The LSvision 4.3.x.x. software

User's manual

1. CONTENTS

2. DESTINATION

The LSvision software is designed to work with LS5 laser triangulation sensors. The software functions include:

- searching for sensors and their identification;
- reading and recording of the sensor parameters;
- receiving the measurement results in a stream from a single sensor;
- saving the measurement results with the ability to view them graphically;
- editing the saved measurement results;
- reading the «last result» from a single sensor;
- latching and reading the result from one or more sensors;
- exporting of the results to a text file or Excel file.

3. OVERVIEW

When you launch the software, the main window is displayed (see fig. 3.1), which can be divided into two parts. The upper part is responsible for work with the COM port and selection of the exchange protocol and the current network address of the sensor. The lower part consists of a set of four tabs, their purpose is described below. Without the search for sensors on the first tab, further work with the software will be impossible.

Figure 3.1 – The initial view of the software

The status bar is used to display the status of an operation (see fig. 3.2).

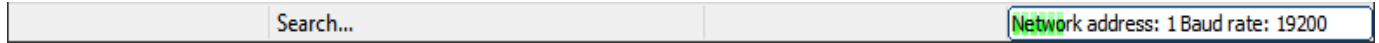| Search...	Network address: 1 Baud rate: 19200

Figure 3.2 – The status bar

4. SEARCH

At the beginning of work, make sure that the sensors are supplied with power and they are connected to the computer's COM port. Next, select the number of the port used from the **«Port»** drop-down list in the upper part of the working window of the soft, and specify the exchange protocol from the same area of switches.

To establish a connection with sensors, use the first tab – **«Sensor search»** (see fig. 3.1).

The **«Find sensors»** button launches the process of addresses scanning from the first to the predetermined one (the **«Upper search limit»** input area is used). After the scanning process is complete, a list of found sensors will appear in the list on the right side of the workspace (see fig. 4.1). This list contains information for each sensor about the type of sensor (serial number, measurement range, model), its address, and the baud rate at which the sensor is currently running.
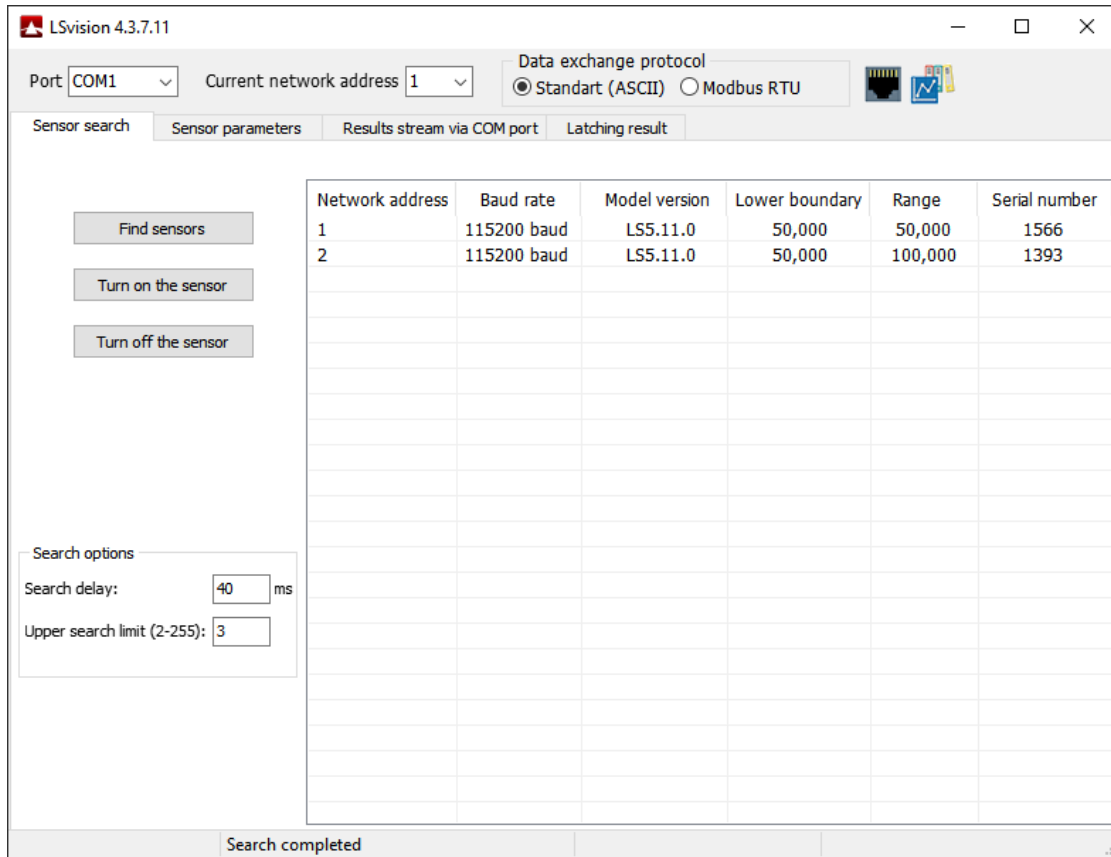

Figure 4.1 – Search of sensors

Note: In most cases, it is enough to set a delay of 40 ms in the **«Search delay»** input area to guarantee the sensor detection (see fig. 4.1). During the routine maintenance of sensors, you can reduce the value to 20 ms, which will allow you to search for sensors faster. It is also recommended to reduce the upper limit of the search as much as possible.

For further work, you need to select the address of the desired sensor in the **«Current network address»** cell in the upper part of the software window.

The «**Turn on the sensor**» and «**Turn off the sensor**» buttons are used to turn on and off the sensor laser. After pressing the «**Turn on the sensor**» button, the laser turns on and the sensor goes into measurement mode. When the «**Turn off the sensor**» button is pressed, the laser turns off and the sensor is in low-power mode.

5. WORK WITH SENSOR PARAMETERS

The «**Sensor parameters**» tab (see fig. 5.1) is used to set up all the main parameters of the sensors. The purpose of the parameters is described in the technical description of the sensors[1].
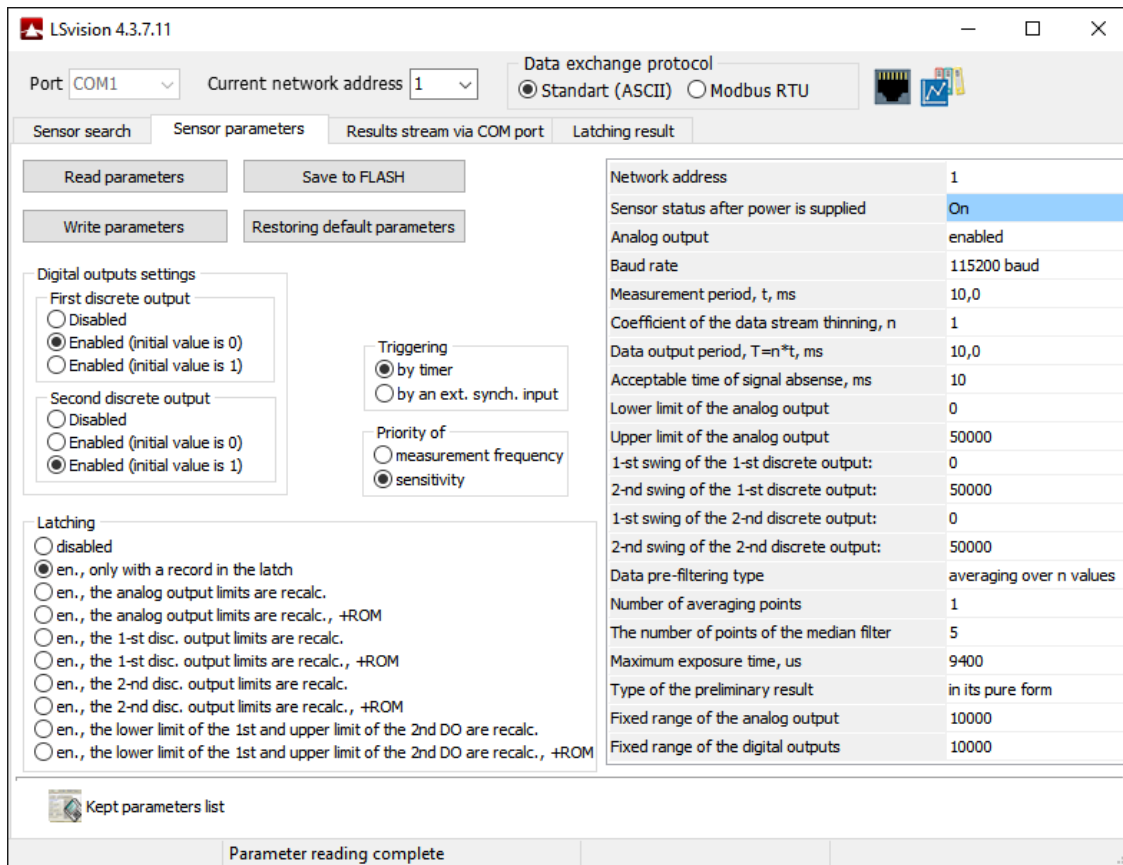

Figure 5.1 – Sensor parameters

Before continuing the work here and in subsequent tabs, you need to search for sensors (see section 4) and check whether the communication parameters (COM port number, sensor address) are set correctly.

