Application Note

AN2018

D-Series

Moving target characteristic with RS-422

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Abstract

This application note describes how to use the Moving Target measurement characteristic. This measurement characteristics is suitable for fast and precise distance measurements of continuously moving targets. As communication interface the RS-422 is used.

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1 Introduction

Different measurement characteristics are implemented on the D-Series laser distance sensors. These measurement characteristics provide the necessary flexibility to configure the sensors for various applications.

This document describes the configuration and connection of the D-Series laser distance sensors for the use with the "Moving Target" characteristic and the RS-422 interface. While this document provides step by step configuration instructions, the Technical Reference Manual gives a more detailed description (see www.dimetix.com).

Depending on the selected D-Series sensor type and the used communication interface, measurement speeds of up to 250 Hz (1 kHz output rate) are possible with the "Moving Target" characteristics. With the RS422 Interface the maximum output rate is limited to 250 Hz.

Compared with the "Fast" measurement characteristics the "Moving Target" characteristics provides additional accuracy at 250 Hz. But it must be kept in mind, that the "Moving Target" characteristics is optimized for continuous movements and there for it is not suitable, if distance jumps might occur.

The baud rate must be set to 115'200 baud to be able to transfer the measurement results with a speed of 250 Hz. If the baud rate is set to a lower value, the output rate will be reduced.

1.1 Fast position monitoring

Figure 1 shows a possible application for the "Moving Target" characteristic.

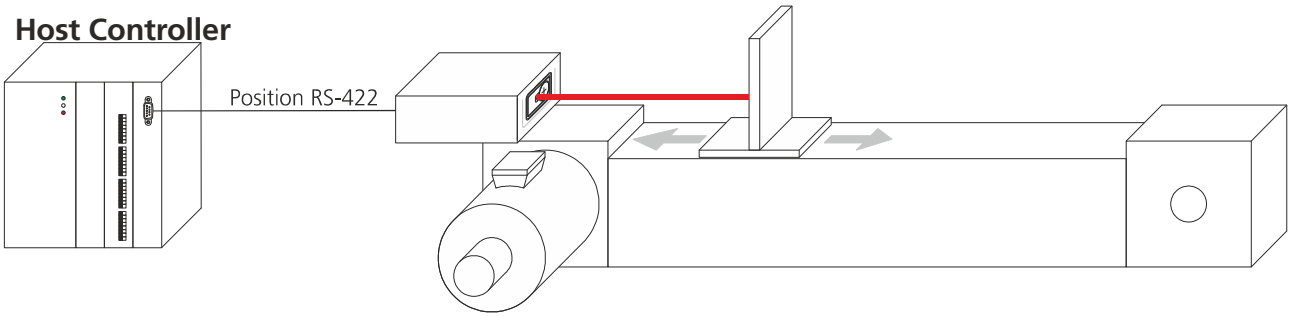

Fig. 1: Position monitoring

Ensure that no distance jumps occur in order to use the "Moving Target" characteristic.

1.2 Usable sensors

Except for the DBx-xx-xxx sensor types all D-Series sensors support the "Moving Target" characteristics. Check the Technical Reference Manual of the D-Series for measurement speed and accuracy specifications.

2 Preparation

1) The following items are needed to configure the sensor.

   USB Mini type B cable

   24V DC power supply

2) Download the Laser Sensor Utility software from the website https://dimetix.com/en/products/software/ and install it on a PC.

3) Connect the sensor to the PC and to the 24V DC Power supply as shown in Fig 2.

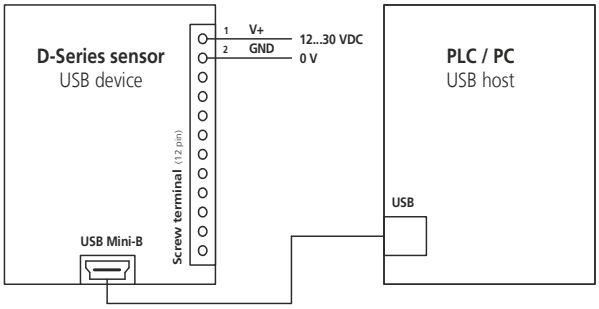

Fig. 2: Configuration connection

4) Start the Laser Sensor Utility software on the PC.

2.1 Reset of D-Series sensor

Before proceeding, it is recommended to reset the sensor to its factory defaults. But keep in mind that all previously done settings will be lost when performing a factory reset.

