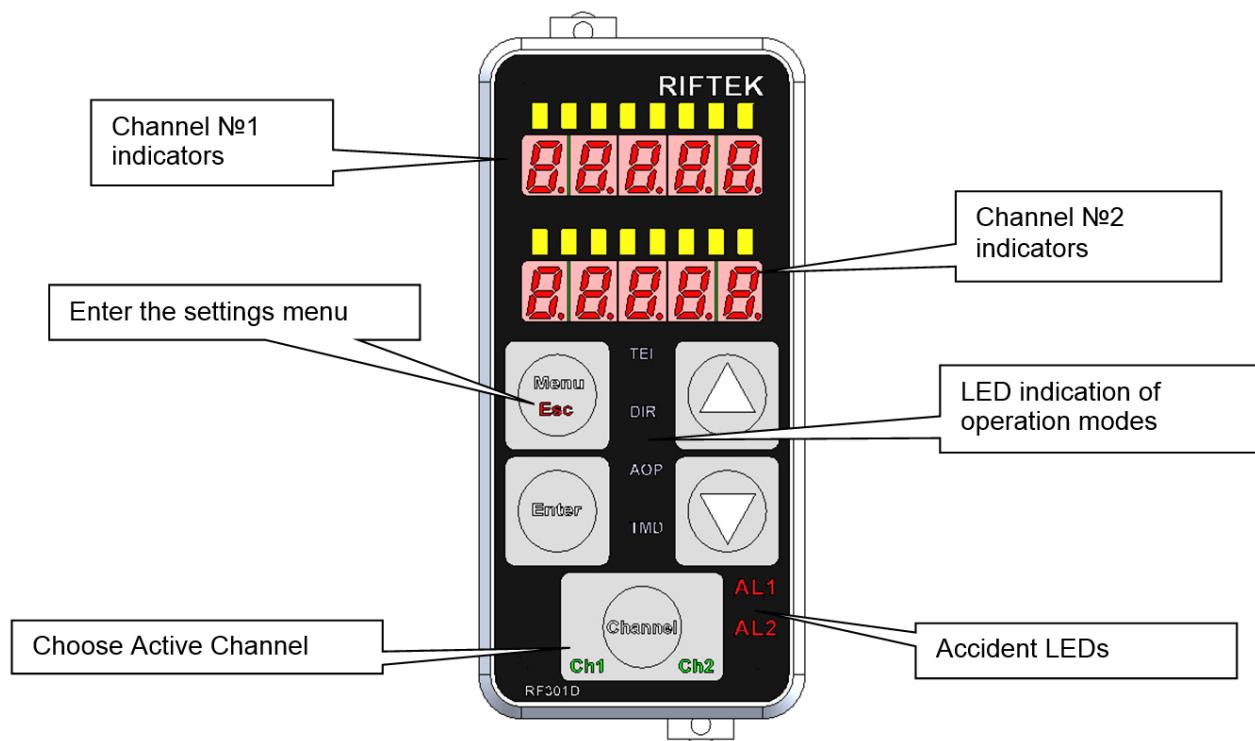


Figure 3

Parametrization is performed for each channel separately. Press the **Channel** button to select the channel. Selected channel is indicated by the corresponding LED.

9.1. Settings menu

To enter the settings menu, you need to hold the **Menu** button pressed for 3 seconds.

9.2. Zero point

This parameter sets the measurement starting point within the measuring range. After Zero Point is set, the measurement result (in the digital display and analog output) is displayed as deviation from a zero point.

Press the **Channel** button and select the channel. The current channel number is highlighted by LED. Install the controlled object to the required position within the range.

Enter the settings menu, select "SEt.0" using the arrows, and press the **Enter** button. Display 2 will show the current value. Select the current value of the parameter by pressing the **Up** arrow, or select '3.50 mm' (the middle of the range) by pressing the **Down** arrow. Then press **Enter** to confirm selection.

To exit the settings menu, press the **Esc** button. You will be prompted to exit without saving to FLASH by the "CAnCEL" message. To save parameters to FLASH, select "SAUE" and press **Enter**.

9.3. 'Technological elements ignoring' mode

Under technological elements to be understood objects in the test material, projecting with respect to its edge (pins, fasteners and so on), or slots, technological gaps and the like in the edge. Technological elements affect the correct measurement of the material edge position. The device has the ability to ignore the technological objects in the measurement process to ensure stable control of the main edge position.

Press the **Channel** button and select the channel. The current channel number is highlighted by LED.

Enter the menu, select "**tEl.x**" using the arrows, and press **Enter** to enter the submenu.

9.3.1. Detection threshold

Detection threshold sets a value, going beyond that is considered as the time of technological element detection. The parameter sets positive and negative thresholds simultaneously, i.e. if parameter is equal to 1.000 mm, all the values above 1 mm and below -1 mm trigger the 'Technological elements ignoring' mode.

Indication of parameter number – the leftmost LED lights up on the LED line. Display 1 shows the "**thrES**" message (Detection threshold), Display 2 shows the parameter value.

To edit the parameter, use the **Up** and **Down** buttons. To increase the parameter, press **Up**. To decrease the parameter, press **Down**. In order to go to the next parameter, press **Enter**.

9.3.2. Analog output retention time

Analog output status remains unchanged since the detection the of technological object and within the time specified by this parameter. The value of analog output corresponds to the last value before the operation mode begins.

Indication of parameter number – two leftmost LED light up on the LED line. Display 1 shows the "**AOrt**" message (Analog output retention time), Display 2 shows the parameter value.

To edit the parameter, use the **Up** and **Down** buttons. To increase the parameter, press **Up**. To decrease the parameter, press **Down**. In order to go to the next parameter, press **Enter**.

9.3.3. Lock range of the mode

At the end of analog output holding time, during the lock mode interval, the event of the going beyond threshold is not processed. Analog output level corresponds to the current measured value. This parameter is intended to allow the edge position adjustment of the material in the event of going beyond the threshold during time when the analog output was held.

Indication of parameter number – three leftmost LED light up on the LED line. Display 1 shows the "**LrAng**" message (Lock range of the mode), Display 2 shows the parameter value.

To edit the parameter, use the **Up** and **Down** buttons. To increase the parameter, press **Up**. To decrease the parameter, press **Down**. In order to go to the next parameter, press **Enter**.

9.3.4. Enabling/disabling the mode

Indication of parameter number – four leftmost LED light up on the LED line. Display 1 shows the "**StAtE**" message, Display 2 shows the parameter value. To edit the parameter, use the **Up** and **Down** buttons. To enable the mode, press **Up**. To disable the mode, press **Down**. In order to go to the main menu, press **Enter**.

When the mode is activated, the "**TEI**" LED lights up.

To exit the settings menu, press the **Esc** button. You will be prompted to exit without saving to FLASH by the "**CAnCEL**" message. To save parameters to FLASH, select "**SAUE**" and press **Enter**.

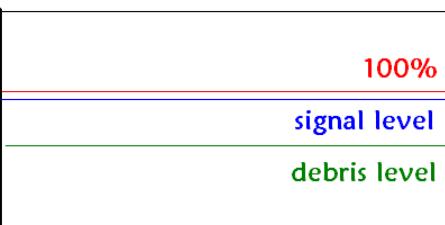
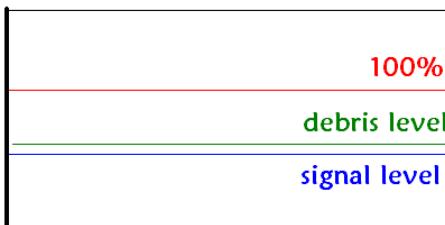
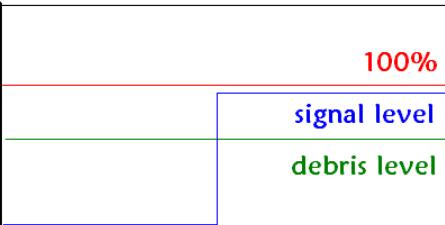
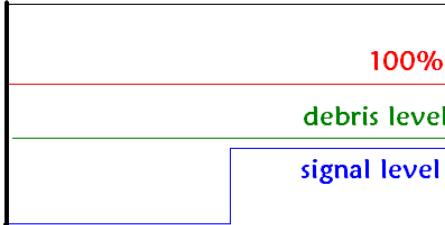
9.4. 'Debris' parameters

The **Debris** parameter is intended for setting the threshold value of the optical signal. If the values of the optical signal of the sensor are below the threshold, the display shows the "**AL2**" error message that signalizes unacceptable contamination level.

