Application Note

AN2006

D-Series

Timed measurement characteristic example

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Abstract

The D-Series laser distance sensor offers configuration possibilities for fix timed measurements. This application note gives some configuration examples and describe the specialties of the timed measurement characteristic.

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1 Introduction

1.1 Measurement

In normal configuration, the D-Series laser distance sensor adjust the measuring rate depending on the signal conditions to ensure the measurement accuracy. This means, bad targets (dark surface) led to long measurement times while good targets (white or reflecting) led to short measurement times. Hence, measurement times can vary form about 0.004s up to 4s.

Depending on the application where the D-Series laser distance sensor is used, the requirements for the measurement speed and/or the accuracy differ. With the configurable measurement characteristics, the D-Series laser distance sensor offers a flexible feature to adapt to a wide range of requirements.

1.2 Measurement characteristic

The measurement characteristic controls the way measurements are done. The laser sensor offers various measurement characteristics such as:

- Normal (factory setting)
- Fast
- Precise
- Timed
- Moving Target

Please see the technical reference manual for additional information.

The scope of this application note is the timed measurement characteristic, which offers a fixed sample rate. At the same time the measurement accuracy is variable, depending on the target reflection property.

1.3 Operation modes

The operation mode defines the start of the measurement. The D-Series has two different operation modes with three kinds of events to start the measurement. See the following graphic 1 for an overview.

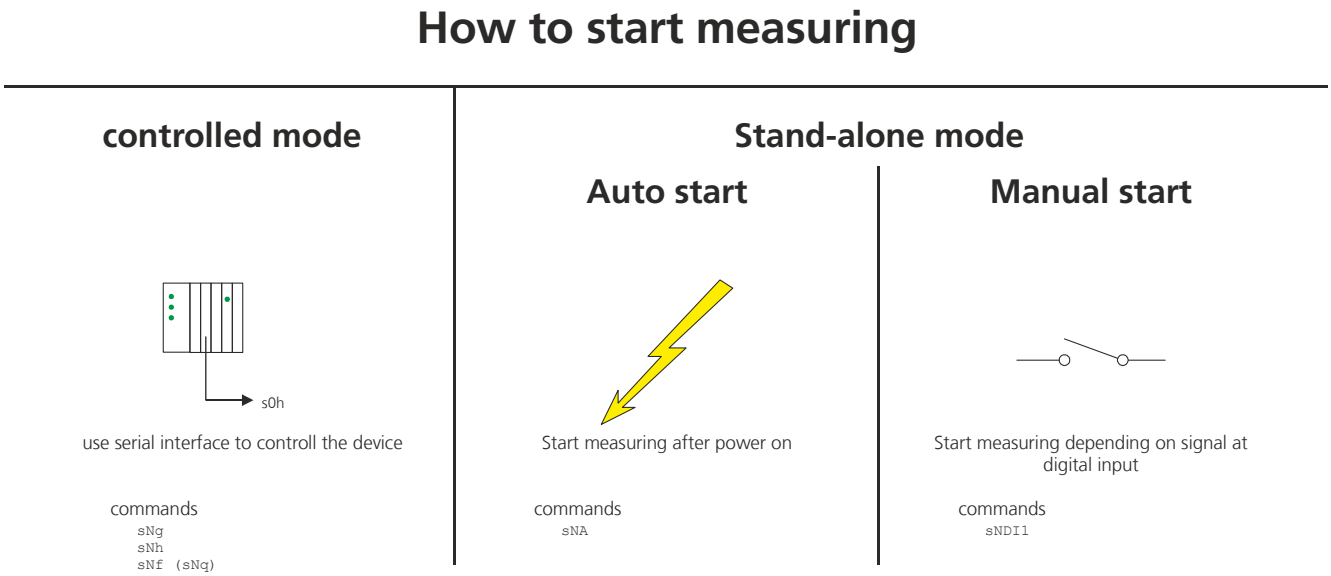

Fig. 1: Overview of operation modes

For each start event, an example is given later in this document.