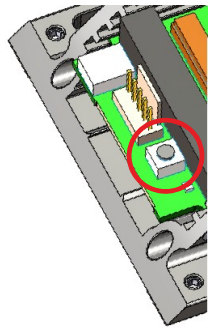

Fig. 3: Reset push button

1) Switch off the power supply used for the device
2) Press the reset push button and keep it pressed
3) Switch on the power supply used for the device
4) Keep the reset push button pressed until all status LED's (POWER, ERROR, DO1, DO2) flash for a short time (about 0.5 seconds)
5) Release the reset push button
6) Switch off the power supply and wait 5 seconds
7) Switch on the power supply and wait until the green status LED (POWER) is on.
8) Reset procedure executed successfully

2.2 Connection of Laser Sensor Utility with D-Series sensor

The USB configuration interface is handled as a virtual COM port and is therefore accessed over its COM Port number like any other serial interface. In this example the USB port no. is COM3. On your PC the port number might be different. After factory reset of the D-Series sensor the port setting are: 19200 Baud, 7 data bits, parity even and device ID 0.

After start-up of the Laser Sensor Utility software the window shown in figure 4 is visible. Set the "Communication parameters" corresponding to the default settings mentioned above and press the "CHECK CONNECTION" button.

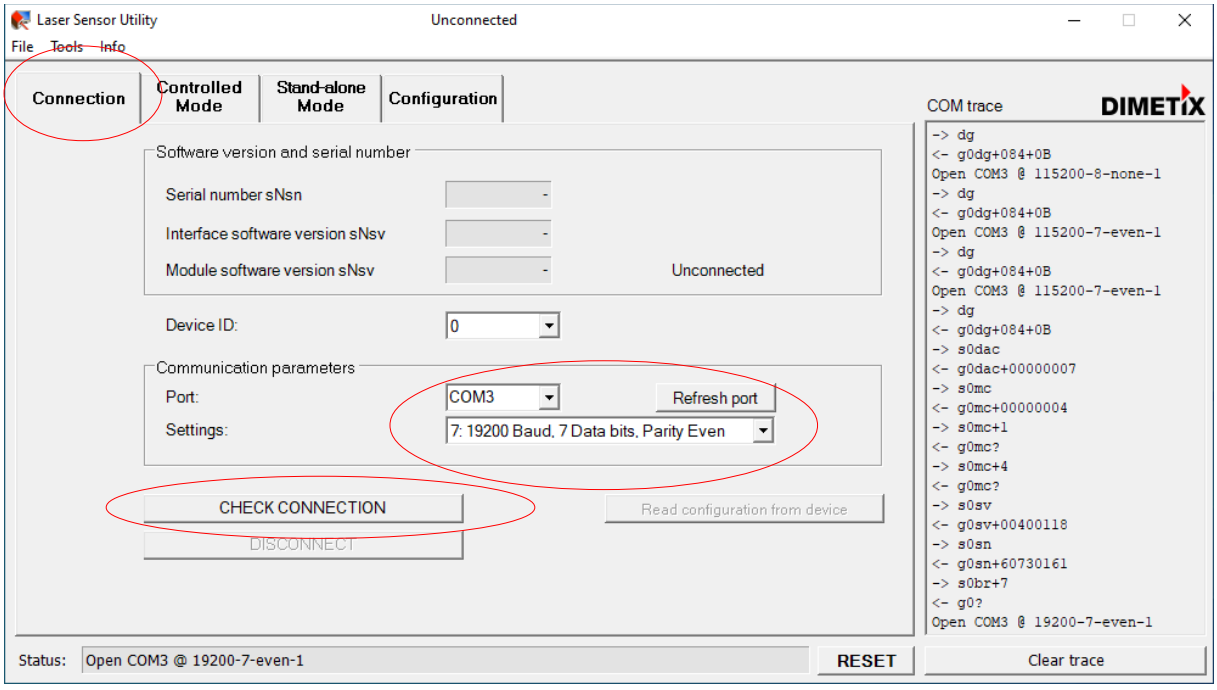

Fig. 4: Start window Laser sensor utility software

After the Laser Sensor Utility software connected successfully to the sensor, the "Software version and serial number" section is updated as shown in figure 5. Further the "Status:" field at the bottom will show "OK".