9

ATTENTION!

When setting the **Debris** parameter, make sure that there are no objects within the control zone and the windows of the receiver and transmitter are clean.

Object is absent. Signal Level > Debris Level. No dirt. AL2=OFF	Object is absent. Signal Level < Debris Level. Window of measuring head is dirty. AL2=ON
	
Object is within the control zone. Signal Level > Debris Level. No dirt. AL2=OFF	Object is within the control zone. Signal Level < Debris Level. Window of measuring head is dirty. AL2=ON
	

Press the **Channel** button and select the channel. The current channel number is highlighted by LED.

Enter the menu, select "**dEbr.x**" using the arrows, and press the **Enter** button to enter the submenu.

9.4.1. Contamination level threshold

Indication of parameter number – the leftmost LED lights up on the LED line. Display 1 shows the "**thrES**" message, Display 2 shows the parameter value.

To edit the parameter, use the **Up** and **Down** buttons. To increase the parameter, press **Up**. To decrease the parameter, press **Down**. In order to go to the next parameter, press **Enter**.

9.4.2. 100% level of signal

ATTENTION!

Always install the current signal level as the level corresponding to 100%, in the following cases:

- when the system is turned on for the first time,
- when the length of the receiver or transmitter connecting wires were changed,
- when receiver and/or transmitter was reinstalled.

Indication of parameter number – two leftmost LED light up on the LED line.

To edit the parameter, use the **Up** and **Down** buttons. To set the current signal level as the parameter value, press **Up**. Display 1 shows the "LECr.x" message. To save the previous value, press **Down**. Display 1 shows the "LEUP.x" message. In order to go to the main menu, press **Enter**.

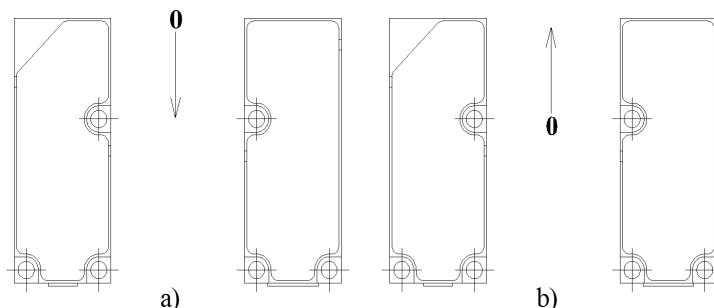
To exit the settings menu, press the **Esc** button. You will be prompted to exit without saving to FLASH by the "**CAnCEL**" message. To save parameters to FLASH, select "**SAUE**" and press **Enter**.

9.5. 'Count direction' parameter

Default count direction is conducted from top down (Fig. a). If necessary, the count direction can be changed.

Press the **Channel** button and select the channel. The current channel number is highlighted by LED.

Enter the menu, select "**dIr.x**" using the arrows, and press the **Enter** button in order to enter the submenu.



To edit the parameter, use the **Up** and **Down** buttons. To set the reverse count direction, press **Up**. Display 2 shows the "**UP**" message. To set the direct count direction, press **Down**. Display 2 shows the "**dn**" message. In order to go to the main menu, press **Enter**.

When you set the reverse count direction, the "**DIR**" LED lights up.

9.6. 'Analog output polarity and indication direction' parameter

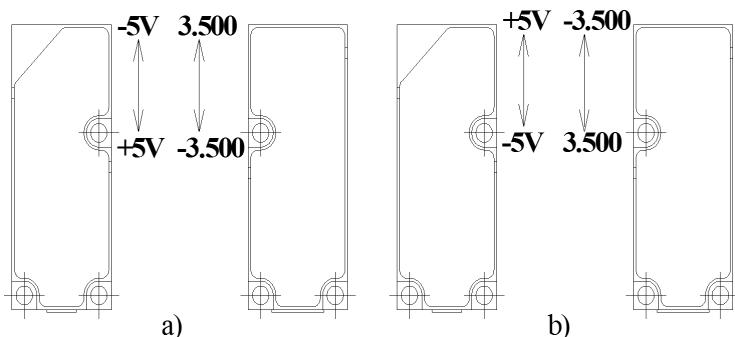
By default the analog output gives -5V with fully opened receiver (display shows 3.500), and +5V with fully closed receiver (display shows -3.500) (Fig. a) - negative polarity. If necessary, the polarity of the analog output can be changed (Fig. b).

Press the **Channel** button and select the channel. The current channel number is highlighted by LED.

Enter the menu, select "**AOP.x**" using the arrows, and press the **Enter** button in order to enter the submenu.

To edit the parameter, use the **Up** and **Down** buttons. To set the positive polarity of the analog output (Fig. b), press **Up**. Display 2 shows the "**POS**" message. To set the negative polarity of the analog output, press **Down**. Display 2 shows the "**nEg**" message. In order to go to the main menu, press **Enter**.

When you set the positive polarity of the analog output, the "**AOP**" LED lights up.



9.7. Logic output thresholds

The controller is equipped with logical outputs (two logical outputs for each channel). These logical outputs signalize about going beyond the upper and lower measurement thresholds.

Press the **Channel** button and select the channel. The current channel number is highlighted by LED.

Enter the menu, select "**LOut.x**" using the arrows, and press the **Enter** button in order to enter the submenu.

9.7.1. Lower threshold

The Threshold Low logical output is an isolated output of the open collector type (n-p-n). It is set to the active state when the measurement value is lower than the value of the lower limit parameter.

Indication of parameter number – the leftmost LED lights up on the LED line. Display 1 shows the "**LO.x**" message, Display 2 shows the parameter value.

To edit the parameter, use the **Up** and **Down** buttons. To increase the parameter, press **Up**. To decrease the parameter, press **Down**. In order to go to the next parameter, press **Enter**.

9.7.2. Upper threshold

The Threshold High logical output is an isolated output of the open collector type (n-p-n). It is set to the active state when the measurement value is higher than the value of the upper limit parameter.

Indication of parameter number – the leftmost LED lights up on the LED line. Display 1 shows the "**HI.x**" message, Display 2 shows the parameter value.

To edit the parameter, use the **Up** and **Down** buttons. To increase the parameter, press **Up**. To decrease the parameter, press **Down**. In order to go to the main menu, press **Enter**.

9.8. Resetting parameters

Parameters can be reset to factory values. In this case, all parameters of both channels will be reset.

Enter the menu, select "**dEFLt**" using the arrows, and press the **Enter** button in order to enter the submenu.

To edit the parameter, use the **Up** and **Down** buttons. To set the default values, press **Up**. Display 2 shows the "**LOAD**" message. To cancel the action, press **Down**. Display 2 shows the "**CAnCEL**" message. In order to go to the main menu, press **Enter**.

10. Analog outputs

The analog outputs are set up once by the manufacturer, but in some cases an adjustment may be required.

To enter the setting menu, it is necessary to do the following: when the controller is turned off, press the **Down** button, turn on the power, and, holding the **Down** button pressed, wait for the "**AOut.1**" and "**CLbr**" messages to appear.