2 Theory about the measuring characteristics

2.1 Normal, Fast, Precise with sNh command

With the Normal, Fast or Precise characteristics the sensor adjusts the measuring rate depending on the signal quality to ensure the measurement accuracy. Bad targets (dark surface) lead to long measurement times while good targets (white or reflecting) lead to short measurement times.

Legend

- **Good target (white)**
- **Fair target quality (grey)**
- **Bad target (black)**

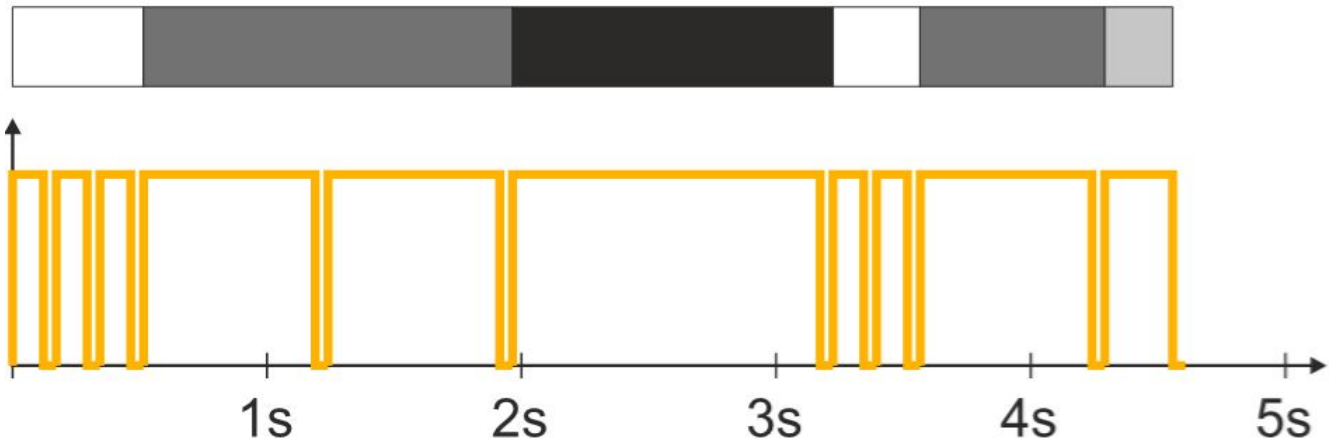

Fig. 2: Normal, Fast, Precise with sNh command

2.2 Normal, Fast, Precise with sNh+xxx command

With the measuring command sNh+xxx the sensor starts measuring with a fixed sample rate. If the Normal, Fast or Precise characteristic is used, the sensor adjusts the measuring time depending on the signal quality. With a white target the measuring time will be short. When the measuring time is longer then the sampling time (given by the command sNh+xxx, xxx in ms), the laser sensor will return the error code E211: Tracking measurement time too short