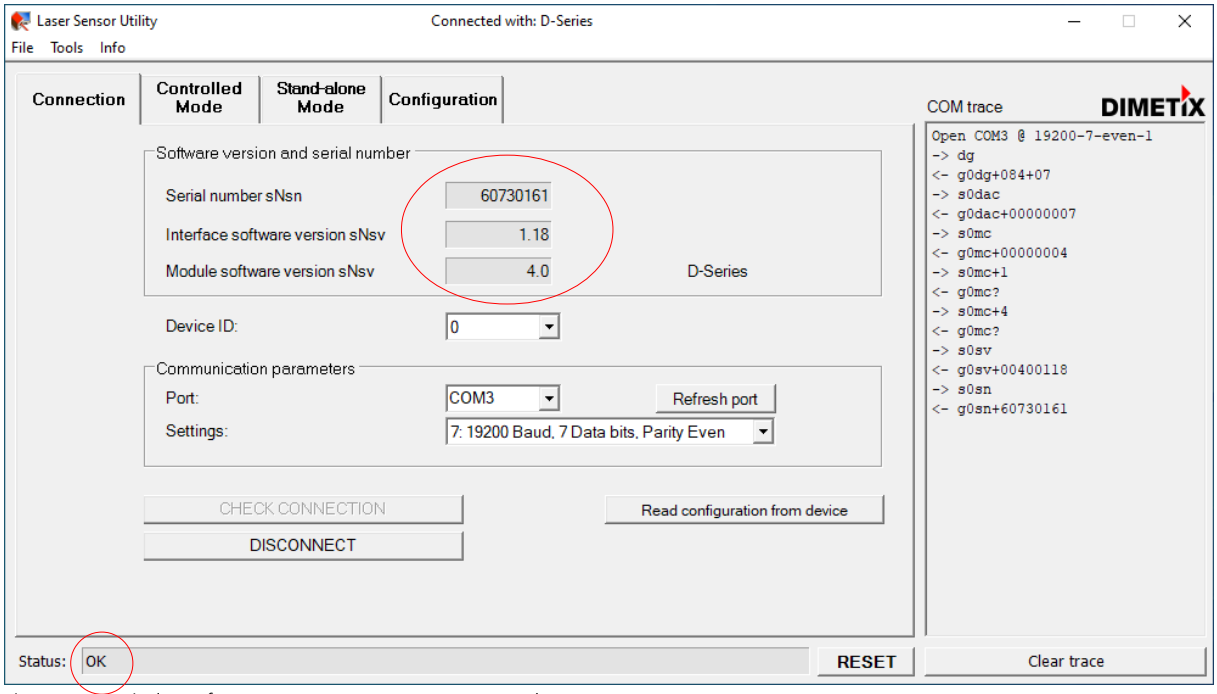

Fig. 5: Start window after "CHECK CONNECTION" procedure

3 Measurement characteristic configuration

Activate the "Moving Target" characteristic to be able to measure with 250 Hz. To do so, select the "Configuration" tab, then select the "Measurement characteristic" sub tab on the left, check "Moving Target" and press the "DOWNLOAD TO DEVICE" button. figure 6 shows the mentioned settings.