- Connect the voltmeter to terminals AO1 and AGnd.
- Press the **Enter** button. Display 1 shows the "**AOLo.1**" message. Display 2 shows the parameter value.
- Use the arrow buttons to set the parameter value so that the voltage at the analog output AO1 is set to -5V.
- Press **Enter** to go to the next parameter.
- Display 1 shows the "**AOHi.1**" message. Display 2 shows the parameter value.

- Use the arrow buttons to set the parameter value so that the voltage at the analog output AO1 is set to 5V.
 - Press **Enter** to go to the next parameter.
 - Display 1 shows the "**AOLo.2**" message. Display 2 shows the parameter value.
 - Connect the voltmeter to terminals AO2 and AGnd.
 - Use the arrow buttons to set the parameter value so that the voltage at the analog output AO2 is set to -5V.
 - Press **Enter** to go to the next parameter.
 - Display 1 shows the "**AOHi.2**" message. Display 2 shows the parameter value.
 - Use the arrow buttons to set the parameter value so that the voltage at the analog output AO2 is set to 5V.
 - Press **Enter**.
 - To save the changes, select "**SAUE**" using the arrow buttons.
 - To exit without saving, select "**CAnCL**".
 - Press **Enter** to exit the settings menu.

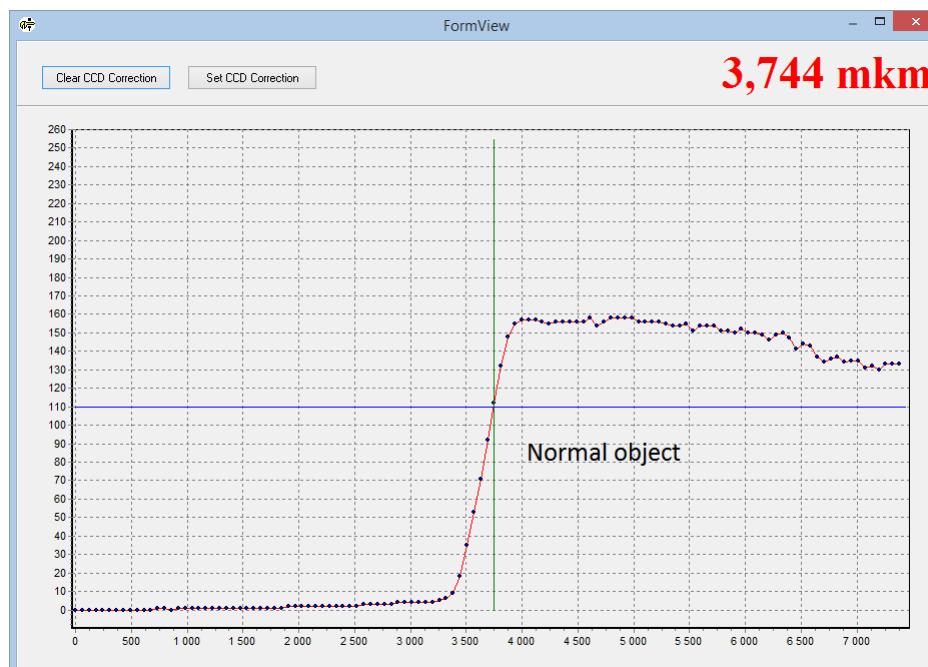
12

11. Controller settings for working with transparent objects

When working with transparent objects, it may be necessary to perform additional controller settings. This is due to the fact that the value of the threshold for finding the border of transparent objects depends on the degree of their transparency.

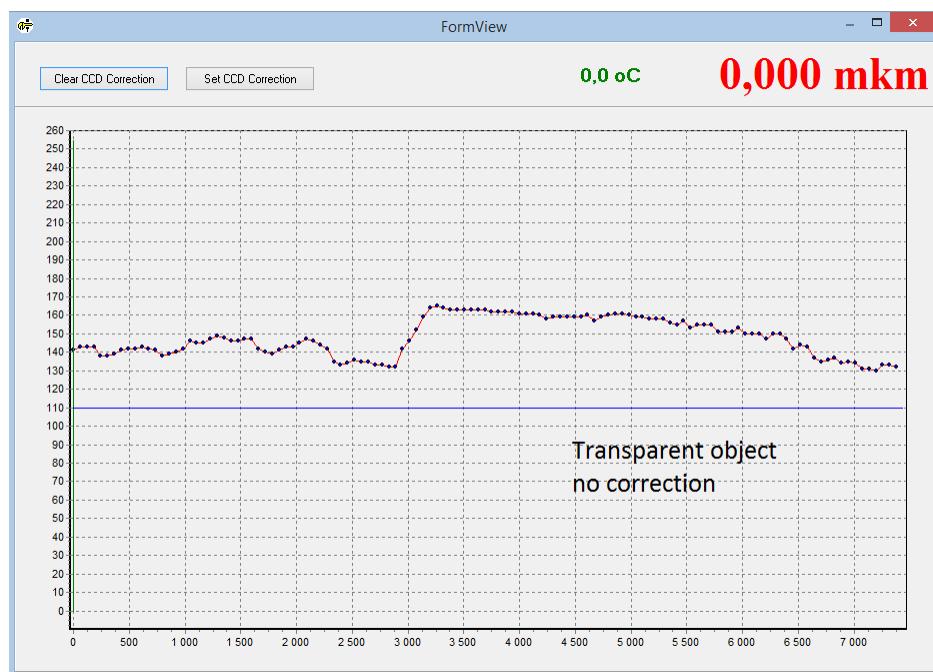
The screenshots below show the signals from the CMOS sensor for various objects and settings.

- Normal object.