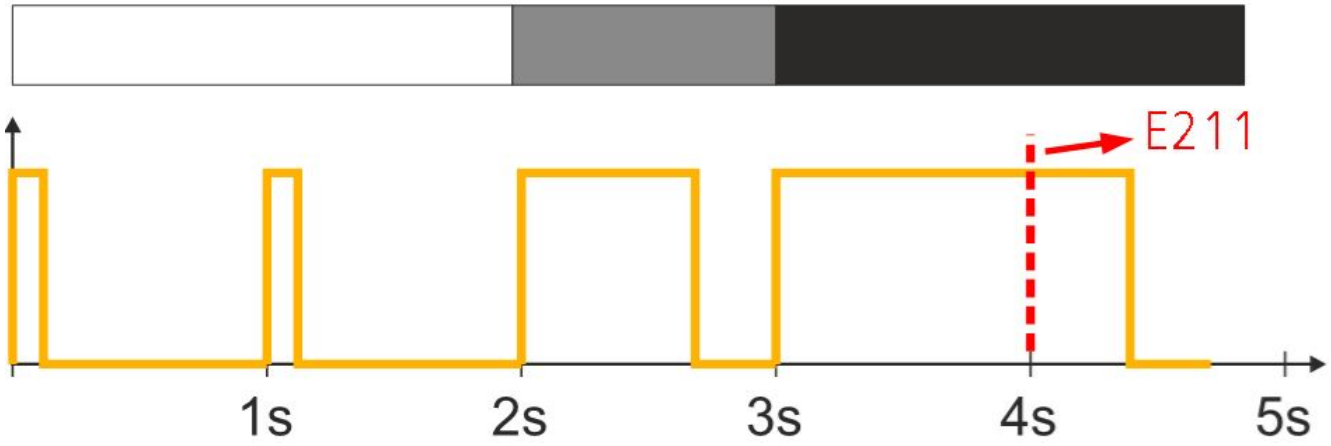

Fig. 3: Normal, Fast, Precise with sNh+xxx command

2.3 Timed characteristic with sNh+xxx commands

Timed measuring characteristic allows user defined measuring rates. But contrary to the other measurement characteristics, the time characteristic is extended over the full sampling period. The device does not consider measuring conditions to reach the specified accuracy. The measuring rate is fixed and the accuracy is variable (depends on the signal quality).

If the timed characteristic is used with the sNh+xxx command, the laser sensor will measure with a fixed sampling time (given by the sNh+xxx, xxx in ms), this is independent of the signal quality.

In that mode the laser sensor is able to measure on very bad targets with limitations in accuracy.

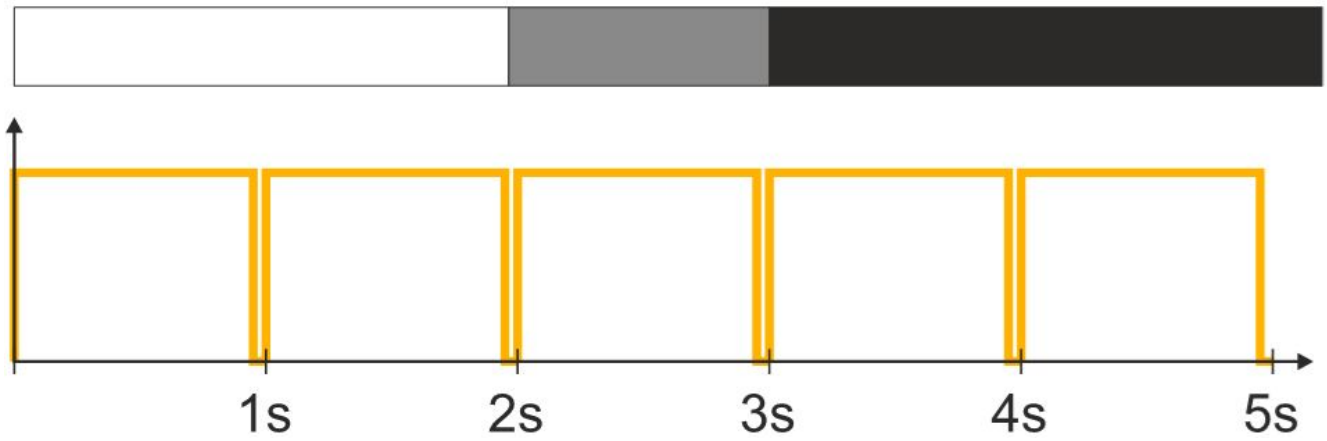

Fig. 4: Timed characteristic wit sNh+xxx command

3 Configuration Example

3.1 Timed measurement characteristic

This chapter is a step by step configuration example. Just do each single step described later in this to configure the sensor for a fixed sample rate.

Steps	Description
1	Connect the laser sensor over USB or RS-232 to the PC, start the Laser Sensor Utility software and check the connection. Download and install the latest "Laser Sensor Utility" software (www.dimetix.com/UtilitySW).
2	Check the right firmware version of the D-Series interface board: V1.16 (or newer) because older versions had a SSI bug. Otherwise update the laser sensor firmware according firmware update instructions on the Dimetix knowledge base. https://dimetix.com/en/services/knowledge-base/#how-can-the-sensor-firmware-be-updated
3	Choose the "Configuration" tab and the "Measurement characteristic" sub tab
4	Select the Timed measurement characteristic
5	Press the "Download to device" button to send and save the chosen configuration to the laser sensor