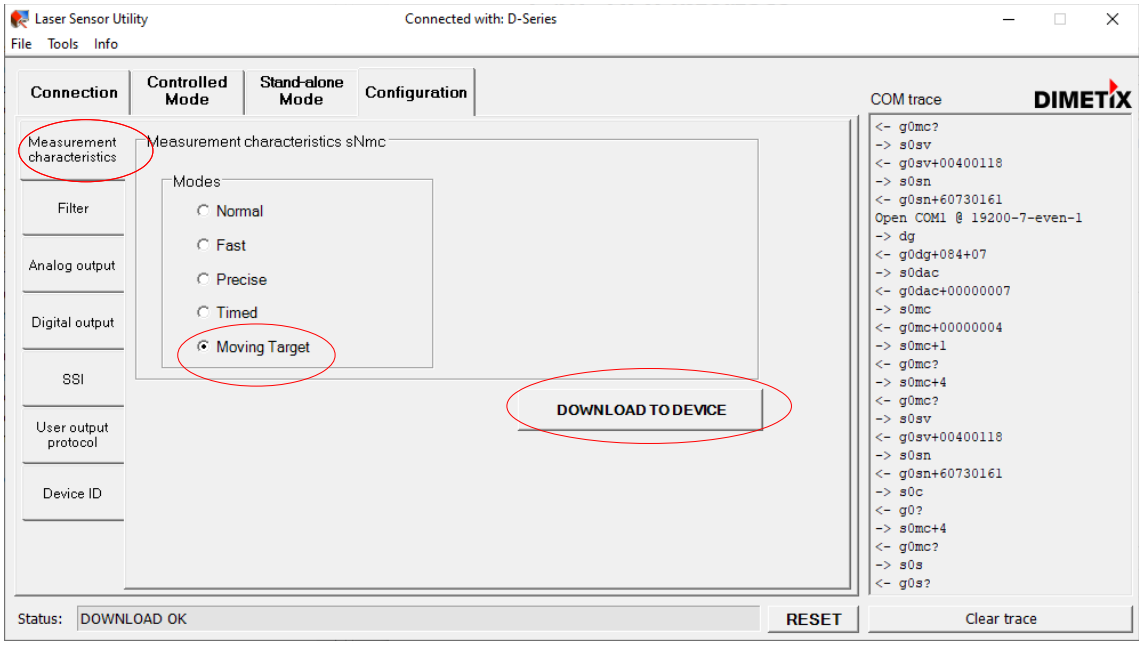

Fig. 6: Configuration of the "Moving target" characteristic

4 Interface setup

4.1 General

While the sensor measures in "Moving Target characteristic the measured distances are available on all interfaces. The following example shows the use of the RS-422 interface.

4.2 RS-422

The RS-422 is designed to connect multiple sensors to one line. Therefore the sensor can not send measurement results autonomously. However the "Single Sensor tracking" sends the measurement results automatically to the RS-422 interface. Please see 5 Measurement mode later in this document.

For this example, do not connect more than one device to the RS-422 line.

4.2.1 Configuration of the RS-422

On the "Configuration" tab, select the "SSI" sub tab on the left. In the "4-pole serial port usage sNSSI" area select RS-422 to activate the RS-422 interface and deactivate the SSI interface as shown in figure 7. After configuring all options press the "DOWNLOAD TO DEVICE" button to save the settings on the sensor.

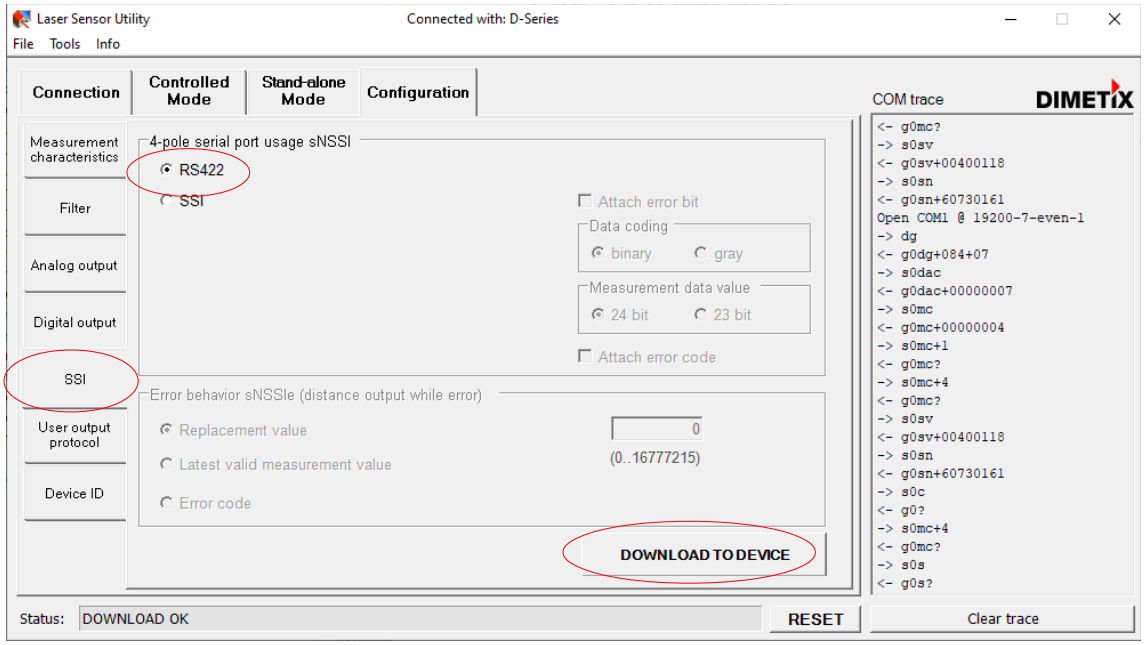

Fig. 7: RS-422 configuration

To be able to transfer the measurement result with a sufficient speed, the baud rate must be set to 115'200 baud. Select the "Connection" tab as shown in figure 8. In the "Communication parameters" section change "Settings" to "11: 115200 Baud, 7 Data bits, Parity Even".