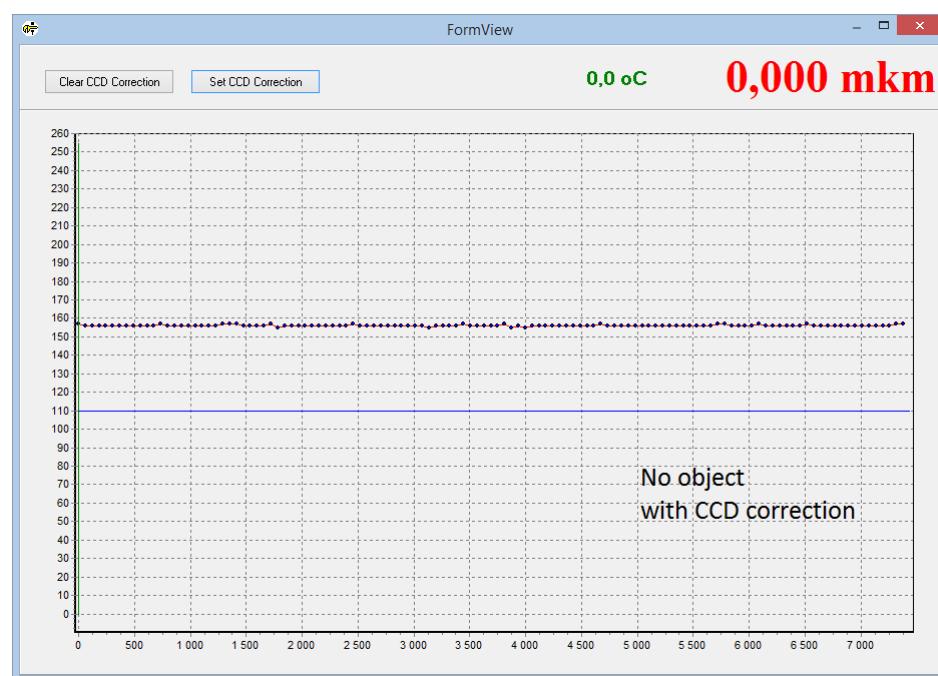


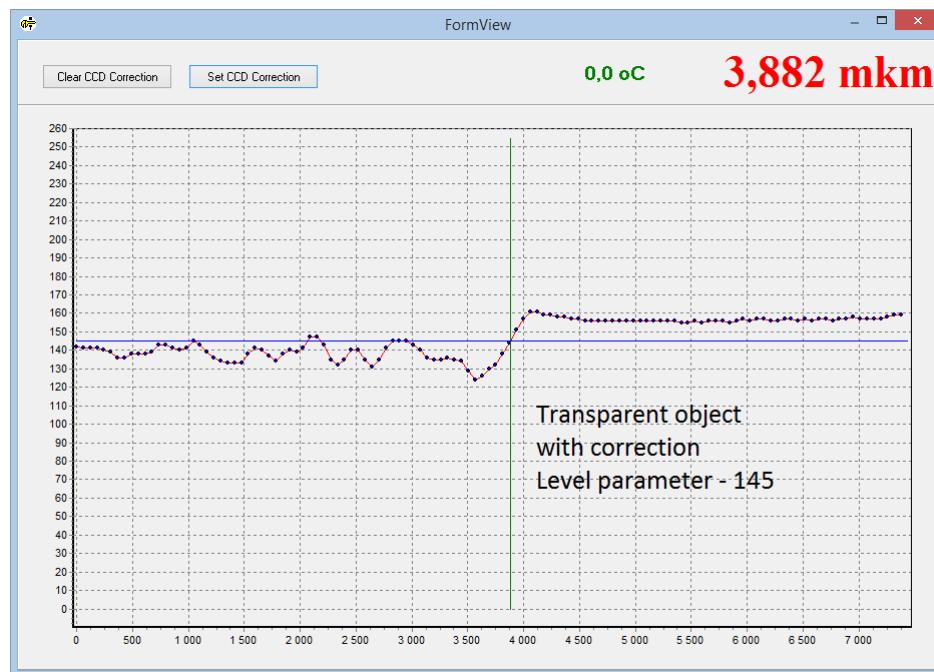
- Transparent object (without correction, the **Level** parameter is not set).

13



For correct operation, it is necessary to perform correction of the CMOS signal and set the parameter of the position detection threshold. The screenshots below show the following: the CMOS signal with correction, and the CMOS signal when measuring the position of the object with correction and with the **Level** parameter specified correctly.



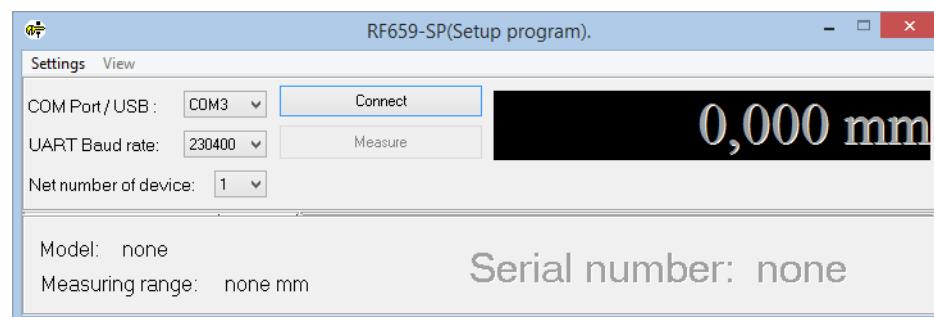


14

11.1. Setting algorithm

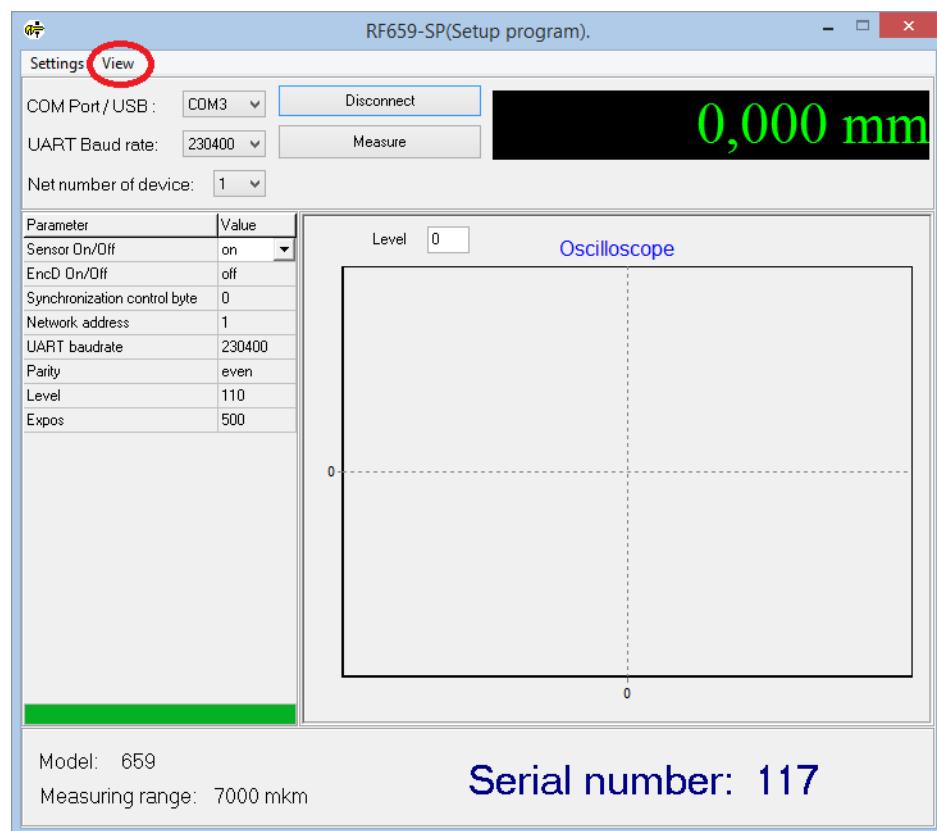
To configure the controller, you will need: the RS485 converter to connect the controller to a PC, and the RF659SP program.

- Turn off the controller.
- Fix the measuring heads in the working position.
- Connect the measuring heads to the controller.
- Using terminals 6, 7 and 8 of the 8-pin connector (see par. 7) and the RS485 converter, connect the controller to the PC.
 - Holding the **Enter** button pressed, feed power to the controller and wait for the "rF659" and "tESt" messages to appear.
 - Run the RF659SP program.

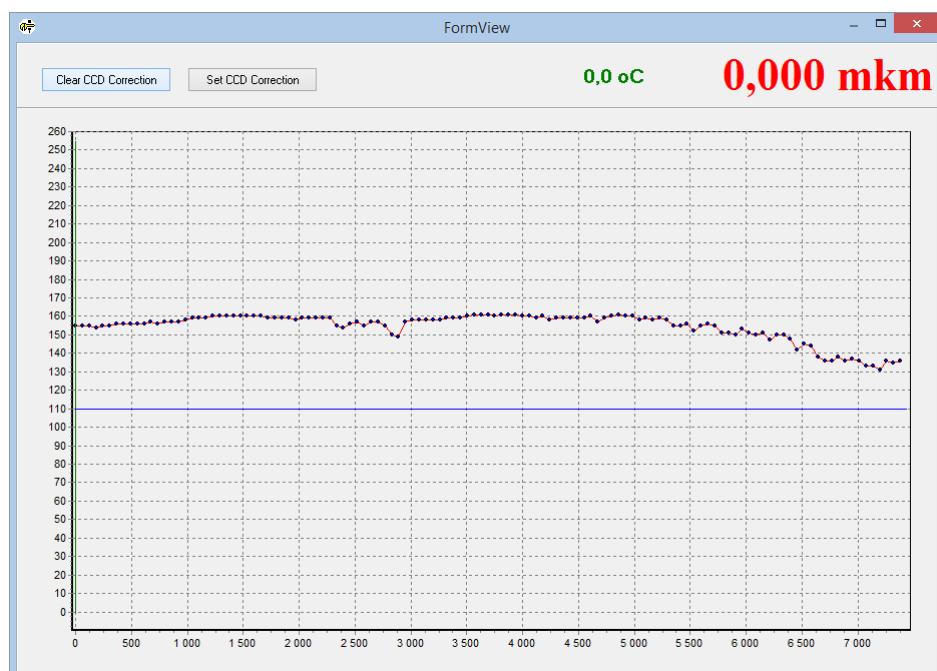


- Select the COM port, to which the RS485 converter is connected. Set the **Net number of device** parameter – 1. Click the **Connect** button.