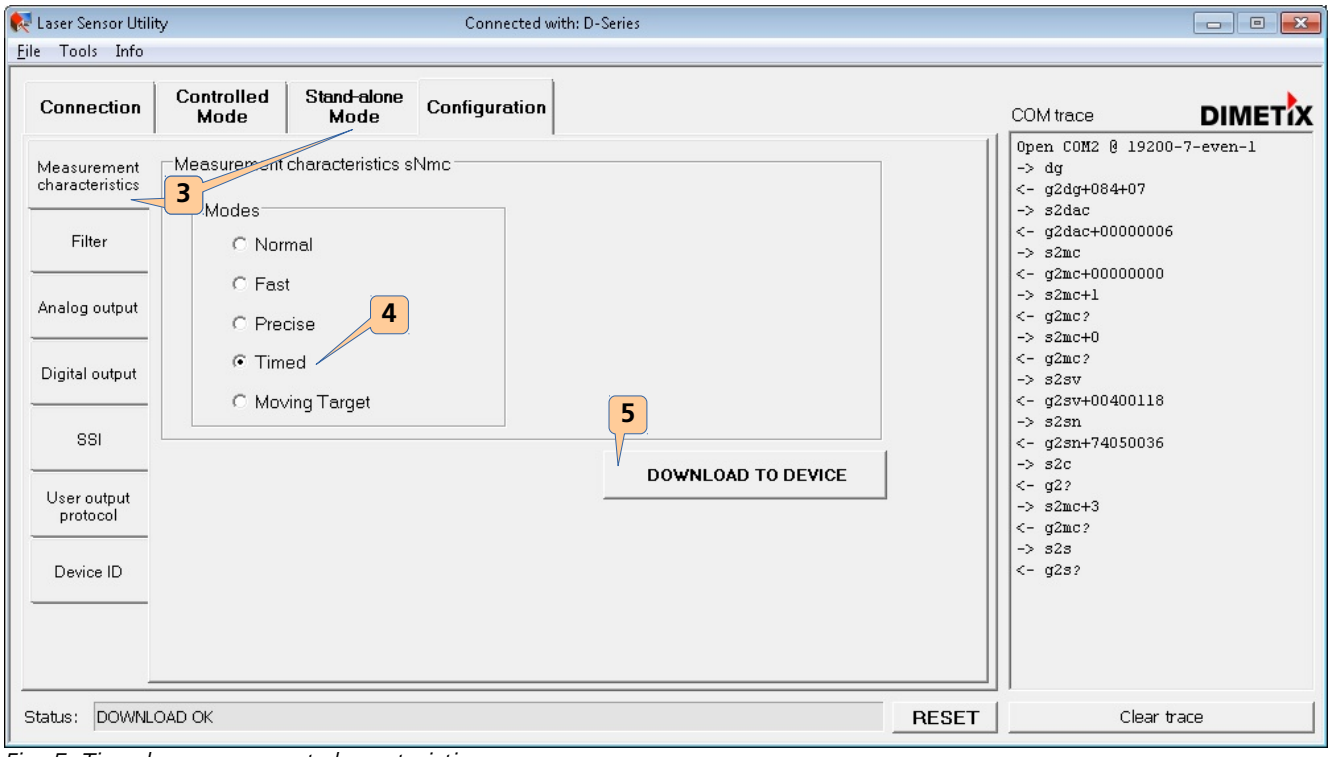

Fig. 5: Timed measurement characteristic

The next configuration step depends on the desired operation mode. Please continue with the chapter that fits your desired operation mode.

3.2 Controlled mode

Before doing the following configuration, do the configuration described under 3.1 Timed measurement characteristic on page 6.

In controlled mode the measurement is started with a command. In this example the following command is used.

	Command	
Command	sNh<CrLf>	
Return successful	gNh+aaaaaaaa<CrLf>	
Return error	gN@Ezzz<CrLf>	
Parameters	*N* Device ID *aaaaaaaa* Distance in 0.1 mm *zzz* Error code	

In this example the "Laser Sensor Utility" is used to send the command. Therefore open the "Manual command input" window by clicking on the menu "Tools/Manual command input" (see Fig. 6).