When you click the «**Read parameters**» button, the sensor parameters are read. The resulting parameters are displayed in the corresponding table cells. If necessary, you can adjust the parameters.

To write the corrected parameters in the sensor, click the «**Write parameters**» button. After that, the sensor will start working with the new parameters.

Note: Clicking on the «**Write parameters**» button allows you to change the parameter values only in the sensor's RAM, i.e. the values of the new parameters will only be valid until the sensor power is turned off. The next time you enable it, the parameters will return to their old values. In

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[1] http://prizmasensors.ru/files/teh-ls5_eng.PDF

addition, when changing the address of the active sensor or when searching for a new one, the «**Sensor parameters**» tab displays the message «**Parameters are not valid for the current sensor!**» (see fig. 5.2).
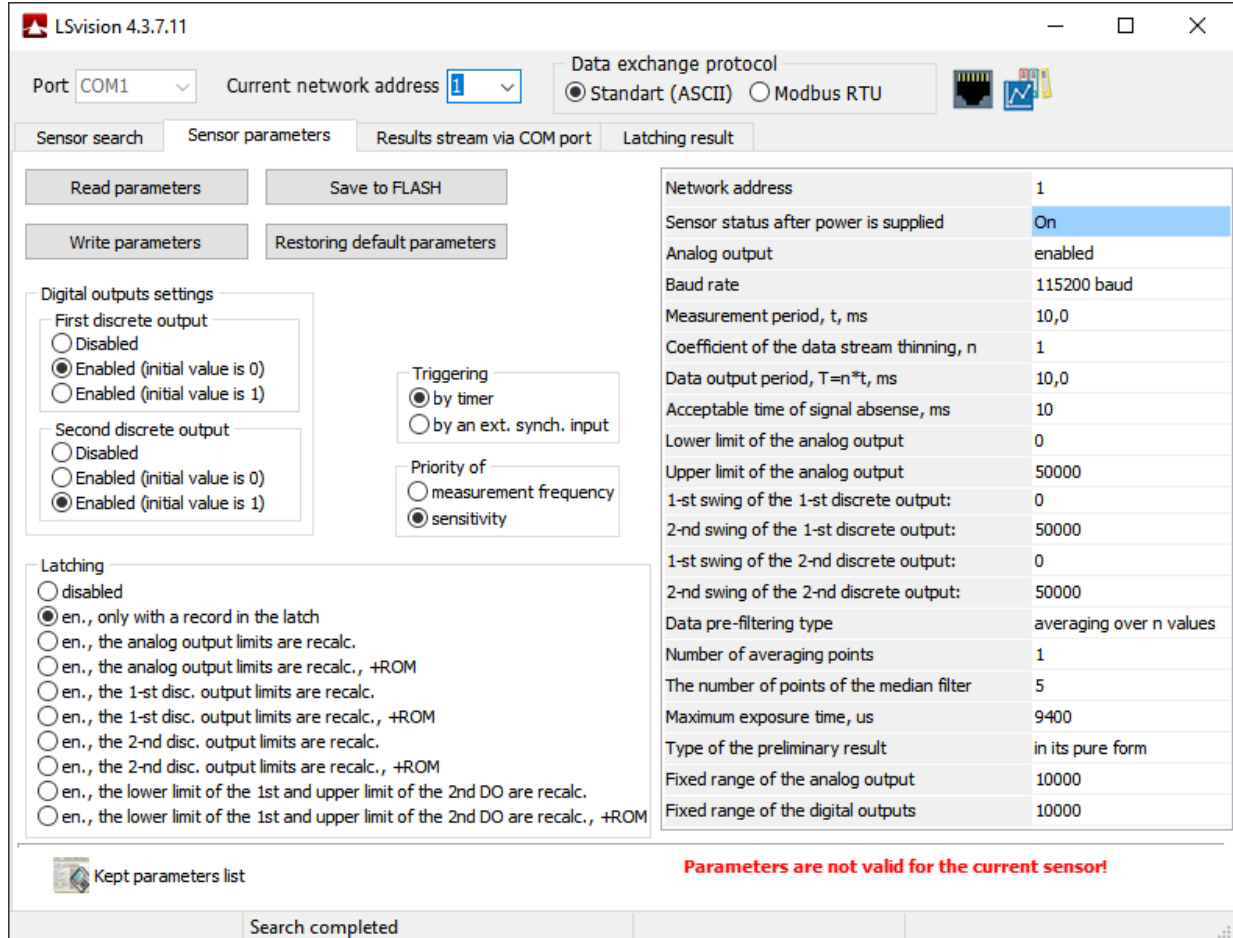

Figure 5.2 – View of the «**Sensor parameters**» tab for invalid parameters

To save the newly recorded parameters in non-volatile memory, click the «**Save to FLASH**» button (you must first record the parameters). After this procedure, the sensor will use the new parameters even after restarting (power off and on).

The «**Restoring default parameters**» button is used to set the sensor parameters set by the manufacturer. When this button is clicked, the «Set default parameters» command is sent to the sensor and the parameters are read.

For sensors that can transmit a stream over Ethernet, the «**Sensor parameters**» tab on the right shows the «**Ethernet Settings**» area (see fig. 5.3).
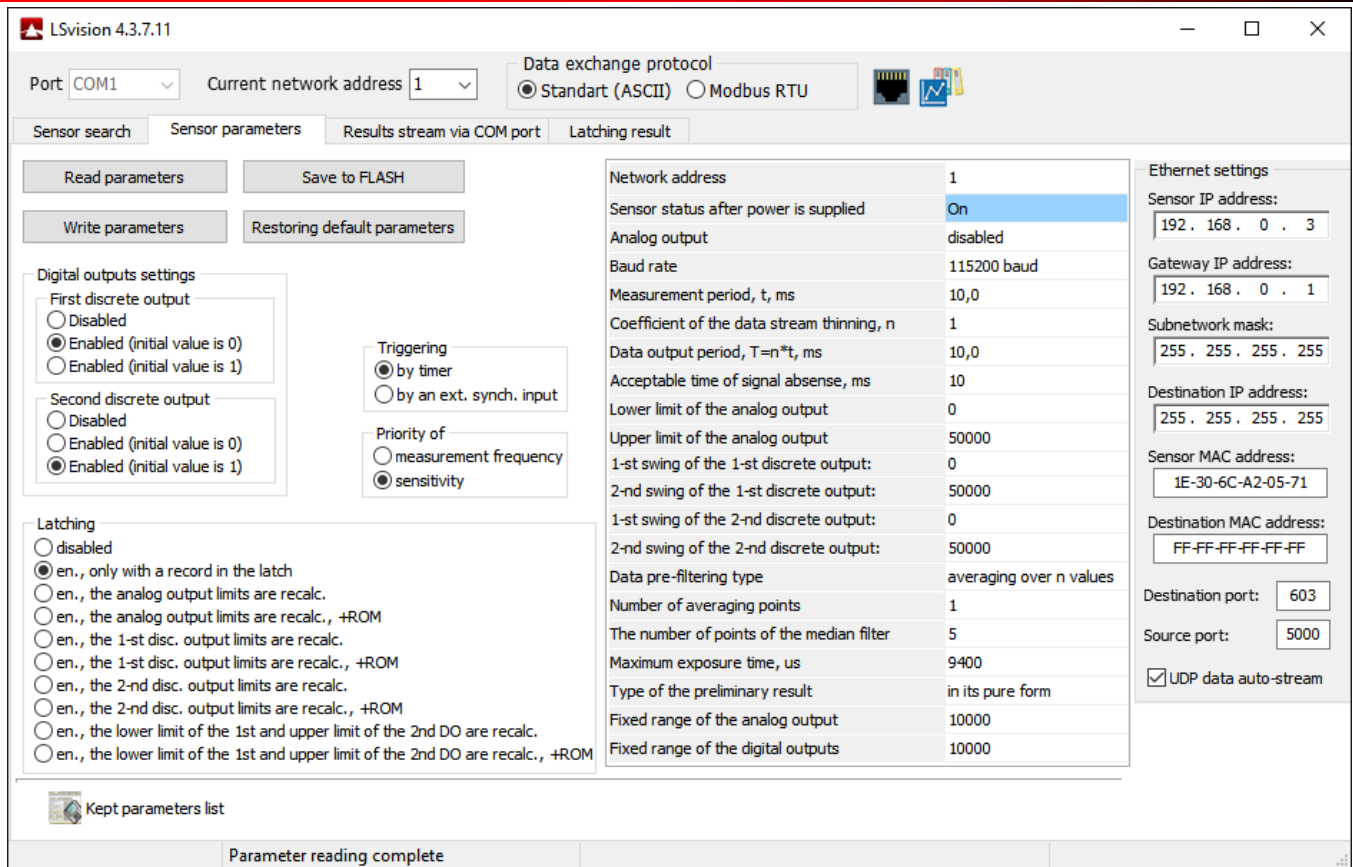
Figure 5.3 – Example of the appearance of the «**Sensor parameters**» tab for sensors that can transmit a stream over Ethernet
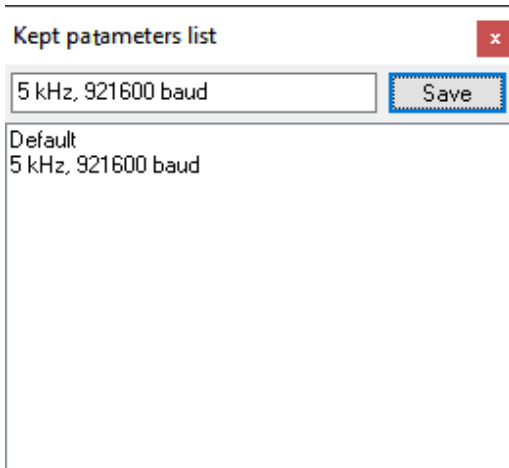

Figure 5.4 – Example of the «**Kept parameters list**» window

The «**Kept parameters list**» button opens a window with the same name (see fig. 5.4). This window is used for saving sets of parameters displayed on the «**Sensor parameters**» tab; its tools include a list of sets, a save button, and a field for entering the set name.

