Application Note

AN2008

D-Series

Addtional measurement filter - Signal monitoring

V1.01

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Abstract
The D-Series laser distance sensors provide a wide range of configuration possibilities. This document shows how to configure the signal monitoring function. This feature works like a plausibility check of the signal value of the latest distance measurement. A typical use cases can be positioning applications e.g. in the logistics.

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1 Document scope

This document covers an Application Note written for the Dimetix D-Series Laser Distance Sensors. The following topics are discussed:

- Safety instructions
- Application Note descriptions

2 Safety instructions

This Application Note is written for qualified system integrators to help doing an application specific sensor configuration.
Before using the D-Series sensor also the safety related information in the D-Series Technical Reference Manual must be consider.

Looking into the laser beam may be hazardous to the eyes.

- Do not look into the laser beam. Make sure the laser is aimed above or below eye level. (particularly with fixed installations, in machines, etc.).

Take precaution against electrostatic discharge (ESD) when the D-Series laser distance sensors exchangeable cover is open.

- Generally the sensor with removed exchangeable cover is a sensitive device and can be damaged by electrostatic discharge.
- Only handle the device properly grounded and with care.
- No warranty will be granted on improper handling and / or ESD caused problems**.**

3 Description

There are a lot of applications using the Dimetix sensors with the orange reflective plate or foil to allow the maximum sensor performance or the full distance measurement range.
But the Dimetix sensors can also measure on a wide range of natural surfaces not only on the mentioned reflective surface. In some applications this is not a desired behavior and the possibility to supervise the sensor signal intensity would give an added value.
For this reason, a new monitoring function is implemented in the D-Series sensor, which can be activated and configured as usual via sensor commands. This function monitors the sensor signal intensity and reacts if the signal intensity changes more than a defined limit compared to the previous distance measurement. In case of a limit value violation the sensor immediately shows this by error code @E262. See figure 1 for an example.
This function can be used in tracking measurement only.

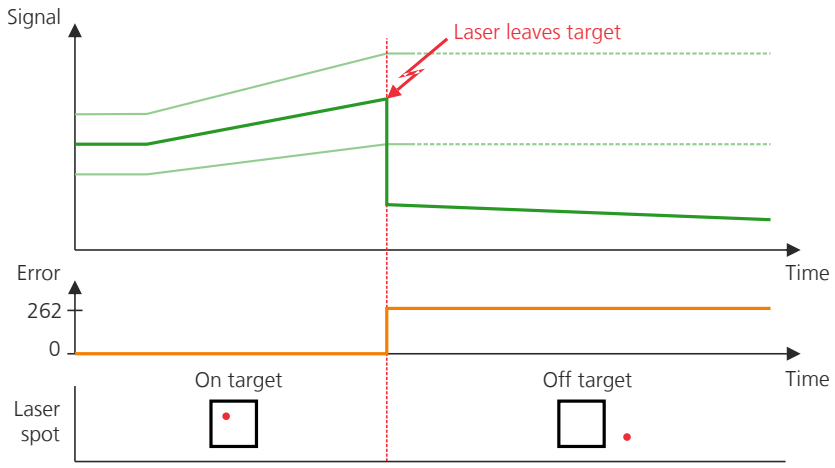

Figure 1: Measurement signal intensity course with defined limit (green and light green) and event (red flash) where laser spot leaves measurement surface. Error code 262 (orange) indicates the limit value violation.

Available for interface board and module firmware V1.21 and V4.1 or newer. For more details or if you are interested in the new functions, please let us know.

An other monitoring function is available with the distance jump detection feature. For more details see the Application Note AN2007.

3.1 Calculation formula

The signal monitoring function works according the relation below.

$|Signal_{NEW} - Signal_{REF}| \leq Signal_{REF} * Sig.Change[\%]$ → ***No error (signal in tolerance)***
$|Signal_{NEW} - Signal_{REF}| > Signal_{REF} * Sig.Change[\%]$ → ***Error @E262***

$Signal_{NEW}$ → *New signal value from latest distance measurement*
$Signal_{REF}$ → *Reference signal (internally filtered last valid signal values)*

As long as the difference between the new signal value and the internal signal reference is smaller than the defined limit (percentage of the signal reference), no error is generated. As soon as this is no longer the case, an error is issued.

3.2 Error behaviour

The behavior of the sensor when a limit value violation is detected (during signal monitoring) is defined as follows:

- The error code @E262 will be immediately shown on all interfaces

- The distance value will be reset to 0 (for relevant interfaces e.g. SSI, Industrial Ethernet)

The limit violation then can be reset as follows:

- Automatically if the signal value is again within the defined limits e.g. return to orange reflective foil / plate after leaving beforehand.
- Restart the tracking measurement. Attention, at the start it must be ensured that on the correct target is measured.