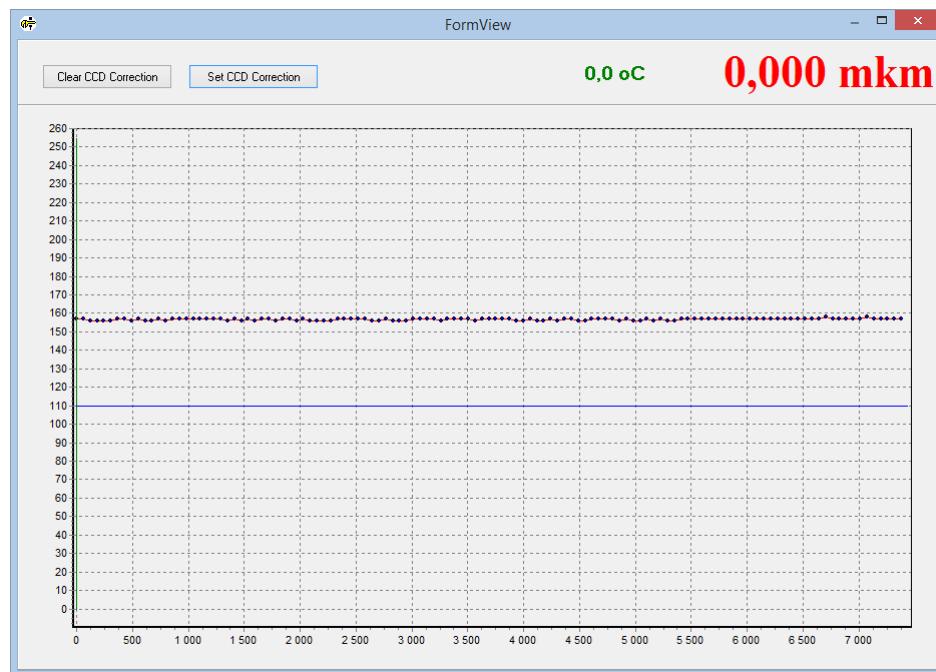
15



- Click **View** to enter the CMOS signal view mode. The **FormView** window appears.
- Make sure that there are no objects in the measurement area, and the windows of the receiver and transmitter are clean.

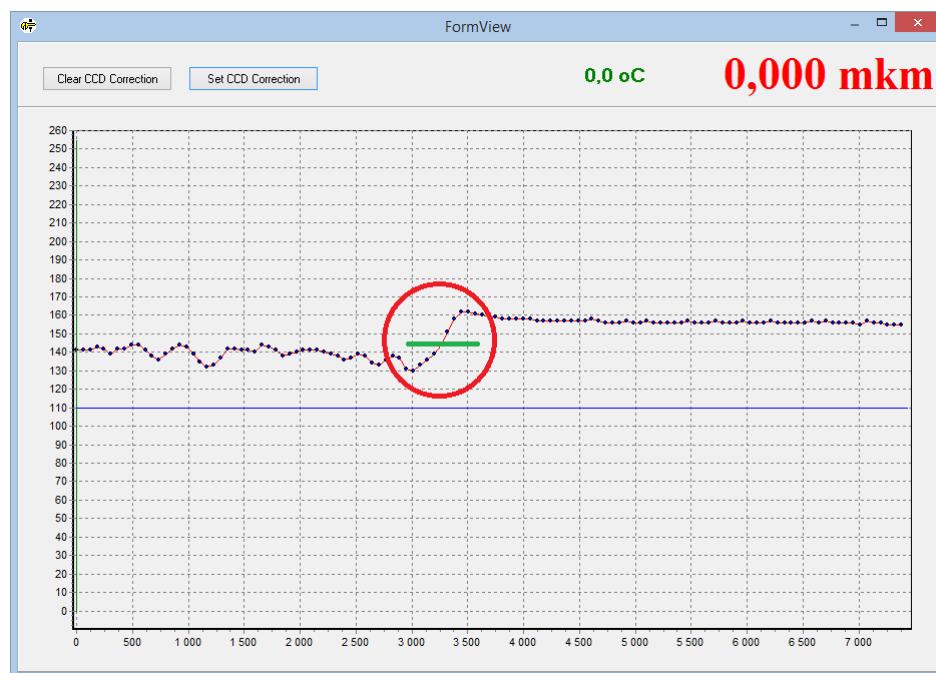


- Click the **Set CCD Correction** button.



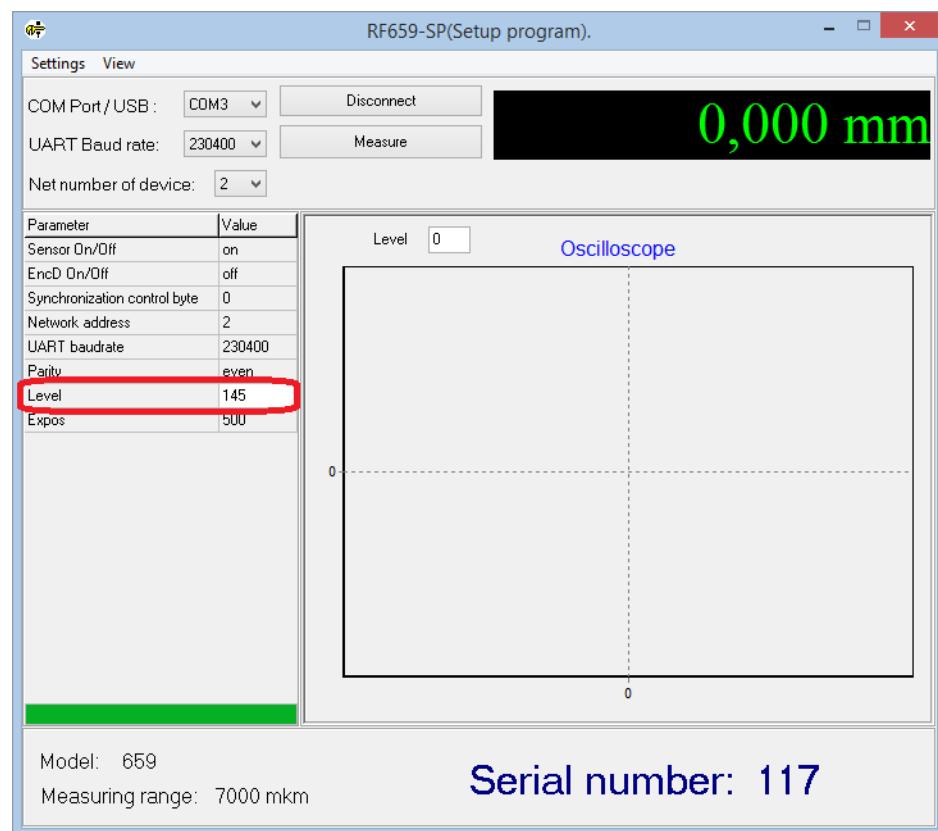
16

- Install a transparent object in the measurement area.
- Visually determine the level of the object position detection threshold.