To save a set of parameters, make sure that the desired parameter values are set on the tab, enter the name of the set in the «**Kept parameters list**» window, and click the «**Save**» button; after that, another item will appear in the list. When you save a set of parameters again with a name that already exists in the list, the old one is completely erased. You can use this feature to edit a set of parameters.

You can save it even if not all parameters are set on the tab. When you select a set from the list, the LSvision software automatically sets the parameters recorded in the set on the «**Sensor parameters**» tab.

Note: The selected parameter configuration is displayed only in the LSvision software, but is not saved in the sensor memory. Therefore, after the changes are made, it is recommended to write them into the sensor using the «**Write parameters**» or «**Save to FLASH**» buttons

You can only delete a set of parameters by editing the «**Settings.ini**» file (the **[Parameters List]** section of the ini-file), where all saved sets are available for detailed editing.

The «**Kept parameters list**» window is only available on the «**Sensor parameters**» tab.

6. RESULTS STREAM

The «**Results stream via COM port**» tab (see fig. 6.1) is used for accumulating and viewing the results that are output in the stream. A stream can only be received from a single sensor with the address specified in the «**Current network address**» cell.

Note: When exchanging data over the Modbus RTU Protocol, the «**Results stream via COM port**» tab is not available.
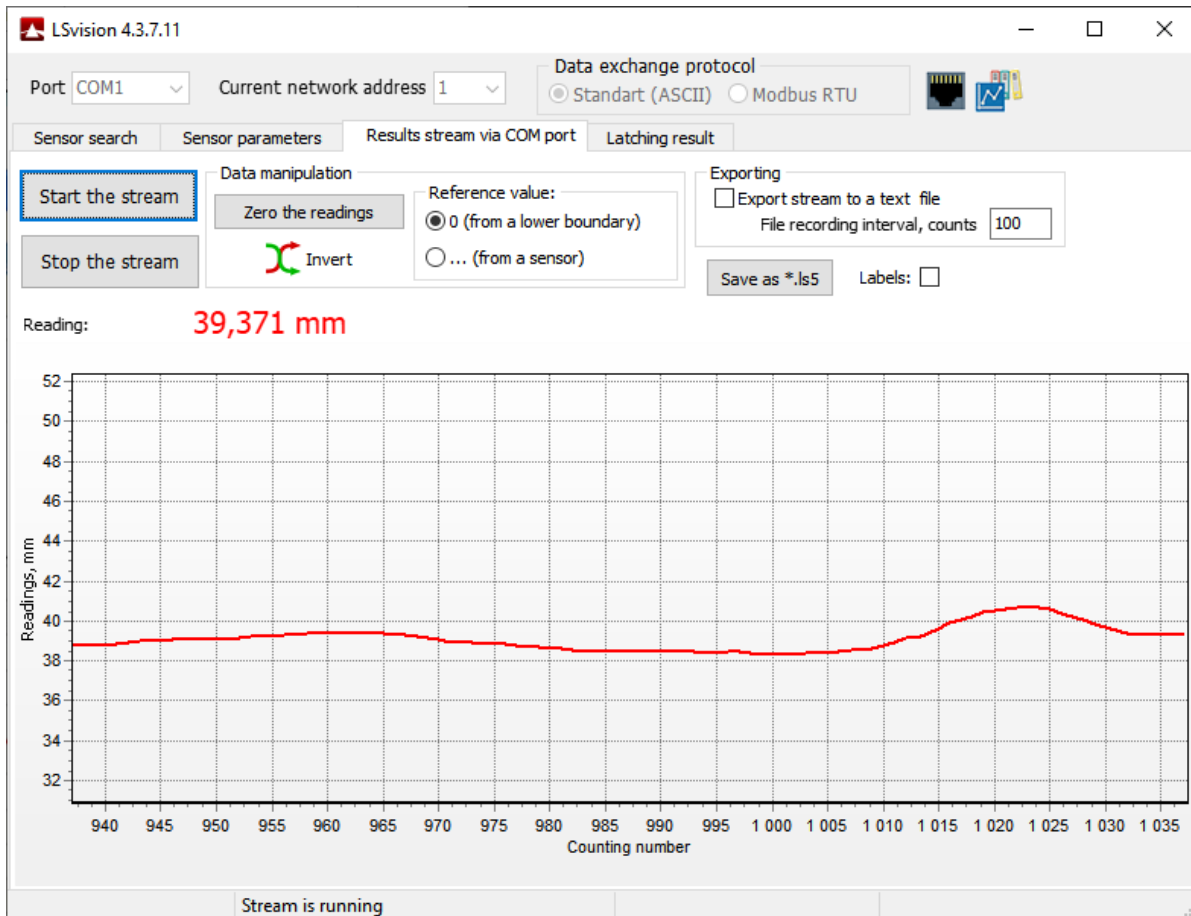

Figure 6.1 – The «**Results stream via COM port**» tab when starting the stream

The «**Start the stream**» and «**Stop the stream**» buttons start and stop the results stream. The last received value is displayed in the working window after the «**Reading**» label. The value is shown in millimeters.

After clicking the «**Start the stream**» button, the sensor outputs measurement results within the period specified by the «**Data output period**» parameter (see the «**Sensor parameters**» tab).

The result stream is interrupted not only by the «**Stop the stream**» command, but also when trying to transmit any commands to the sensor via the serial port. However, if the sensor is working at a high frequency or on a slow computer, there may be collisions on the transmission line or failures and slowdowns in receiving/transmitting of packets. In this case, it may take longer to stop the stream (the program will send the «**Stop the stream**» command to the sensor until the sensor stops it). A guaranteed stream stop is indicated by the appearance of the «**The stream is stopped**» label in the

status bar.

> **Note**: If the specified data output period is less than the time required to transmit a single result, the actual period will be determined by the time required to transmit a single data packet (this is possible, for example, at low serial interface speeds).

Two coloured horizontal lines – labels are used to ease the monitoring of the output of the sensor readings beyond the set values. To display them on the chart, select the «**Labels**» check mark, and then specify the desired values in the input fields that appear (see fig. 6.2).
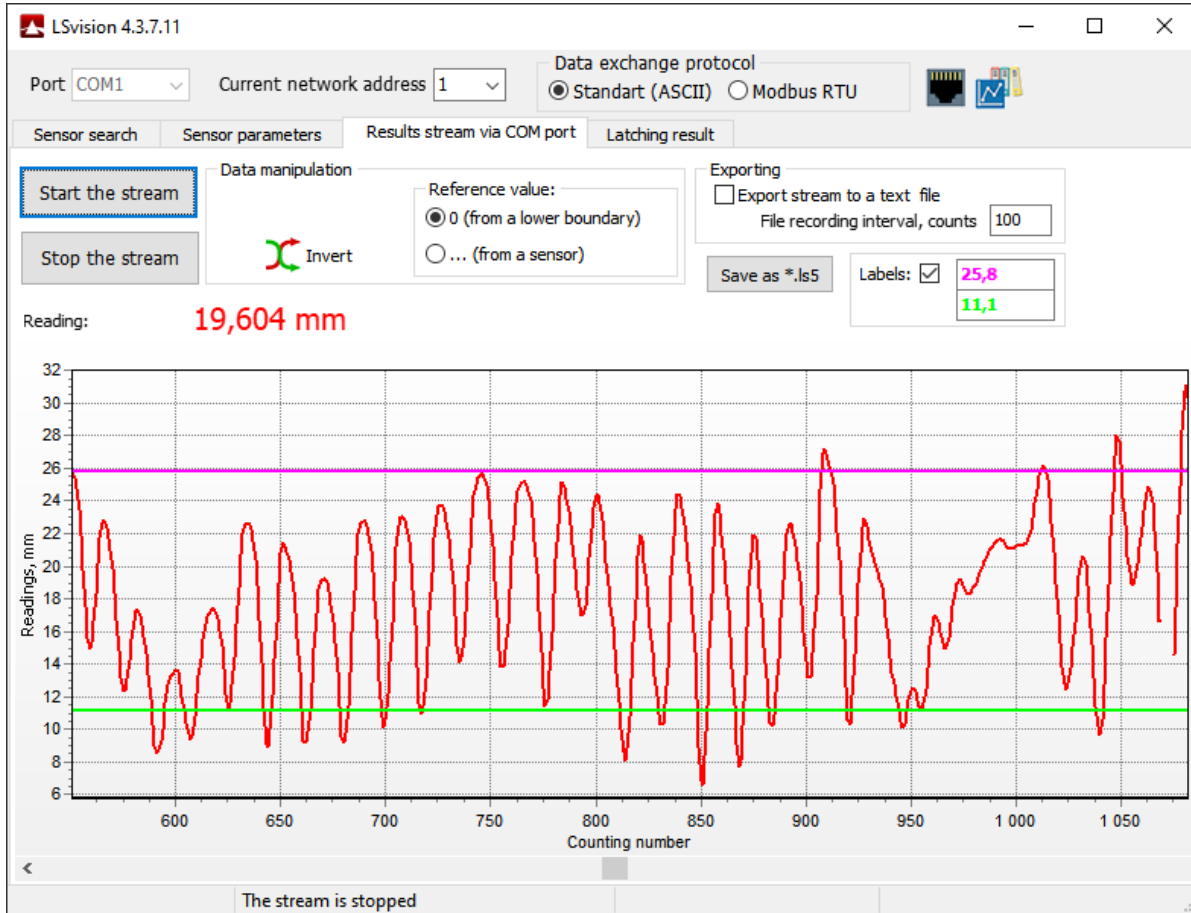