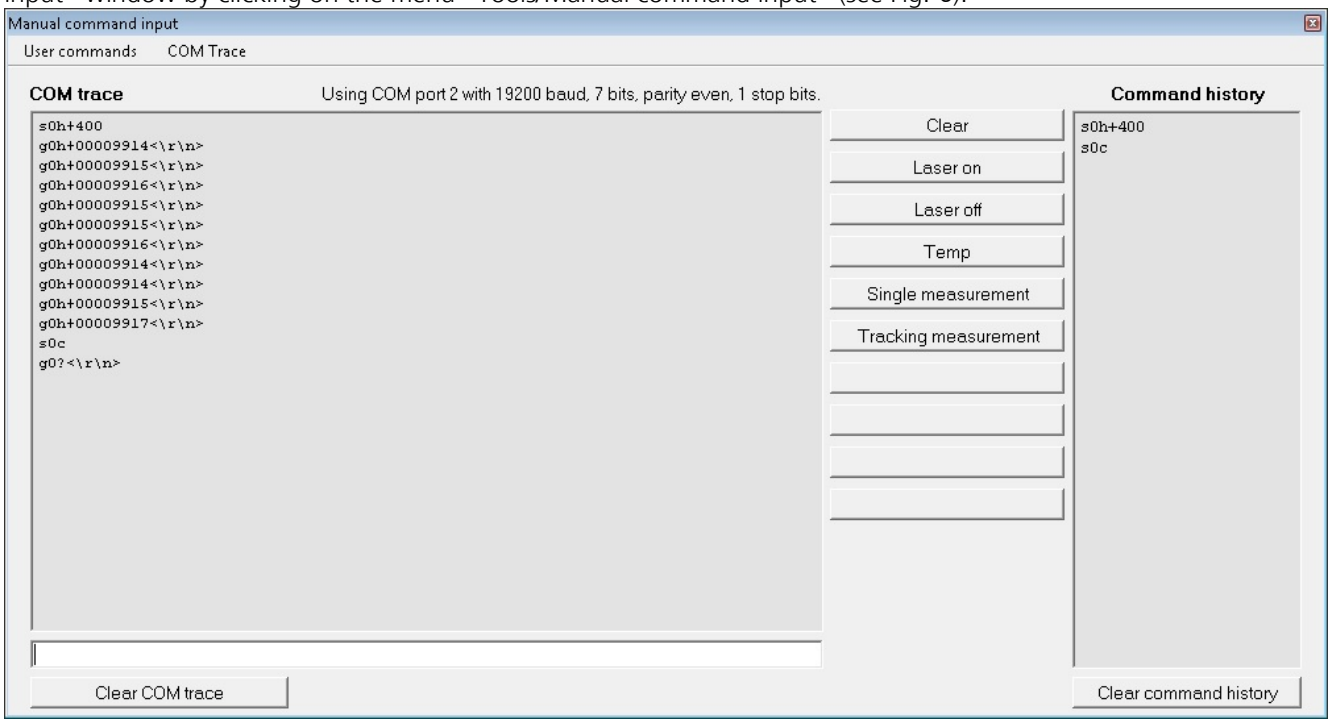

Fig. 6: Manual command input

For example type the command sNh+400 (N stands for the ID, for example 0) into the input line and press enter. The command is sent to the laser sensor and the measurement results are received.

The command sNh+400 sets the timing for the measurement to 400*1ms = 0.4s. The measurement is now executed with 0.4s independent of the target surface.

3.3 Stand-Alone mode - Auto start configuration

In this configuration the laser sensor starts measuring as soon as the power is switched on.

Before doing the following configuration do the configuration described under 3.1 Timed measurement characteristic on page 6.