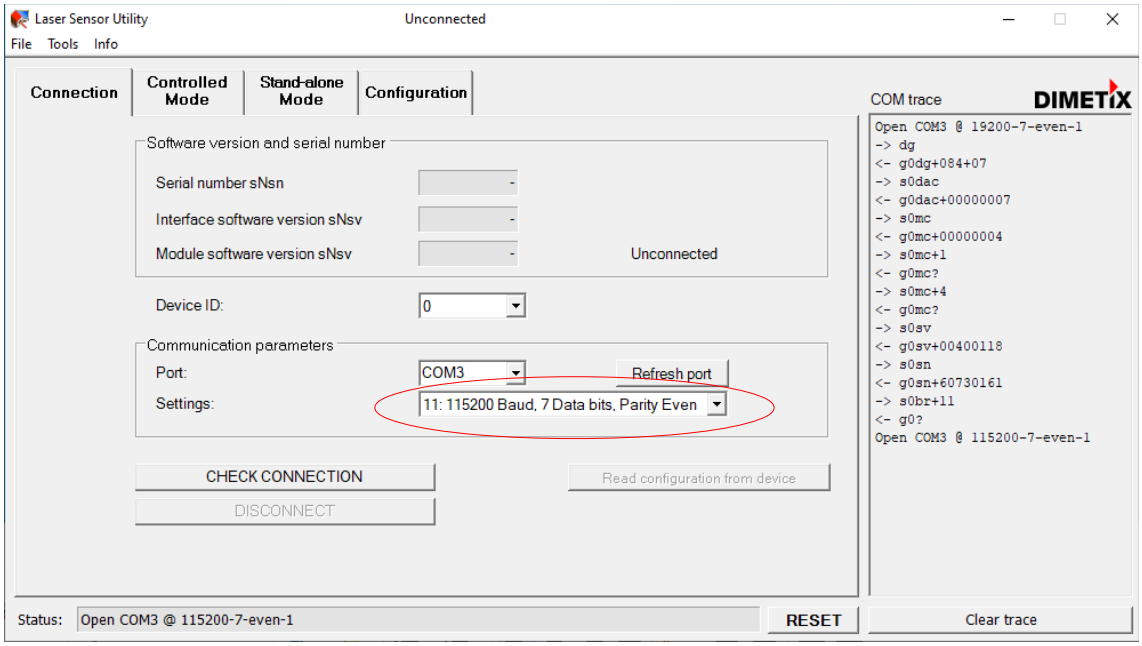

Fig. 8: Change the baud rate with the Laser Sensor Utility software

The Laser Sensor Utility software shows the window as in figure 9. Press "Yes" to confirm, that the baud rate of the sensor should also be changed.

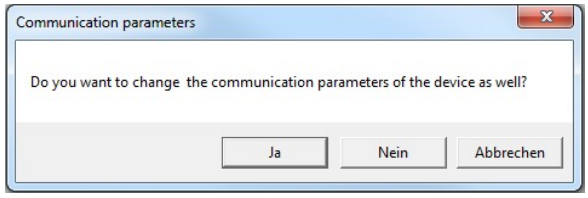

Fig. 9: Change communication parameters

Additional warning windows (Figure 10 and figure 11) pop up. Press "OK" until the process is finished

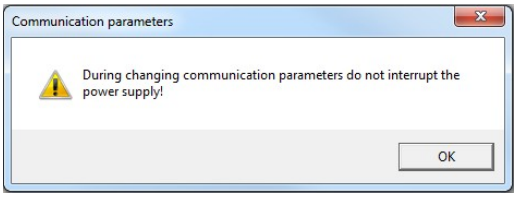

Fig. 10: Do not disconnect the power

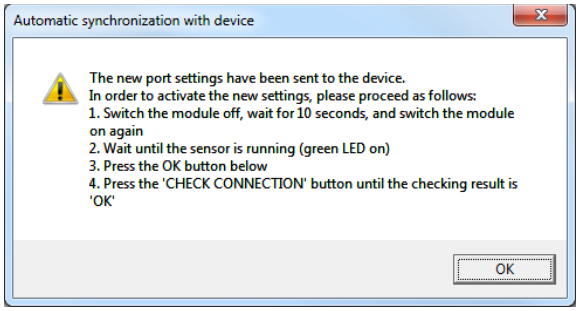

Fig. 11: Restart the sensor

Restart (Power off and on) the sensor as advised in figure 11 to activate the new baud rate settings.