Figure 6.2 – Example of using labels at work with a chart

Labels are unchecked when «**Labels**» is unchecked. You can set, reset, or change labels either when the stream is running or when it is stopped.

6.1 Data manipulations

The «**Data manipulations**» area is used to set up the base distance of the sensor and changing the appearance (inverting) of the signal.

The base distance is the distance from the lower boundary of the sensor to the point that is considered to be the beginning of the measurement range, regardless of the value of the lower boundary of the sensor. The selection of the distance relative to which the sensor readings are provided is made in the «**Reference value**» area. For example, for a sensor lower boundary 50 mm and the measurement range 100 mm results will be read as follows:

In addition, the random base distance installation function is available when the results stream is running. To do this, set the sensor at the desired distance relative to the measurement object and

click the **«Zero the readings»** button. The set position of the sensor will be considered the beginning of the measurement range. In this case, the operating range can contain both positive and negative values.

> **Note**: If the sensor measurement results are out of range when the «**Zero the readings**» button is clicked, the first value that falls within the operating range will be taken as the zero point.

In some cases, inverting is used for better visual perception of the results or to use them in further calculations. It is performed by clicking the «**Invert**» button. The chart changes its colour.

6.2 Working with a chart

As it had been already mentioned, the program accumulates the received data. While receiving a stream, the chart automatically starts scrolling horizontally to facilitate perception if the number of received results exceeds 100 points (as shown in fig. 6.1). In addition, the chart automatically scales vertically.

While receiving a stream, manipulations with the chart are not available (except for setting labels). After the stream stops, the chart can be scaled and scrolled using the mouse buttons.

You can scroll the chart in the following way: hover the cursor over the chart area, right-click and move the cursor in the desired direction without releasing it, then release the button. Another way is to use the horizontal scroll bar.

The horizontal scroll bar appears on the chart when zooming only when the stream is stopped. The second way of scrolling can be convenient to find quickly the details on the chart with a large number of accumulated results.

Zoom is performed as follows: hover the cursor over the chart area and left-click. Moving the cursor to the lower-right corner of the place you are interested in, draw a rectangle. When you release the mouse button, the chart will appear at the scale that corresponds to the selection rectangle.

You can return to the original zoom level when the selection rectangle is drawn from the lower-right corner to the upper-left corner.

You can also use the cursor to view the value at a particular point on the chart. To do this, hover the cursor over the chart area, press the Shift, left-click and move the cursor closer to the desired point on the chart. A cross of dotted lines will appear showing the position of the point on the chart, and the area opposite the «**Reading**» label will display the value on the vertical axis in millimeters for this point (see fig. 6.3).
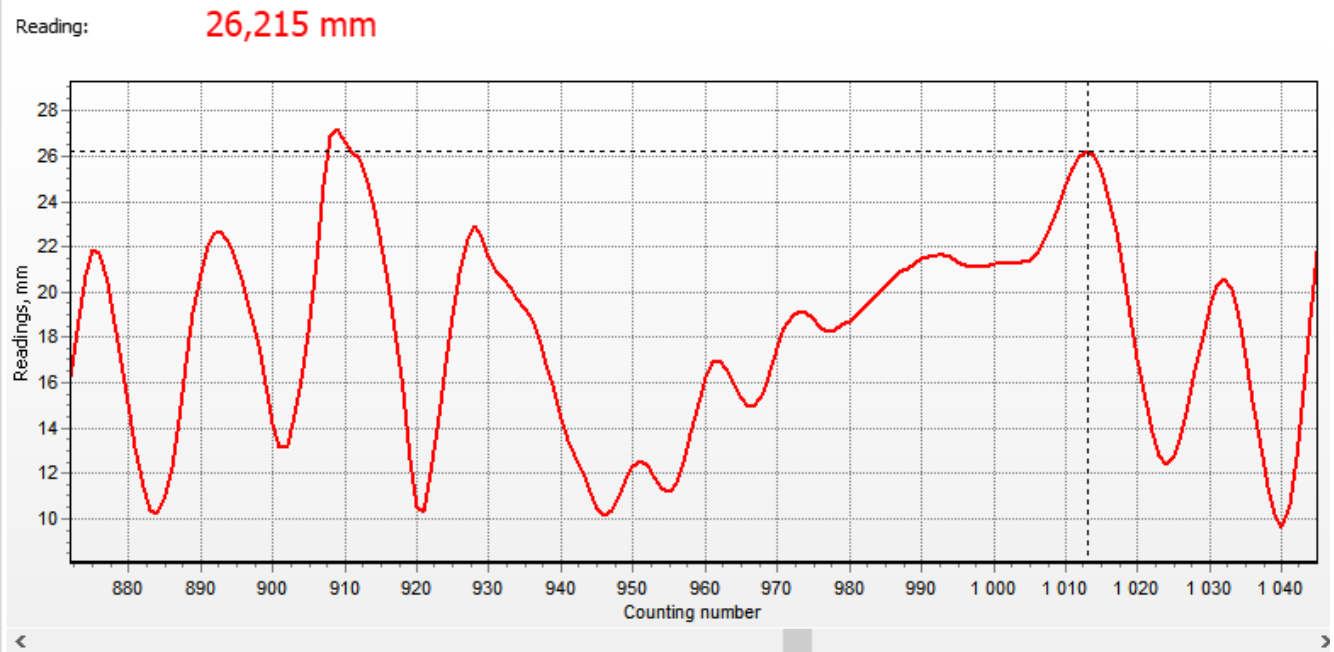
Reading: **26,215 mm**

Figure 6.3 – An example of a detailed view of the chart with the dotted lines cursor

6.3 Saving the results

6.3.1 Export a stream to a file

The LSvision soft allows you to dynamically (at the started stream) record the received data to a text file. To do it at the started stream, select the «**Export stream to a text file**» check mark on the «**Results stream via COM port**» tab (see the fig. 6.1) or in the «**Results stream via Ethernet**» window (see the fig. 7.1). When this option is selected, data will be written separately to the computer's RAM. When the check mark is removed or the stream is stopped, the recorded data is exported to a text file «Thread.txt» (when transmitting data via the COM port) or «ThreadEthernet.txt» (when transmitting over Ethernet). The specified files are placed in the directory (folder) from which the program was running. Recording occurs at the selected interval in counts (set in the input field «**File recording interval, counts**»), i.e. with the decimation through the desired amount of received data.

File structures «Thread.txt» and «ThreadEthernet.txt» are the same and contain a list of fractional numbers, for example:

```
550,908
551,496
557,52
571,332
567,672
563,904
570,816
563,028
572,664
573,708
574,044
```

Note: The interval for recording to a file does not affect the period when data is received from the sensor and the results chart.

At the end of the next write to the file, the previous file «Thread.txt» (or «ThreadEthernet.txt») is being erased.

6.3.2 Saving and viewing of charts

When you click «**Save as *.ls5**», the captured chart is saved to a file on disk in LSvision format. This file will be located in the «**Data**» folder with a name containing the date and time of the beginning and end of measurements. The chart can be saved both when the stream is running and when it is stopped.