Steps	Description
6	Choose the “Stand-alone” tab and the “Auto start configuration” sub tab
7	Set Automatic Mode to ON
8	Set a sample time. Set value to 0 sec for fastest possible measurements
9	Press the “Download to device” button to send and save the chosen configuration to the laser sensor. Immediately after downloading the sensor starts to measure.
	Information: This setting is stored in the device and every time the device is powered on, the measurement will start.

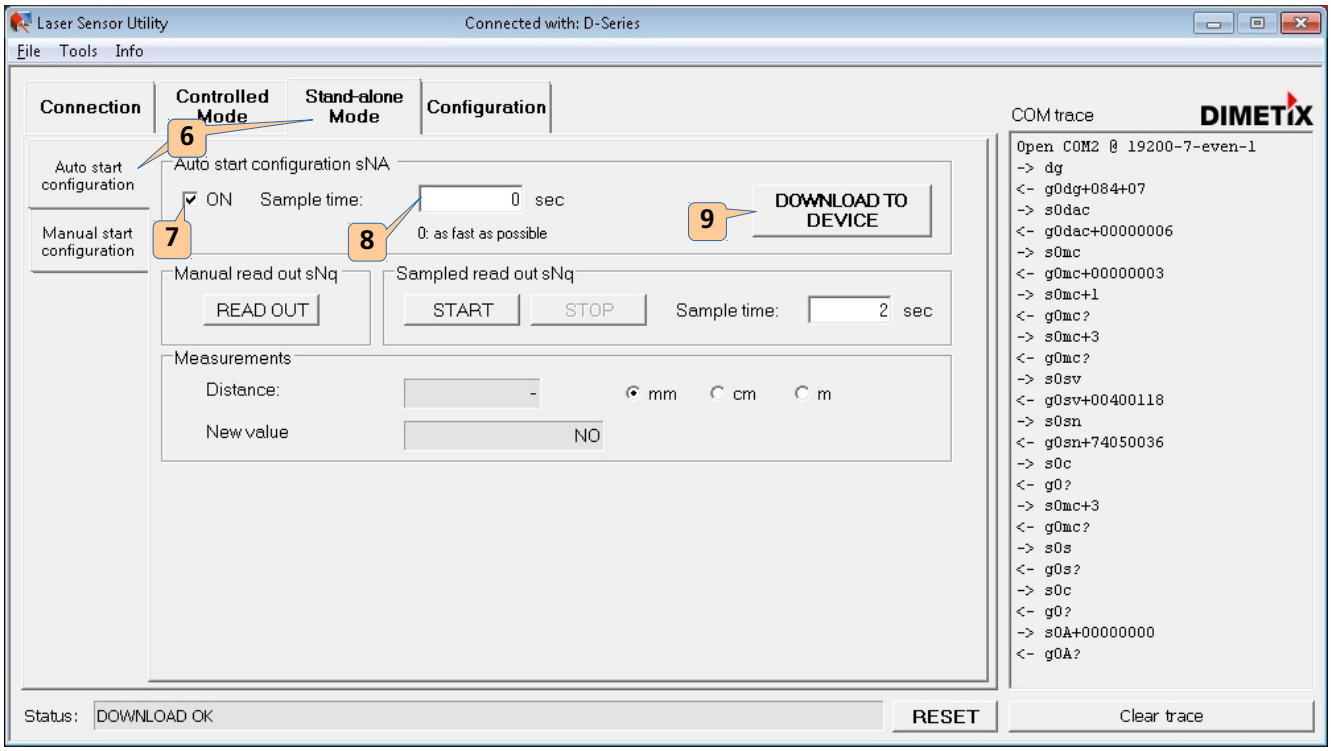

Fig. 7: Auto start configuration

3.4 Stand-Alone mode - Manual start configuration

In the manual operation mode, the measurement is controlled by the digital input.

Before doing the following configuration do the configuration described under 3.1 Timed measurement characteristic on page 6.