4 Application example

This monitoring function can be helpful for the following types of applications to ensure that the distance measurements are made on the correct measuring surface:

- All anti-collision systems e.g. cranes.
- All positioning systems with problematic laser beam interruption
- All monitoring systems e.g. large structures
- Other applications are also conceivable

This function is primarily for the use of the Dimetix sensors in connection with the orange reflective foil / plate. Of course applications without the reflective foil / plate may also be possible.
In figure 2 an application is shown where the laser gets on and off the target and this must be detected.

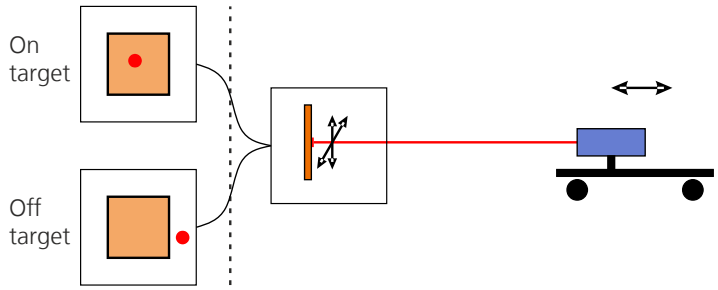

Figure 2: Application example with laser spot movement on the measurement target. The condition where the laser leaves the measuring target must be detected.

5 Configuration

5.1 Configuration steps

Do the following steps to configure the sensor for the described additional measurement feature / filter possibilities. Note, the configuration can be saved permanently in the laser distance sensor. Like this, the configuration process has to be done only once.

Steps	Description
1	Connect the D-Series sensor over USB or RS-232 to the PC, start the Laser Sensor Utility software and check the connection. Download the latest “Laser Sensor Utility” software from www.dimetix.com/UtilitySW.
2	Check the right firmware version of the D-Series interface board (V1.21 or newer) and module (V4.1 or newer). Otherwise update the 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	Run the manual command input. “Laser Sensor Utility” → “Tools” → “Manual command input”
4	Use the command s*N*um+5 to activate the linear signal output (for details see chapter 5.2.1). Use the command s*N*afi+3+x to activate and configure the max. allowed signal change / “jump” between the last valid signal value and the signal value of the newest distance measurement (for details see chapter 5.2.2). This max. change limit is application specific and must be determined by the application designer. The measuring surface, the possible moving speed, the measuring rate of the sensor and other influential

	factors have to be considered. **Remark:** Checking of max. signal changes / "jumps" are only possible for tracking measurement. The error code @E262 is present until the signal value is in the limit again or the measurement is restarted.
5	Do other configurations if needed.
6	With command s*N*s the configuration can be saved permanently. Otherwise all configurations are volatile and the sensor must be reconfigured after every power cycle.
7	Start tacking measurement (signal monitoring and check is active). In case of a signal limiting violation, the sensor immediately shows this by error code E262.

5.2 Commands

5.2.1 Set/Get user mode (s*N*um)

This command allows the configuration of special user modes.

	Set command	***Get command***
Command	s*N*um+*a*<CrLf>	s*N*um<CrLf>
Return successful	g*N*um?<CrLf>	g*N*um+*aaaaaaaa*<CrLf>
Return error	g*N*@E*zzz*<CrLf>	g*N*@E*zzz*<CrLf>
Parameters	*N* Device ID *a* User mode number: 0 –› Default mode, no user mode active 5 –› Activate user mode for linear signal output (e.g. used for signal monitoring function) Other –› Not used *zzz* Error code	

5.2.2 Set/Get additional measurement filter configuration (s*N*afi)

This command allows additional measurement filter / feature configurations.

	Set command	***Get command***
Command	s*N*afi+*a*+*bbbbbbbb*<CrLf>	s*N*afi+*a*<CrLf>
Return successful	g*N*afi+*a*?<CrLf>	g*N*afi+*a*+*bbbbbbbb*<CrLf>
Return error	g*N*@E*zzz*<CrLf>	g*N*@E*zzz*<CrLf>
Parameters	*N* Device ID *a* Additional filter / feature number: 3 –› Max. allowed signal change (signal monitoring) configuration *bbbbbbbb* a = 3 –› Max. allowed signal change / jump in % (0 –› Filter / Feature disabled) *zzz* Error code	

Remark: All configurations are volatile, use the save configuration command s*N*s to save configuration permanently.

For more information about available configurations see the Technical Reference Manual of the D-Series laser distance sensor.