To view previously saved charts, use the «**Working with saved readings**» button [icon] located in the upper-right part of the soft window. This button is available on any tab of the soft even if the sensors are not connected. When you click the button, the «**Working with saved readings**» window opens (see the fig. 6.4).
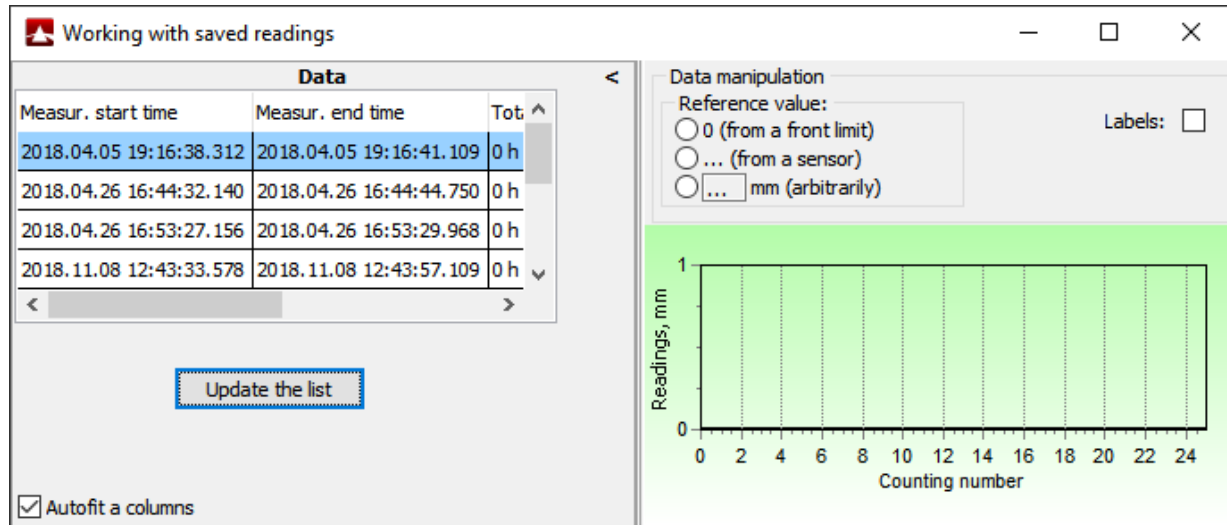

Figure 6.4 – The window «**Working with saved readings**» at the load

In the left part of the window there is a list of previously saved results, which contains the following information:

- measurement start time;
- measurement end time;
- total measurement time;
- a serial number of the sensor producing the measurement;
- lower boundary sensor producing the measurement;
- sensor range, producing the measurements;
- number of measurement points on the chart;
- comments to the saved schedule;
- path of the saved file location.

Ascending and descending sorting is available for each column of the table by a double left mouse button click.

To ease the viewing of the table, the «**Autofit a column**» check mark is used. If the check mark is removed, the width of each column is set by the width of its header; and by the width of the maximum content in this column, if it is set.

The «Update the list» button updates the list of saved charts and clears their plot area.

To view the selected chart double click the left mouse button on its name on the list. You can collapse a table with a list of saved results by clicking the «**<**» icon on the right above the table.

In the right part of the window, there is a saved chart plot area (see the fig. 6.5).
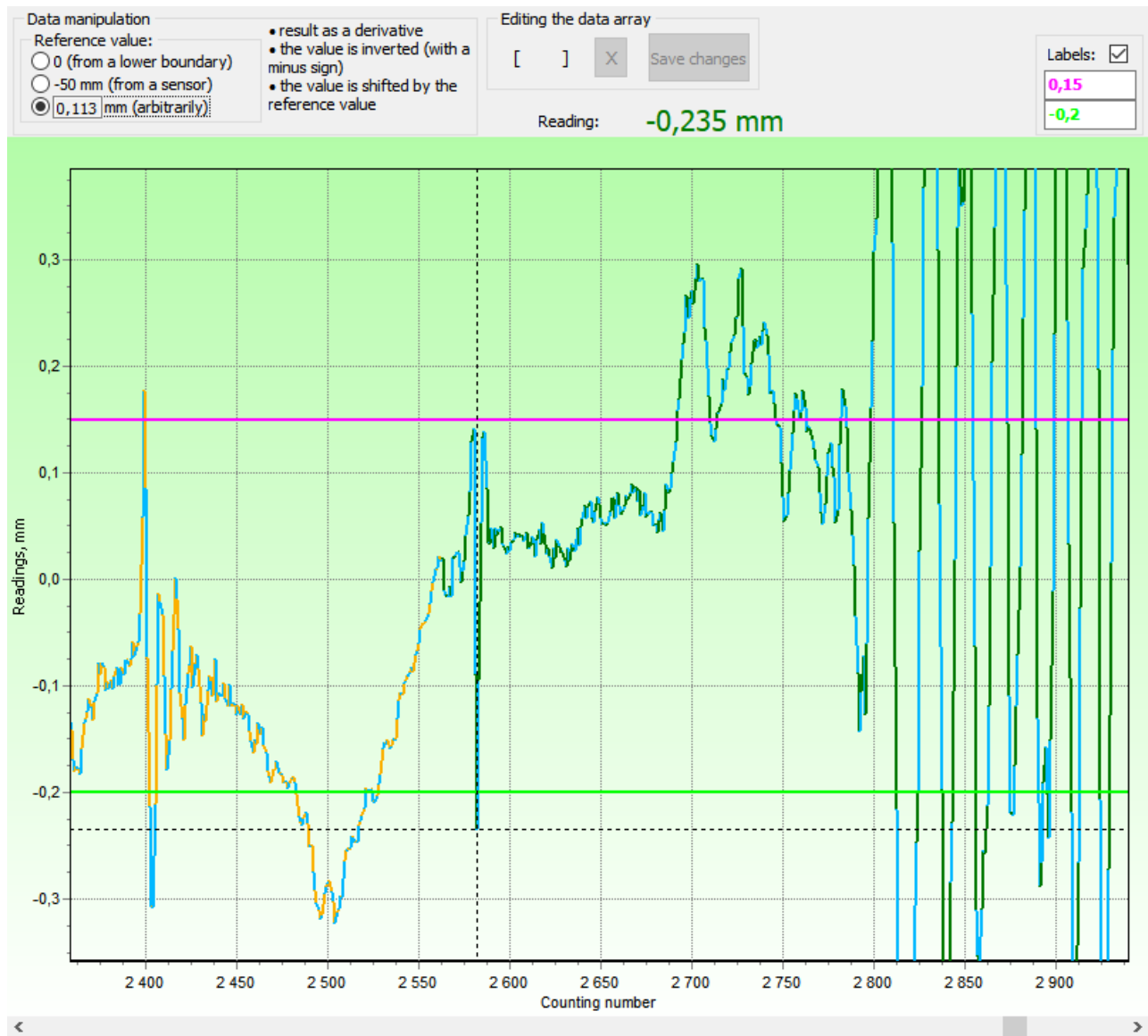

Figure 6.5 – Example of a viewport for a saved measurement results chart

Its appearance is similar to the chart area on the «**Results stream via COM port**» tab (see the fig. 6.1). For a detailed view of the measurement results see the p. 6.2. Label setting is also available.

The «**Data manipulations**» area contains the sensor base distance and a comment on the selected measurement point. For example, you can see in the attributes of the measurement point in the fig. 6.5 that the measurements were obtained in the mode of signal derivation when the «**Invert**» button was pressed (see the p. 6.1) at a distance of -0.235 mm from the set base distance of 0.113 mm.

The charts with measurement results can be edited by cutting off unnecessary parts.

To do it:

- click the «**[**» button in the «**Editing the data array**» area;

- left-click on the point on the chart where the section to delete starts. The part of the chart that is being deleted will change its colour (see the fig. 6.6, *a*);

- click the «**]**»;

- left-click on the endpoint of the section being deleted (see the fig. 6.6, *b*);

- click the «**×**» button in the «**Editing the data array**» area. In this case, the deleted section will disappear from the chart (see the fig. 6.6, *c*);

- click the «**Save changes**» button, if necessary.