4.2.2 Wiring

Connect the sensor to a host as shown in figure 12. Do not connect multiple sensors to the RS-422 interface.

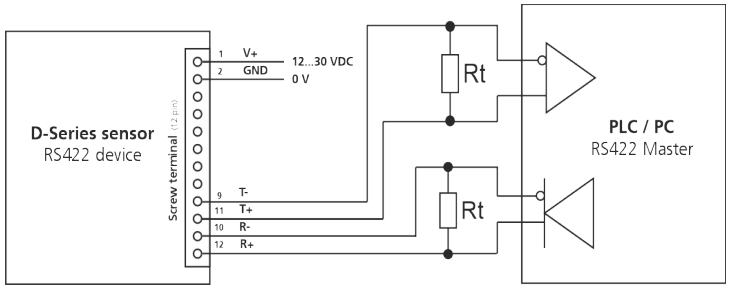

Fig. 12: RS-422 single sensor connection

5 Measurement mode

After configuring the measurement characteristic and the interfaces, the "Start for the measurement" must be configured. The table below outlines the two different possibilities.

Controlled mode	***Manual start***
The measurement of the sensor is controlled with commands from the host. No special configuration is necessary.	The sensor is configured to start measuring depending on the signal on the digital input.

5.1 Controlled mode

In controlled mode, the host sends the corresponding command to start and stop the measurement. The table below outlines the command sequence to start and stop the measurement.

No.	***Action***	***Comment***	***Command (Device ID = 0)***
1	Set controlled mode	Set the sensor to controlled mode, if not already in controlled mode.	`s0c<trm>`[1)]
2	Start single sensor tracking	Start the measurement.	`s0h<trm>`[1)]
3	Stop the measurement	Stop the measurement.	`s0c<trm>`[1)]

The Laser Sensor Utility software can also be used as terminal to send commands to the sensor. You may follow the steps below to start the measurement and to stop it later.

In the Laser Sensor Utility software select the menu "Tools\Manual command input" as shown in figure 13

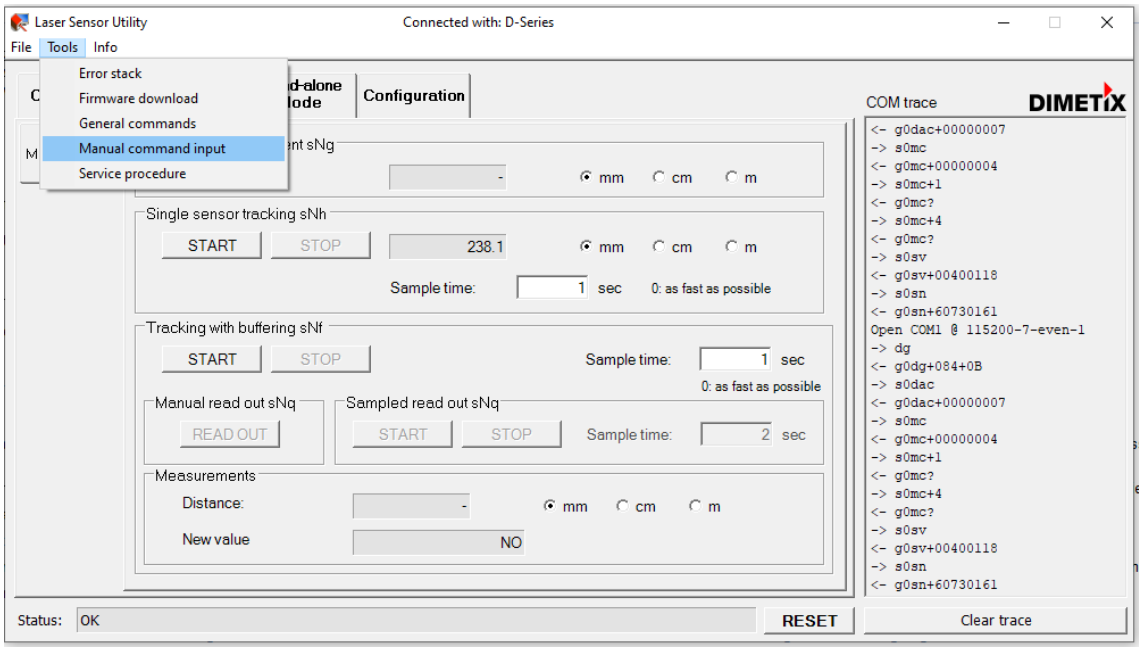

Fig. 13: Manual command input

Figure 14 shows the "Manual command input" window. Enter the commands in the input field at the bottom of the window and press enter to execute the command. All executed commands will be displayed in the "Command history" at the right side of the window. The figure shows the window after the command `s0c` and `s0h` are executed. The "COM trace" shows the measurement results of the sensor.