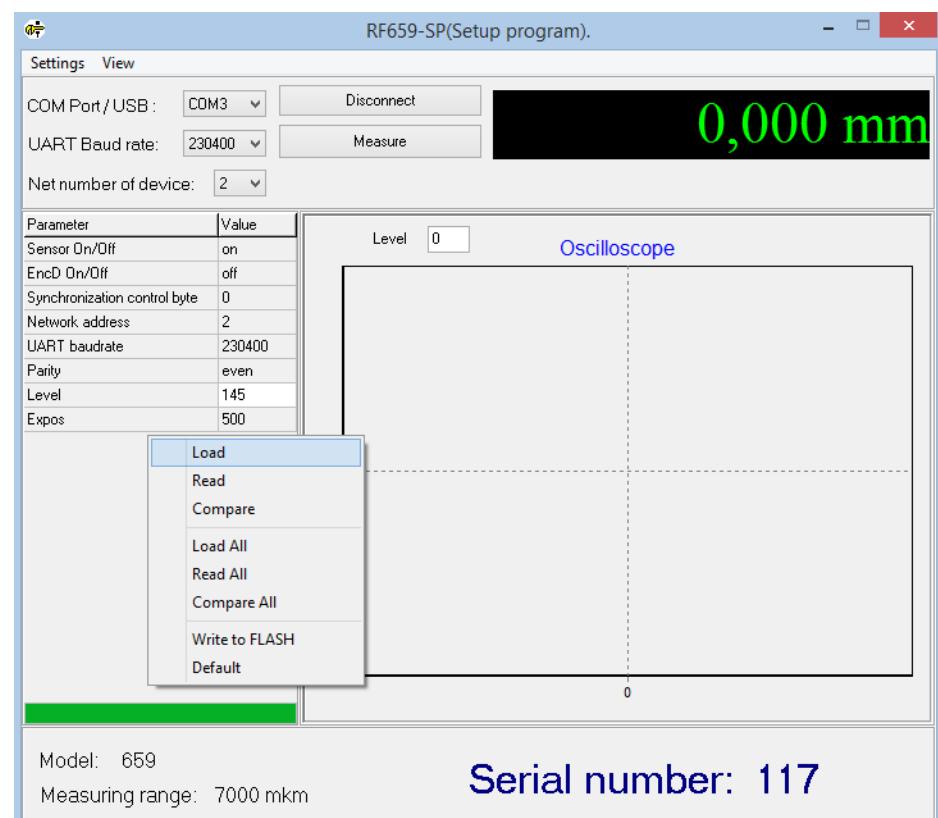


- Close the **FormView** window.
- Enter the value of the **Level** parameter corresponding to the level of the object position detection threshold.

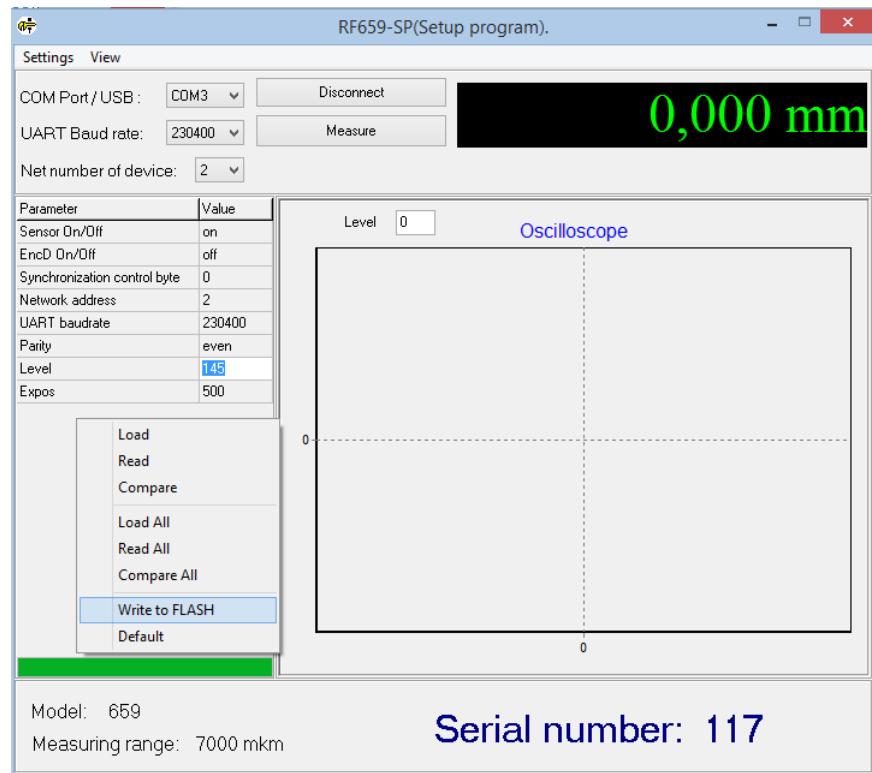
17



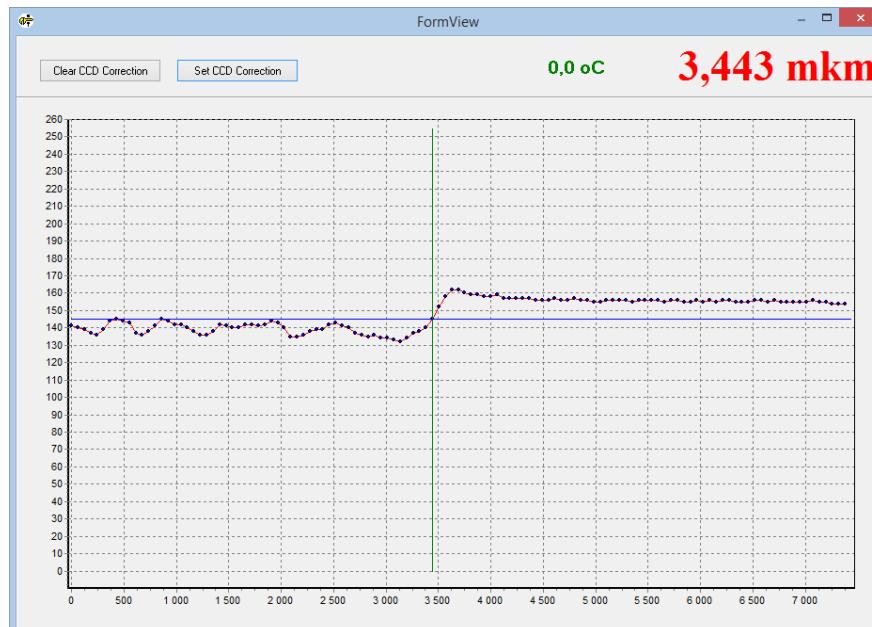
- Right-click in the parameters area and select **Load** to write the parameter to the RAM of the controller.



- Right-click in the parameters area and select **Write to FLASH** to write the parameter to the FLASH memory of the controller.



- Click **View** to open the window for browsing the CMOS signal. The **FormView** window appears. Make sure that the **Level** parameter is set correctly.



- Close the **FormView** window.
- Click the **Disconnect** button.
- Connect to the 2nd channel of the controller: select **Net number of device** – 2, and click the **Connect** button.
- Repeat the algorithm for the 2nd channel.
- Turn off the controller.
- Disconnect the RS485 converter from the controller.


ATTENTION!

In normal operation, the RS485 converter must be disconnected from the controller. Contacts 6, 7 and 8 of the 8-pin connector must be free.

12. LEDs and alarm outputs

Status of outputs AL1 and AL2 is indicated by red LEDs on the front panel of the controller. The algorithm of the outputs work is described below.