- To cancel editing, double-click the chart name in the list or click the **«Update the list»** button.
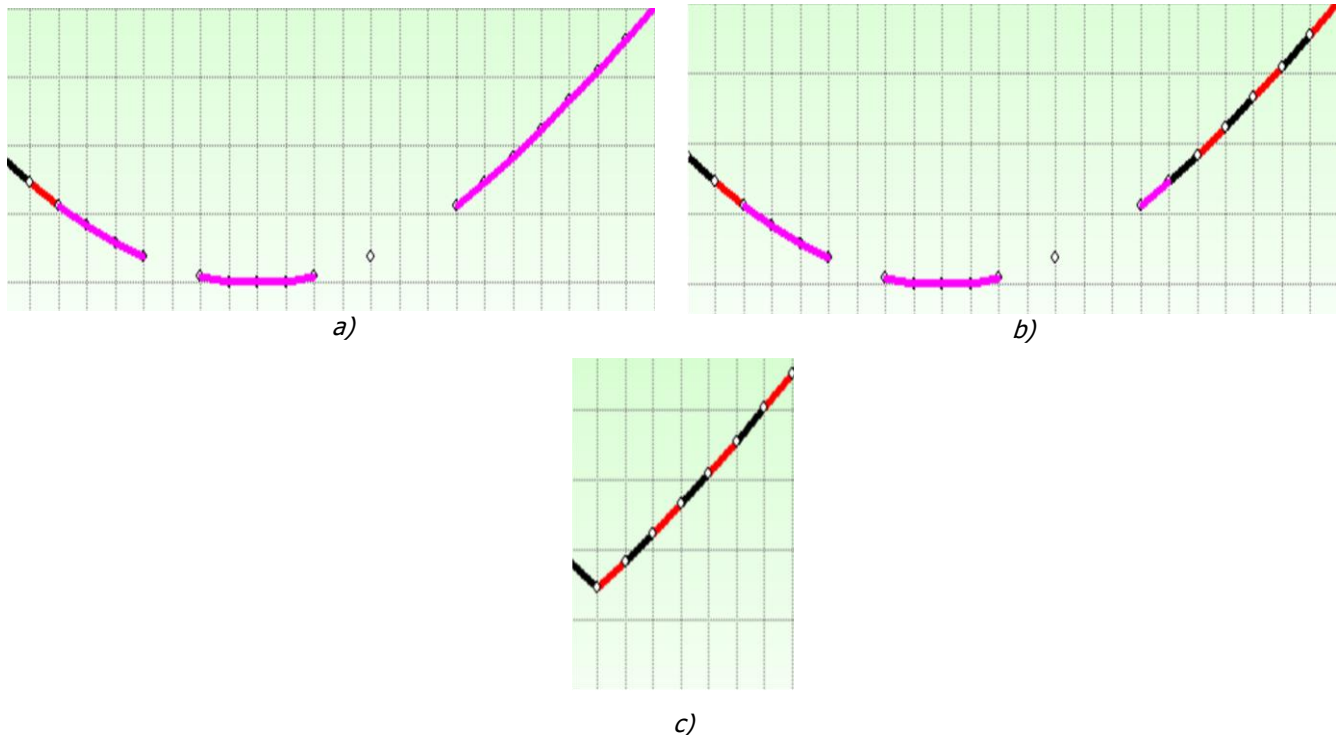

a)

b)

c)

Figure 6.6 – Example of editing a data array: *a* – select the initial border of the section of the chart that is being cut; *b* – define the final border of the chart section to be cut; *c* – edit the view of the data array

7. RECEIVING READINGS VIA ETHERNET

Starting from version LS5.12.0, sensors can receive readings via Ethernet. Only the measurement results can be transmitted via Ethernet; the sensor is searched for and its parameters are set via the COM port.

The sensor outputs measurement results only when the «**UDP data auto-stream**» check mark is selected (in the «**Ethernet Settings**» area of the «**Sensor parameters**» tab, see the fig. 5.3).

Contrary to the data stream through the COM port, no decimation is carried out when receiving data over Ethernet: the chart is based on each measurement made by the sensor. The output speed depends only on the measurement period, but not on the «**Coefficient of the data stream thinning, n**» parameter.

When you click the button , the «**Results Stream via Ethernet**» window opens (see the fig. 7.1).
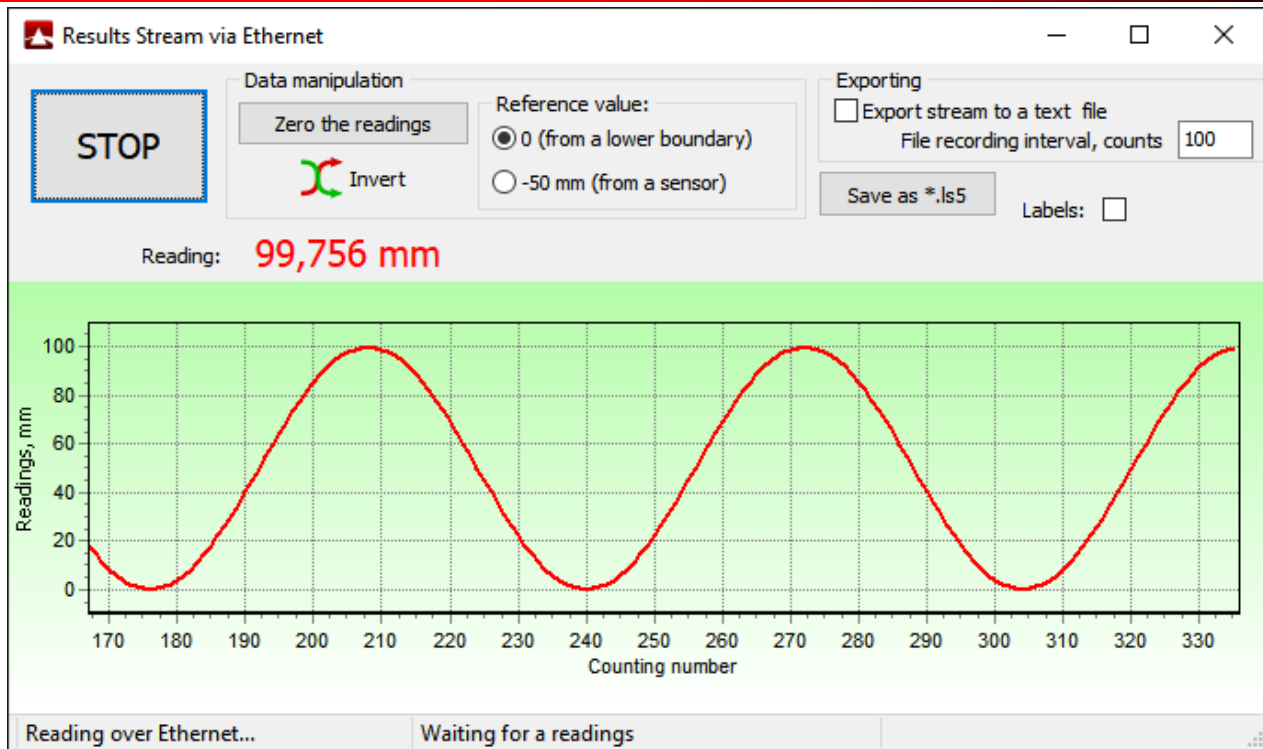
Figure 7.1 – The «**Results Stream via Ethernet**» window

Data reception is started by pressing the «**START**» button, and stop – by pressing the «**STOP**» button.

The functionality of this window repeats the functionality of the tab «**Results stream via COM port**» (see the p. 6).

Note: The stream is exported over the Ethernet into a text file «ThreadEthernet.txt».

8. «LATCH THE RESULT» AND «READ THE LAST RESULT»

The «**Latching result**» tab is used for reading single readings from one or more sensors[1].

Keep in mind that the «**Latch the result**», «**Read from latch**» and «**Read the last result**» buttons allow you to work with one sensor only (the address of which is indicated in the area near the «**Current network address**» label). The «**Latch all**» and «**Read all**» buttons allow you to work with several sensors (those that were found during the search, and whose addresses are in the drop-down list in the fig. 8.1).
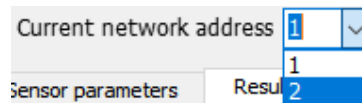

Figure 8.1 Example of an addresses list of the found sensors

When performing various reading and latching, all actions are recorded in the table shown in the fig. 8.2.