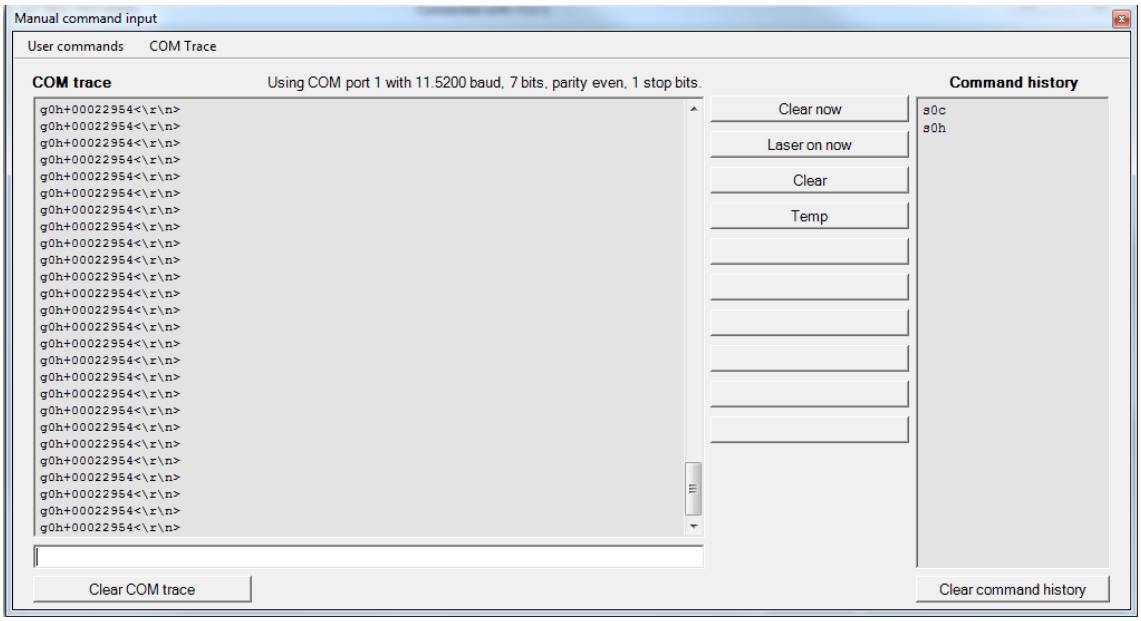

Fig. 14: Manual command input

Figure 15 shows the "Manual command input" window after the stop command `s0c` was executed. The measurement is now stopped.