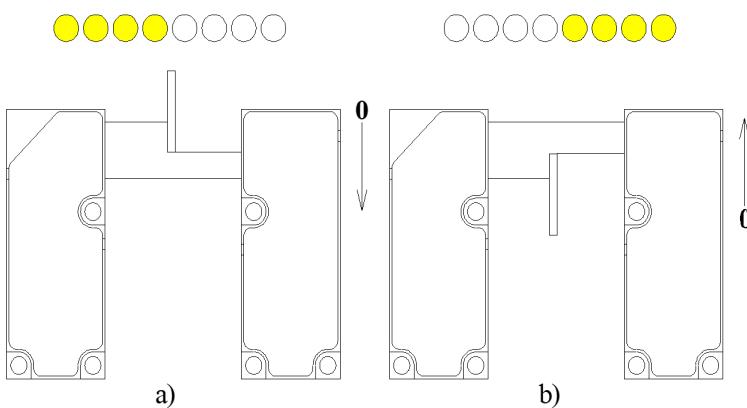
ATTENTION!

When the alarm output is triggered, the analog output of the corresponding channel is latched. The resumption of the analog output operation is performed after the alarm is turned off.

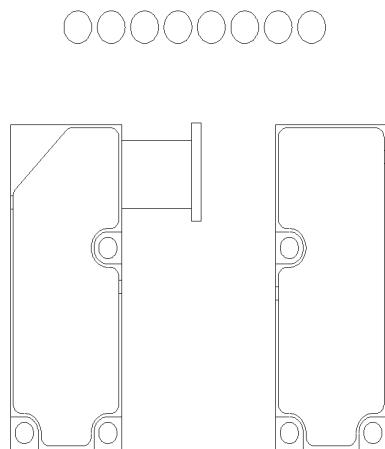
12.1. Output is off, LED is not lit

The position of the object in the measurement area corresponds to the state of **Measurement Direction** parameter,

19

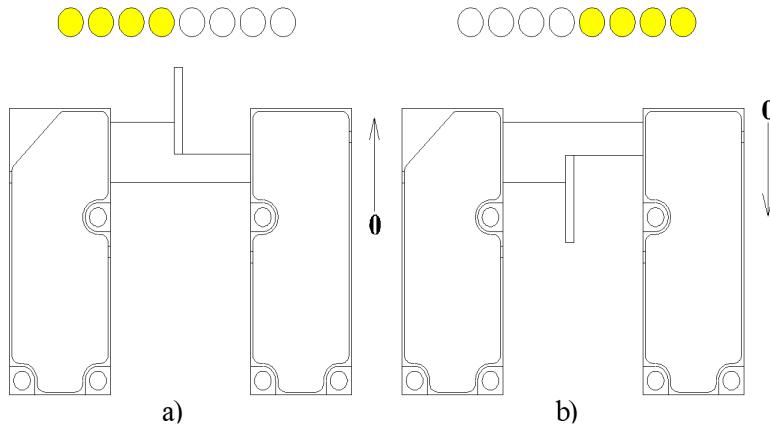


or the object covers the entire measurement area.



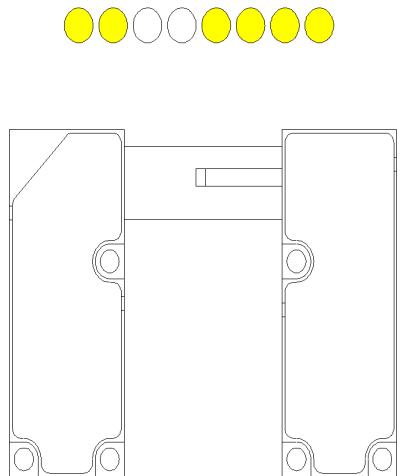
12.2. Output is on, LED is lit

The position of the object in the measurement area doesn't correspond to the state of **Count Direction** parameter,



20

or there is a complex object in the measurement area, forming more than one boundary light-shadow.



13. Warranty policy

Warranty assurance for Edge Sensors RF659 - 24 months from the date of putting in operation; warranty shelf-life - 12 months.

14. Revisions

Date	Revision	Description
05.04.2017	1.0.0	Starting document.
26.06.2018	2.0.0	The following sections were updated: - Basic technical data. - Connection. - Operating procedure. - Working with parameters. - LEDs and alarm outputs. The following sections were added: - Analog outputs. - Controller settings for working with transparent objects.

15. Distributors

AUSTRIA

MBM Industry & Rail Tech GmbH
RAILWAY INSTRUMENTS ONLY
 Tullnerbachstraße 36,
 A-3002 Purkersdorf, Austria
 Tel: +43 2231 66000
 Fax: +43 2231 66000 12
office@mbm-industrietechnik.at
www.mbm-tech.at

BULGARIA, HUNGARY

RMT Ltd.
 R Zahradni 224
 739 21 Paskov, Czech Republic
 Tel: +420 558640211
 Fax: +420 558640218
rmt@rmt.cz
www.rmt.cz

CHINA

Zhenshangyou Technologies Co.,Ltd.
 Rm 2205-2210, Zhongyou Hotel
 1110 Nanshan Road, Nanshan
 District 518054 Shenzhen, China
 Tel: +86 755-26528100/8011/8012
 Fax: +86 755-26528210/26435640
info@51sensors.com
www.51sensors.com

CZECH REPUBLIC

RMT Ltd.
 Zahradni 224
 739 21 Paskov, Czech Republic
 Tel: +420 558640211
 Fax: +420 558640218
rmt@rmt.cz
www.rmt.cz

AUSTRALIA

Applied Measurement Australia Pty Ltd
RAILWAY INSTRUMENTS ONLY
 Thornton Plaza, Unit 5,
 27 Thornton Crescent, Mitcham
 VIC 3132, Australia
 Tel: +61 39874 5777
 Fax: +61 39874 5888
sales@appliedmeasurement.com.au
www.appliedmeasurement.com.au

BENELUX

Altheris B.V.
 Vietweg 17a
 2266KA Leidschendam
 The Netherlands
 Tel: +31 70 3924421
 Fax: +31 70 3644249
sales@altheris.nl
www.altheris.com

BRAZIL

CAPI Controle e Automação Ltda
 Rua Itororó, 121, CEP 13466-240
 Americana-SP, Brazil
 Tel: +55 19 36047068
 Fax: +55 19 34681791
capi@capicontrole.com.br
www.capicontrole.com.br

CHILE

Verne SpA
 Apoquindo 2818, oficina 31,
 Las Condes, Santiago, Chile
 Tel: +56 2 228858633
info@verne.cl
jsaavedra@verne.cl
www.verne.cl

CHINA

Shanghai micron-metrology com., Ltd.
 Room 602 unit 4, lane 399,
 Mudan road, Pudong New district
 Shanghai, China
 Tel: +86-21-68416510
sales@micron-metrology.cn
www.micron-metrology.cn

CHINA

JRKtech Co., Ltd.
 1F, Building 9, 100 Xianlie Rd.,
 Guangzhou, China
 Tel: +86 755 85267190/
 +86 15989362481
 Fax: +86 755 85267190
shengz_k@163.com
www.jrktech.com

FINLAND

TERÄSPYÖRÄ-STEELWHEEL OY
RAILWAY INSTRUMENTS ONLY
 Juvan teollisuuskatu 28
 FI-02920 ESPOO, Finland
 Tel: +358 400 422 900
 Fax: +358 9 2511 5510
steelwheel@steelwheel.fi
www.teraspyora.fi

FRANCE

DB Innovation (ALTHERIS France)
 26, avenue de la Méditerranée
 34110 Frontignan France
 Tel: +33-467786166
 Fax: +33-467740134
dbi@altheris.fr
www.altheris.fr

GERMANY

Disynet GmbH

Breyeller Str. 2
41379, Brueggen
Tel: +49 2157 8799-0
Fax: +49 2157 8799-22
disynet@sensoren.de
www.sensoren.de

GERMANY

BIP-Industrietechnik GmbH

RAILWAY INSTRUMENTS ONLY
Am Elisabethhof 22,
D-14772 Brandenburg
D-41379 Brueggen, Germany
Tel: +49 (0) 33 81 75 90 0
Fax: +49 (0) 33 81 75 90 11
info@bip-industrie.de
www.bip-industrietechnik.de