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[1] More information about the latching and reading the last result can be found in the sensors documentation: http://prizmasensors.ru/files/teh-ls5.pdf
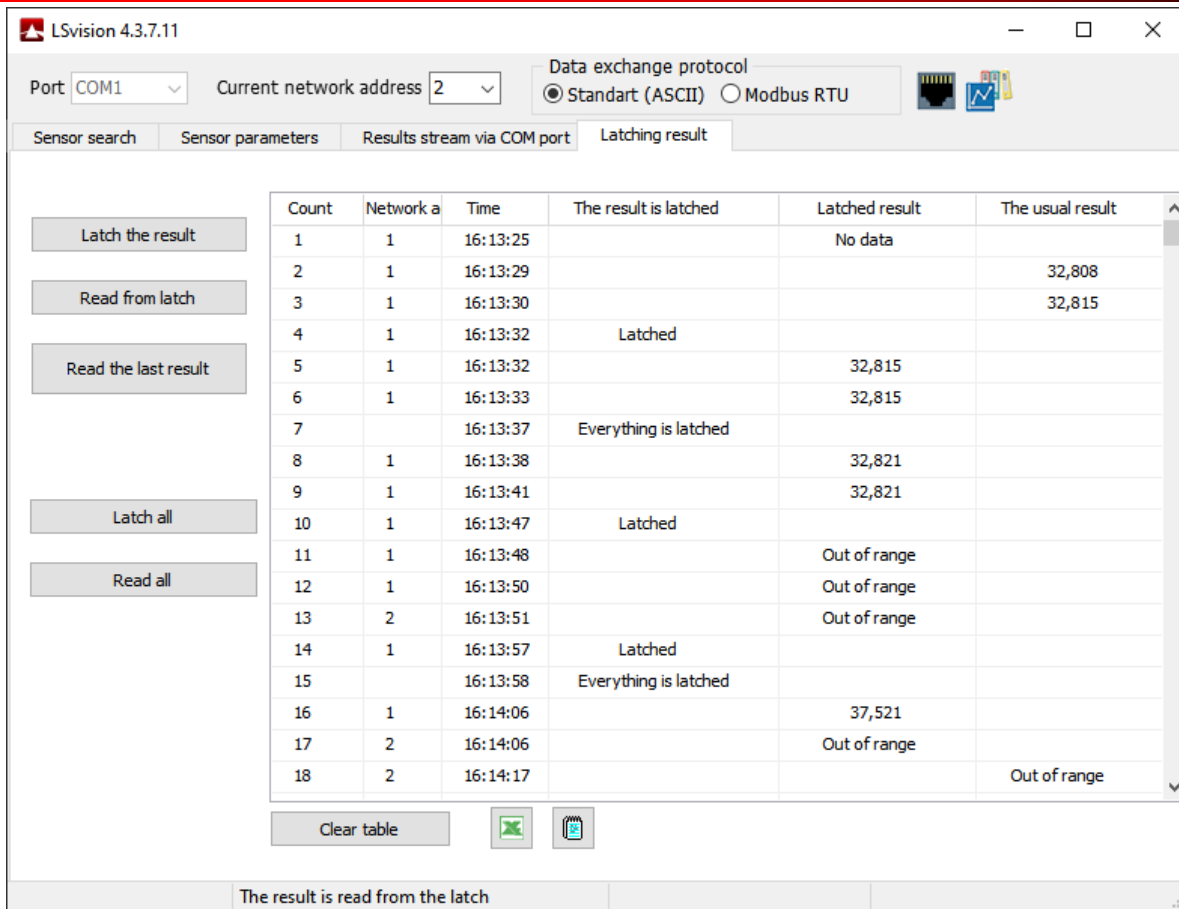
Figure 8.2 – Example of the soft work in the «**Latching result**» window

The «**Count**» column indicates the sequential number of the completed operation. The address of the sensor from which the response was received is in the «**Network address**» column. You can clear the table any time by clicking the «**Clear table**» button.

The button «**Latch the result**» is used to send the latch command to the sensor. After executing the command, the sensor sends a response to the soft, in the table (see the fig. 8.2) a line appears informing you of the response received from the sensor. «**The result is latched**» column will say «**Latched**». The «**Time**» column will indicate the time when the response from the sensor was received.

The «**Read from latch**» button is used to send the «**Read the latched result**» command to the sensor. After receiving this command, the sensor returns a response containing the value from the latch register. This value is written in the table, in the «**Latched result**» column. The «**Time**» column shows the time when the response from the sensor was received.

When the «**Read the last result**» button is clicked, the soft sends the «**Read the last result**» command to the sensor. The sensor then sends a response packet with the last measurement result. The response is also recorded in the table. Moreover, the «**Time**» column shows the time when the response from the sensor arrived, and «**The usual result**» column shows the value transmitted by the sensor.

> **Note**: The values of the measurement results are displayed in millimeters, regarding to the lower boundary of the sensor.

The «**Latch all**» button initiates sending the global «**Latch the result**» command. When this command is received, each sensor executes it, regardless its address. However, the sensor does not send a response. In the table in the fig. 8.2 in the «**The result is latched**» column, the label «**Everything is latched**» appears, and in the «**Time**» column, the time when the button was clicked is written.

The «**Read all**» button is used to automatically read the latched results from each sensor (almost the same as the «**Read from latch**» button). The soft sends commands to «**Read the latched result**» to each sensor and waits for a response. In the table, a result bar appears after each received response from each sensor (the address of the sensor from which the response was received is written in the «**Network address**» column; the value of the measurement result of the corresponding sensor is written in the «**Latched result**» column).

> **Note**: The result latching mode can be used in a multi-sensor system that requires synchronous measurements (for example, in a thickness gauge, internal diameter meter, etc.). You should use the «**Latch all**» and «**Read all**» buttons.

8.1 Exporting a table

The soft allows you to export a table from the «**Latching result**» tab into a text file or Excel program.

Click 🗒 to convert the table into a text file. The data is saved in a file «Report.txt», located in the directory (folder) from which the soft was running.

The example of the contents of the file «Report.txt»:

```
Count;Network address;Time;The result is latched;Latched result;The usual result;
1;1;16:13:25;;No data;;
2;1;16:13:29;;;32,808;
3;1;16:13:30;;;32,815;
4;1;16:13:32;Latched;;;
5;1;16:13:32;;32,815;;
6;1;16:13:33;;32,815;;
7;;16:13:37;Everything is latched;;;
8;1;16:13:38;;32,821;;
9;1;16:13:41;;32,821;;
10;1;16:13:47;Latched;;;
11;1;16:13:48;;Out of range;;
12;1;16:13:50;;Out of range;;
13;2;16:13:51;;Out of range;;
14;1;16:13:57;Latched;;;
15;;16:13:58;Everything is latched;;;
16;1;16:14:06;;37,521;;
17;2;16:14:06;;Out of range;;
18;2;16:14:17;;;Out of range;
```

To export the table into Excel, click the button 📊 . The data is transmitted as shown in the fig. 8.3.

	A	B	C	D	E	F
1	Count	Network address	Time	The result is latched	Latched result	The usual result
2	1	1	16:13:25		No data	
3	2	1	16:13:29			32,808
4	3	1	16:13:30			32,815
5	4	1	16:13:32	Latched		
6	5	1	16:13:32		32,815	
7	6	1	16:13:33		32,815	
8	7		16:13:37	Everything is latched		
9	8	1	16:13:38		32,821	
10	9	1	16:13:41		32,821	
11	10	1	16:13:47	Latched		
12	11	1	16:13:48		Out of range	
13	12	1	16:13:50		Out of range	
14	13	2	16:13:51		Out of range	
15	14	1	16:13:57	Latched		
16	15		16:13:58	Everything is latched		
17	16	1	16:14:06		37,521	
18	17	2	16:14:06		Out of range	
19	18	2	16:14:17			Out of range

Figure 8.3 – The example of exporting a table to Excel.

9. SAVING THE SOFT WINDOW PARAMETERS

When you close the soft the main settings window is stored in the file «Settings.ini»: position and size of the window, the COM port for the work with the sensors, the upper search limit, interval for recording to a file, the output settings result in the stream, state and value labels of the chart. The «Settings.ini» file is generated in the same directory (folder) as the soft. If you delete this file, the default settings of the soft window will be restored.

10. POSSIBLE PROBLEMS WITH THE SOFT AND SENSORS

10.1 Sensor response interval exceeded

Problem

When using elements of the LSvision soft that initiate sending a request to the sensor and a response wait, the message shown in fig. 10.1 is possible.
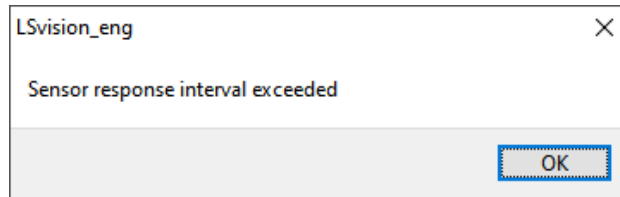

Figure 10.1 – The message about sensor response interval exceeded

This message appears if the soft did not receive a correct response from the sensor to any request within the allotted time. The response packet may be lost or damaged due to communication line failures, sensor power failure, or unexpected sensor failures.

Possible solutions

1. Repeat the last operation (click the button again).
2. Check the power supply of the sensor (turn it off and on, if possible).
3. Make sure that the communication line is complete and coordinated correctly.
4. Reduce the baud rate in the sensor settings.

10.2 Search for sensors when the stream is launched

Problem

Problems at searching for sensors can occur if one of them is producing a stream (actively using the transmission line) at the time of the search. In this case, the following happens:

1) when you click the «**Find sensors**» button, the address space is scanned;
2) the process status indicator (Progress Bar) reaches 100% (the green bar at the bottom of the program window);
3) the message shown in the fig. 10.1 may appear;
4) the status bar displays the following message: «**Search completed: search error**» (see the fig. 10.2). If the data stream is not stopped, you may also see the «**Data receive error**» inscription in the status bar.

Figure 10.2 – View of the software window in case of an error when searching for sensors

Possible solutions

1. Click the «**Find sensors**» button again (the first time you searched, the sensor that «clogged» the line should have received a packet and stopped sending it to the stream).

2. Turn off and turn on the power of the sensors. Repeat the search.

10.3 The sensor was not found by the software

Problem

After clicking the «**Find sensors**» button, the message «**Search completed: not found**» appears in the status bar. The list of found sensors remains empty.

Possible solutions

1. Check the power supply of the sensors and the integrity of the communication line.

2. In the «**Upper search limit (2-255)**» field, enter the value 255 and repeat the Sensor search. Although this search takes a long time over the entire range of addresses, it is possible to reliably determine the fault: either the network address of the sensor is lost for some reason, but the sensor still communicates, or communication with the sensor is impossible (a physical fault).