Steps	Description
6	Choose the "Stand alone Mode" tab and the "Manual start configuration" sub tab
7	Activate the Digital Input (the Digital Output will be deactivated)
8	Choose an action for the Digital-Input. For example start/stop single sensor tracking
9	Set a sample time. Set value to 0 sec for fastest possible measurements
10	Press the "Download to device" button to send and save the chosen configuration to the laser sensor
11	As soon as the Digital Input goes to HIGH level the tracking will start

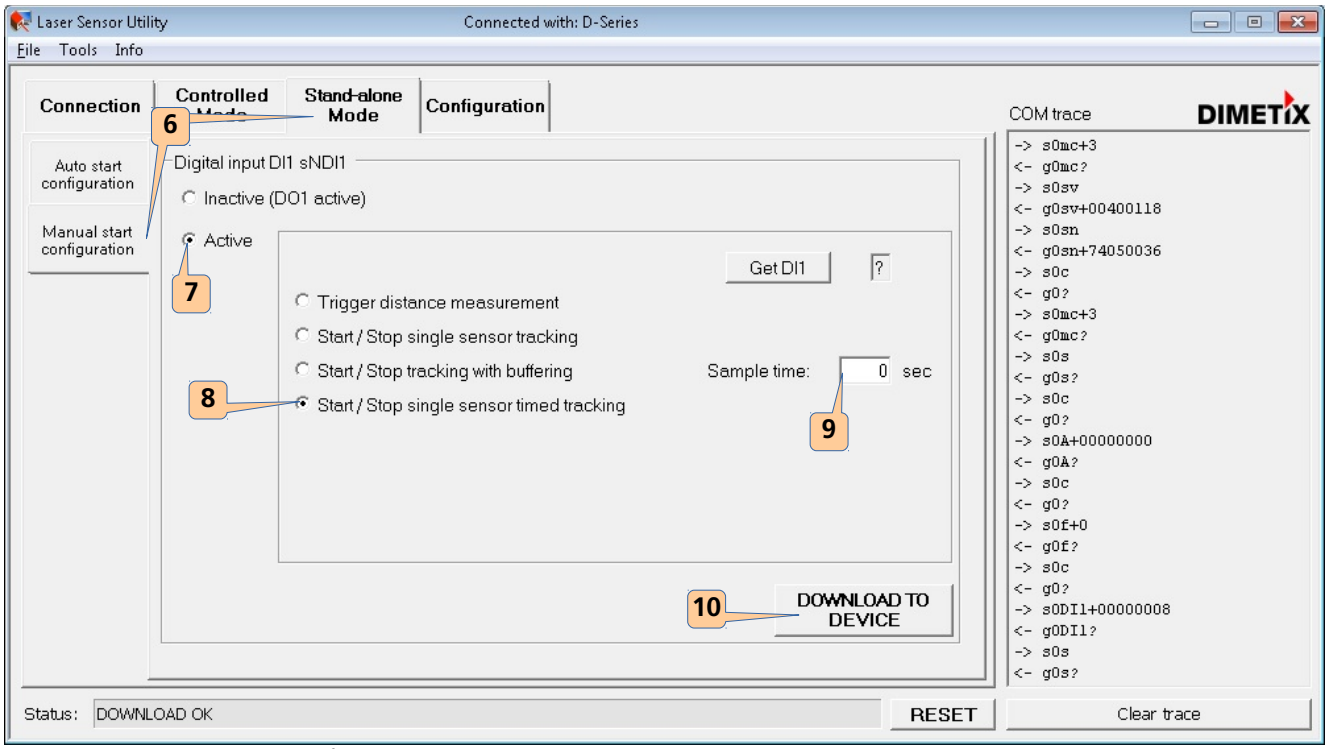

Fig. 8: Manual operation mode configuration

3.4.1 DI connection

Connect the DI1 as shown in Fig. 9. As soon as the switch is closed the Laser distance sensor starts measuring and stops measuring when the switch is opened.

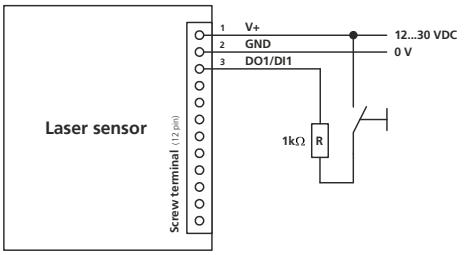

Fig. 9: Connection for external triggering