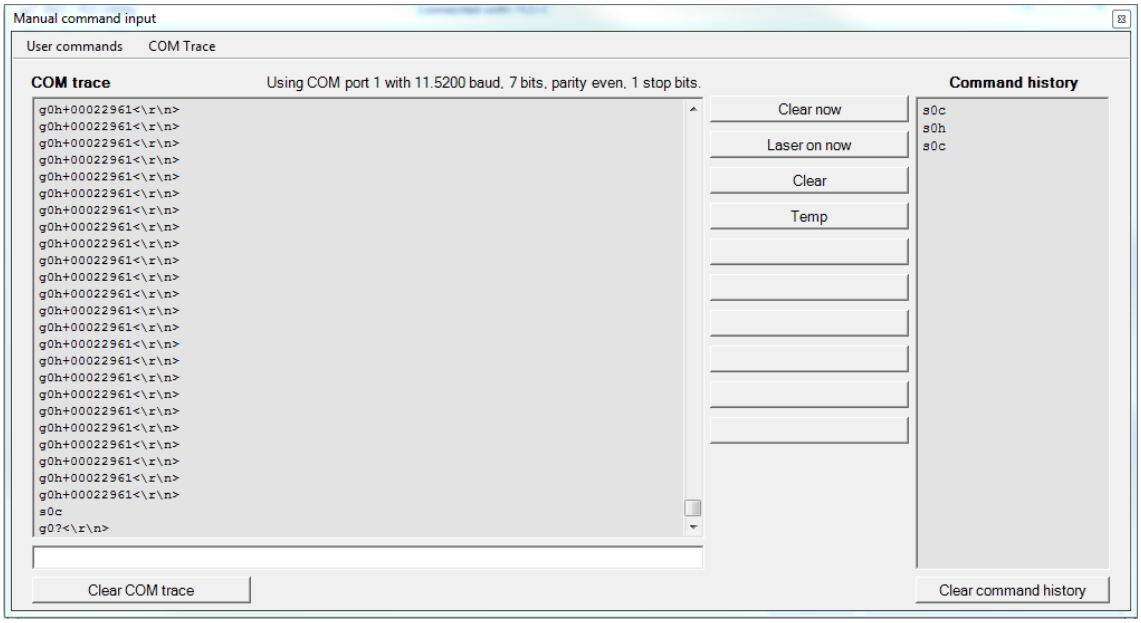

Fig. 15: Manual command input after stop command

5.2 Manual start

In Manual start operation, the measurement is controlled by the digital input of the sensor. The function of the digital input can be configured with the Laser Sensor Utility software as shown in figure 16.

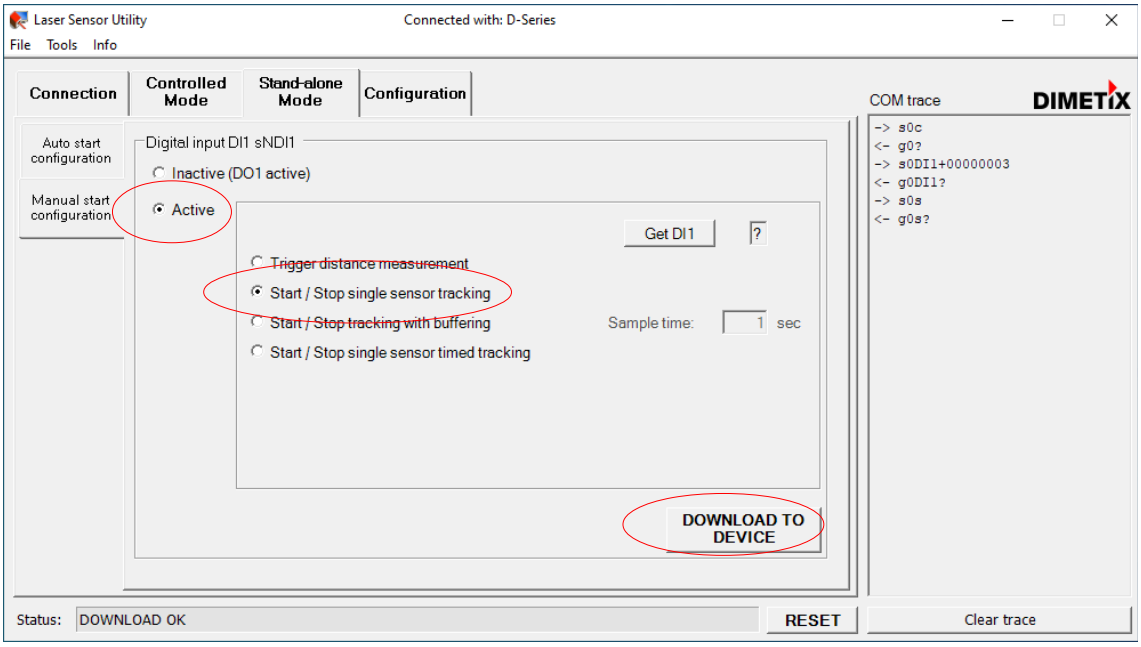

Fig. 16: Manual start configuration (Digital input)

On the "Stand-alone Mode" tab, select the sub tab "Manual start configuration", select "Active" in the "Digital input DI1 sNDI1" area. Additionally select "Start / Stop single sensor tracking". Then press the "DOWNLOAD TO DEVICE" button. Now the sensor starts measuring when the digital input goes to high level and stops measuring if the digital input goes to low level.

5.2.1 Digital input connection

After the digital input is configured and connected as shown in figure 17. The measurement of the sensor can be controlled with an external switch or relays.

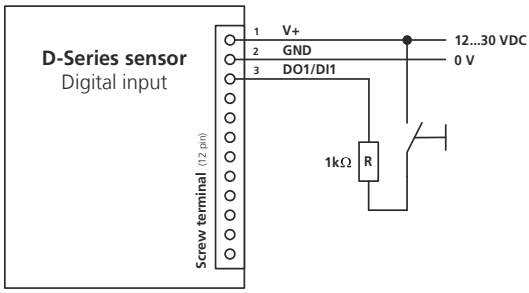

Fig. 17: Digital input wiring