3. Enter a value of 40 or more in the «**Search delay**» area. Repeat the Sensor search.

10.4 Program hang-up

Problem

When the program hangs up, it stops responding to button clicks. The message «**Not Responding**» may appear in the window title, and the cursor may look like an hourglass or wheel (see the fig. 10.3). It indicates that there was an irreparable software error.
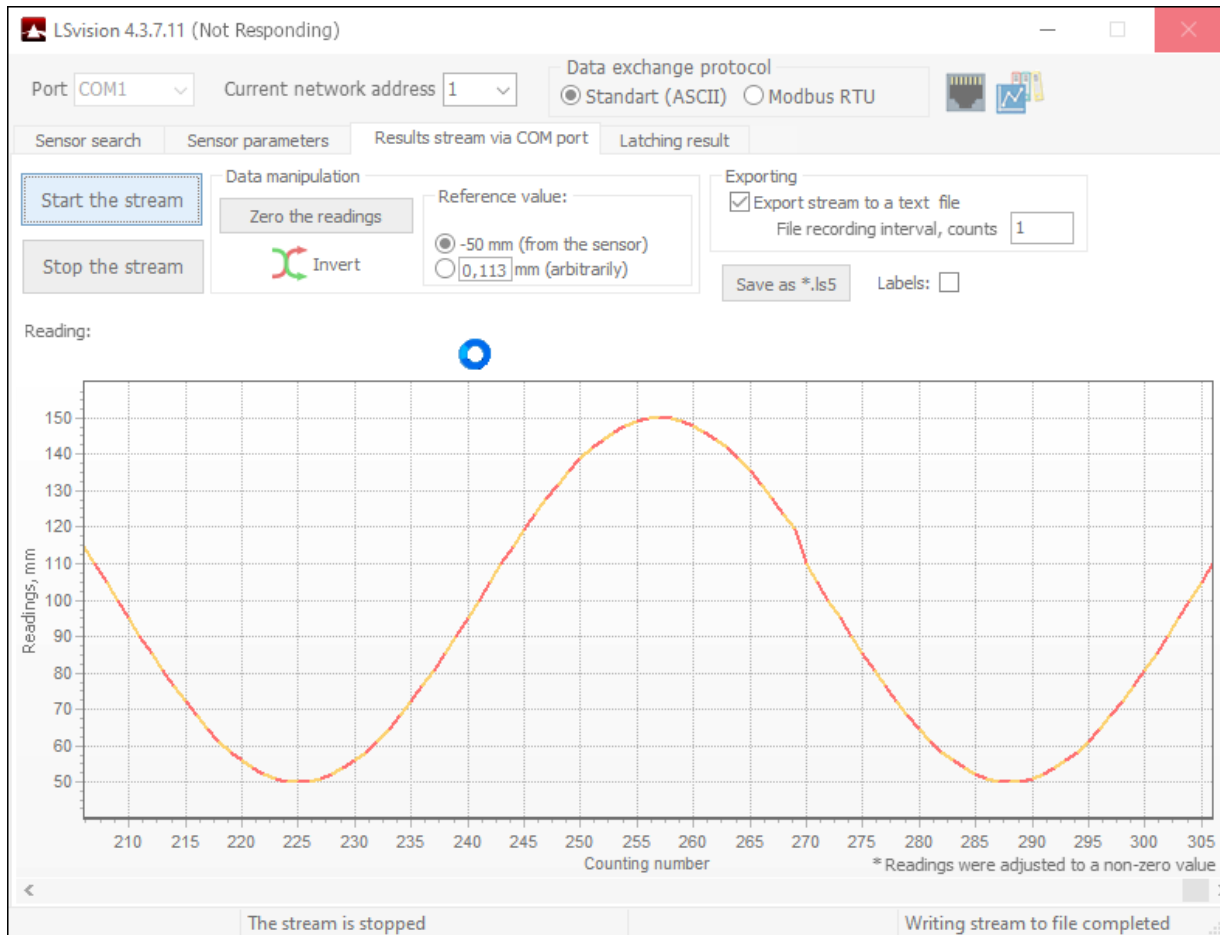

Figure 10.3 –The view of the window when the LSvision soft hangs up, obtained when the stream fails to stop

Keep in mind that some controls (such as buttons) are specifically made inactive (non-removable) to prevent unexpected errors in the program. For example, when you start the program, you can only use the «**Sensor search**» tab (items on other tabs will be unavailable); when you start the stream, you can only work on the «**Results stream via COM port**» tab.

Possible solutions

Close the program and launch it again.

If you can't close the program by clicking the cross in the upper-right corner of the window, you should use the «Task Manager» (possible in the Windows operating system). To do this, right-click on the taskbar (always present on the screen bottom bar), in the menu that appears, select the «Task manager» (you can use the keyboard shortcut «**Ctrl** + **Shift** + **Escape**»). In the window that appears on the «Processes» tab, select the line «LSvision...» and click «Disable task». (see the fig. 10.4).
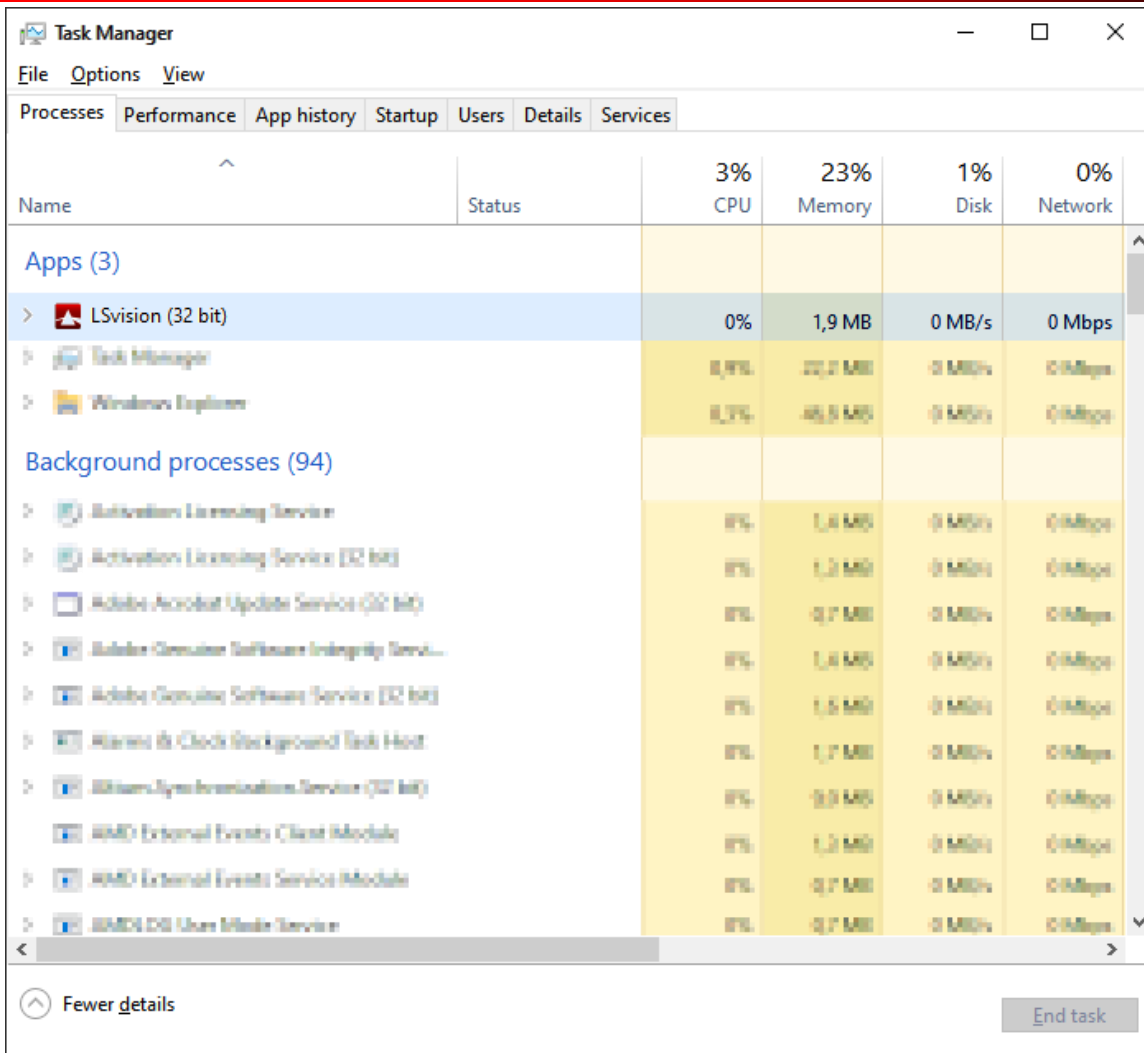
Figure 10.4 – Shutting down the LSvision program using the «Task manager»

If the software doesn't close, there may be problems with the COM port settings. In this case, remove the adapter (if used) from the USB socket and insert it back. It allows you to redefine the virtual COM port in the system. In some cases, restart the computer.