GERMANY

Finger GmbH & Co. KG

OPTICAL MICROMETERS ONLY
Sapelloh 172,
31606 Warmen, Germany
Tel: +49 5767 96020
Fax: +49 5767 93004
finger@finger-kg.de
www.finger-kg.de

GERMANY

Hylewicz CNC-Technik

SHTRIKH-2 ONLY

Siemensstrasse 13-15,
47608 Geldern, Germany
Tel: +49 2831 91021-20
Fax: +49 2831 91021-99
info@cnc-step.de
www.cnc-step.de

INDIA

Pragathi Solutions

#698, 5th Main, 8th Cross,
HAL 3rd Stage,
New Tippasandra Road,
Bangalore, 560075, India
Tel: +91 80 32973388
Tel/fax: +91 80 25293985
Mobile: +91 9448030426/
+919448492380
sales@pragathisolutions.in
arghya@pragathisolutions.in
www.pragathisolutions.in

INDIA

Paragon Instrumentation

Engineers Pvt. Ltd.
RAILWAY INSTRUMENTS ONLY
200, Station Road,
Roorkee, 247 667, India
Tel: +91-1332-272394
tanuj@paragoninstruments.com
www.paragoninstruments.com

22

INDONESIA

PT. DHAYA BASWARA

SANIYASA

Botanic Junction Blok H-9 NO. 7
Mega Kebon Jeruk, Joglo
Jakarta 11640, Indonesia
Tel: + 62 21 29325859
management@ptdbs.co.id

IRAN

Novin Industrial

Development Grp.
Tel: +98 21 44022093-6
Fax: +98 21 43858794
Mobile: +98 9123207518
info@novnid.com
www.novnid.com

ISRAEL

Nisso Dekalo Import

Export LTD
1 David Hamelech Street
Herzlia 46661 Israel
Tel: +972-99577888
Fax: +972-99568860
eli@fly-supply.net
www.fly-supply.net
www.aircraft-partsupply.com

ITALY

FAE s.r.l.

Via Tertulliano, 41
20137 Milano, Italy
Tel: +39-02-55187133
Fax: +39-02-55187399
fae@fae.it
www.fae.it

LATVIA, ESTONIA

SIA "SOLARTEX"

RAILWAY INSTRUMENTS ONLY
Duntes 15a, 5th floor, office B7
Riga, Latvia
Tel.: +371 67 130 787
solartex@inbox.lv

MALAYSIA

OptoCom InstruVentures

H-49-2, Jalan 5, Cosmoplex
Industrial Park, Bandar Baru
Salak Tinggi, Sepang, Malaysia
Tel: 603 8706 6806
Fax: 603 8706 6809
optocom@tm.net.my
www.optocom.com.my

NORWAY

Salitec AS

PB 468,
N-1327 Lysaker
Tel.: +47 23 891015
Fax: +47 92101005
mail@salitec.no
www.salitec.no

PERU

Verne Perú S.A.C.

Las Codornices 104,
Surquillo, Lima, Peru
Tel/fax: +51 992436734
info@verne.cl
www.verne.cl

POLAND

MTL ASCO Sp. z o.o.

RAILWAY INSTRUMENTS ONLY
ul. Wielowiejska 53 44-120
PYSKOWICE (k/ GLIWIC),
Poland
Tel: + 48 32 230 45 70
Fax: + 48 32 332 70 14
rail@ascorail.eu
www.ascorail.eu

PORTUGAL**UltraSens**

Qt. da Portela, Lt. 22.1, Ap. 152
 3030 - 502 Coimbra, Portugal
 Phone +351 239 796 277
 Fax: +351 239 918 267
info@ultrasens.com
www.ultrasens.com

RUSSIA**Sensorika-M LLC**

Dmitrovskoye shosse 64-4
 127474, Moscow, Russia
 Tel: +7 499 487 0363
 Fax: +7 499 487 7460
info@sensorika.com
www.sensorika.com

RUSSIA**Diesel-test-Komplekt LLC**

620030, Karjernaya St, 16
 Ekaterinburg, Russia
 Tel/fax: +7 343 2227565
 Tel/fax: +7 343 2227370
mail@d-test.ru
www.d-test.ru

SERBIA, SLOVAKIA**RMT Ltd.**

Zahradni 224
 739 21 Paskov, Czech Republic
 Tel: +420 558640211
 Fax: +420 558640218
rmt@rmt.cz
www.rmt.cz

SOUTH AFRICA

Ratcom Enterprise Pty Ltd
 CSIR BUILDING 35, Office 78
 Meiring Naude Road, Brummeria
 Pretoria, 0084 South Africa
 Tel: + 27 12 841 2032
 Fax: + 27 86 225 0650
info@ratcom.co.za
www.ratcom.co.za

SOUTH KOREA**PROSEN. CO., LTD**

M-1001, Songdo techno park IT center, 32, Songdogwahak-ro, Yeonsu-gu, Incheon, 21984, Republic of Korea
 Tel: +82-32-811-3457
 Fax: +82-32-232-7458
trade@prosen.co.kr
www.prosen.co.kr

SPAIN**Iberfluid Instruments S.A.**

C/ Botanica, 122
 08908 L'Hospitalet de Llobregat, Barcelona
 Tel: +34 93 447 10 65
 Fax: +34 93 334 05 24
myct@iberfluid.com
www.iberfluid.com

SWITZERLAND**ID&T GmbH**

Gewerbestrasse 12/a
 8132 Egg (Zurich), Switzerland
 Tel: + 41 44 994 92 32
 Fax: + 41 44 994 92 34
info@idtlaser.com
www.idtlaser.com

SWEDEN, DENMARK**BLConsult**

Ryssbält 294,
 95 291 KALIX, Sweden
 Mobile: +46 70 663 19 25
info@blconsult.se
www.blconsult.se

SWEDEN, DENMARK**Latronix AB**

Propellervagen 10,
 183 62 Täby, Sweden
 Tel.: +46 08-446 48 30
 Fax: +46 08-446 48 39
sales@latronix.se
www.latronix.se

THAILAND**Advantech Solution Co.,Ltd.**

20/170 Motorway Rd.,
 Kwang Pravet, Khet Pravet,
 Bangkok, Thailand 10250
 Tel: +662-1848705
 Fax: +662-1848708
sales@advantechsolution.com
www.advantechsolution.com

TURKEY**TEKMA Mühendislik A.S.**

Cevizli Mh. M. Kemal Cd.,
 Hukukçular Towers,
 A-Blok, No: 66-A/39
 Kartal – İstanbul
 Tel: +90 216 970 1318
 Tel: +90 850 840 2334
info@tekma.eu
www.tekma.eu

UKRAINE**KODA**

Frunze st 22
 61002, Harkov, Ukraine
 Tel/fax: +38 057 714 26 54
mail@koda.com.ua
www.koda.com.ua

UNITED KINGDOM, IRELAND**Ixthus Instrumentation Ltd**

The Stables, Williams' Barns
 Tiffield road, Towcester, Northents
 Tel: +44 1327 353437
 Fax: +44 1327 353564
info@ixthus.co.uk
www.ixthus.co.uk

USA, CANADA, MEXICO**International Electronic****Machines Corporation****RAILWAY INSTRUMENTS ONLY**

850 River Street, Troy,
 New York, USA
 Tel: +1 518 268-1636
 Fax: +1 518 268-1639
marketing@iem.net
wwwием.net

USA, CANADA, MEXICO

**Acuity Products of Schmitt
Industries, Inc.**

2765 NW Nicolai Street
Portland, OR, 97210, USA
Tel: +1 503 227 7908
Fax: +1 503 223 1258
sales@acuitylaser.com
www.acuitylaser.com