RED-CLS -60-L

Reflected light Edge Detector for band detection

With the RED series, Sensor Instruments released a new family of reflected-light edge detectors, which are able to reliably detect edges starting from a height of 0.03mm. The detectors of this series are characterized by their large detection distance and detection range, and by their high scan frequency of max. typical 100kHz. With comprehensive software algorithms the RED series also can be used for frequency measurements, for example of turbochargers or fans. RED detectors furthermore can be used to monitor the number of wires when cables are twisted in stranding machines.

Originally developed as copy counters for the printing industry, RED series detectors now have a multitude of other possible applications, e.g. welding seam detection, production of folded paper for air filters, production of corrugated aluminum pipes, or counting of caps that are arranged in stacks.

A special detector version within the RED series, the **RED-CLS-60-L**, also supports for the detection and differentiation of rising and falling edges. This might be useful for detecting bands on rolled products, e.g. for de-strapping / de-banding applications.

RED-CLS-60-L – dimensions and principle

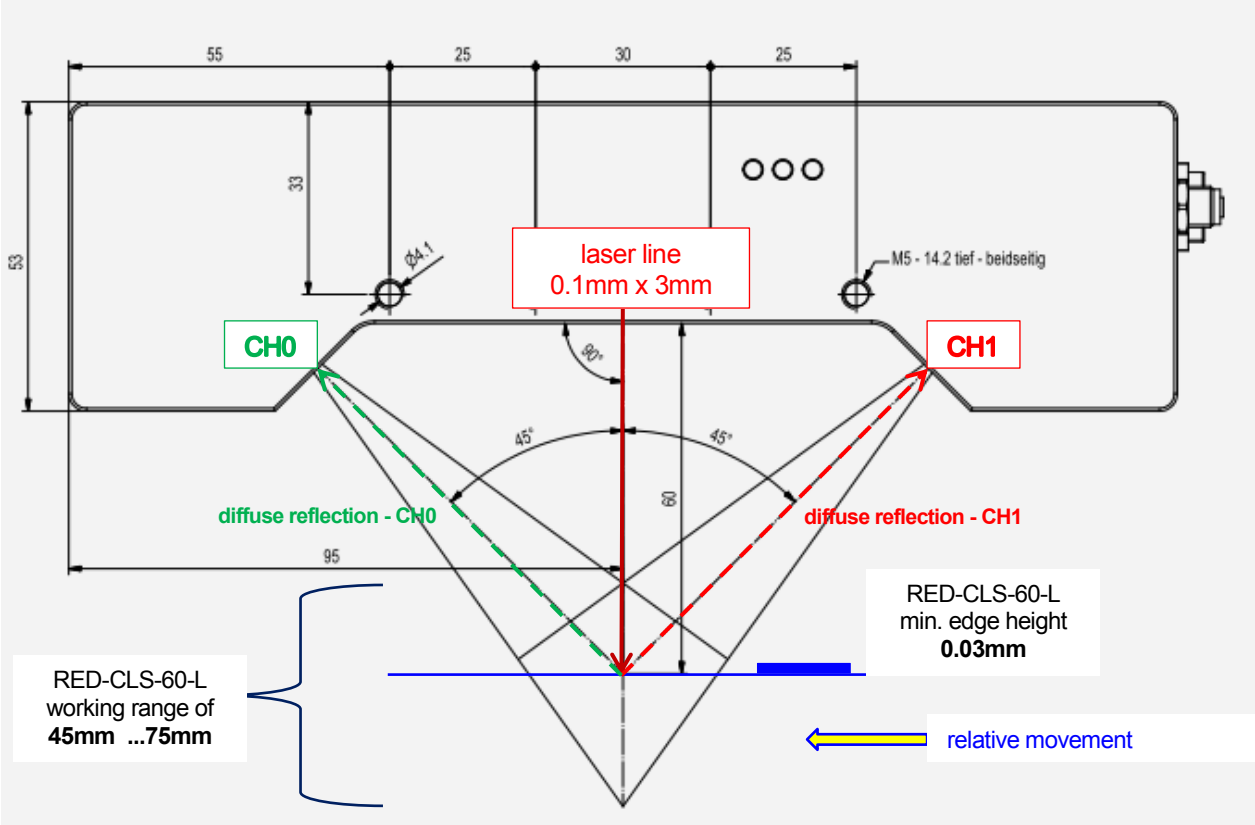
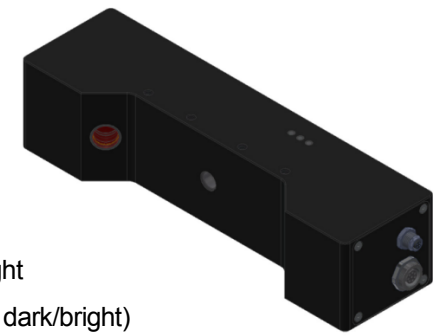


Image 1: dimensions and principle of RED-CLS-60-L - a red laser line of 0.1mm x 3mm is projected at 0° onto a surface. The diffuse reflection under 45° degrees on both sides is collected by two receivers (CH0 and CH1).



- Line laser, Laser class 2 (<1 mW, wavelength 670 nm)
- Type -L: Visible red laser line, typ. 0.1 mm x 3 mm in the focus
- Reference distance 60 mm, working range 45mm … 75mm
- Automatic laser adjustment to the product surface
- Max. scan frequency 85 kHz
- Insensitive to outside light due to interference filter and pulsed laser light
- Proof edge detection even with changing surface quality (glossy/matt, dark/bright)

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- RS232 interface (USB or Ethernet converter available)
- Extern trigger mode
- Windows® user interface
- 2 digital inputs (IN0, IN1)
- 3 digital outputs (OUT0, OUT1, OUT2)
- 1 analog output (0V ... +10V or 4 mA ... 20 mA)
- Switching state indication via 3 LEDs (OUT0, OUT1, OUT2)

RED-CLS-60-L – Detecting rising and falling edges

The following example tries to explain the basic functionality of the RED-CLS-60-L. At a reference distance of 60mm a white board with a brown thin strap (test sample) has been moved under the sensor.

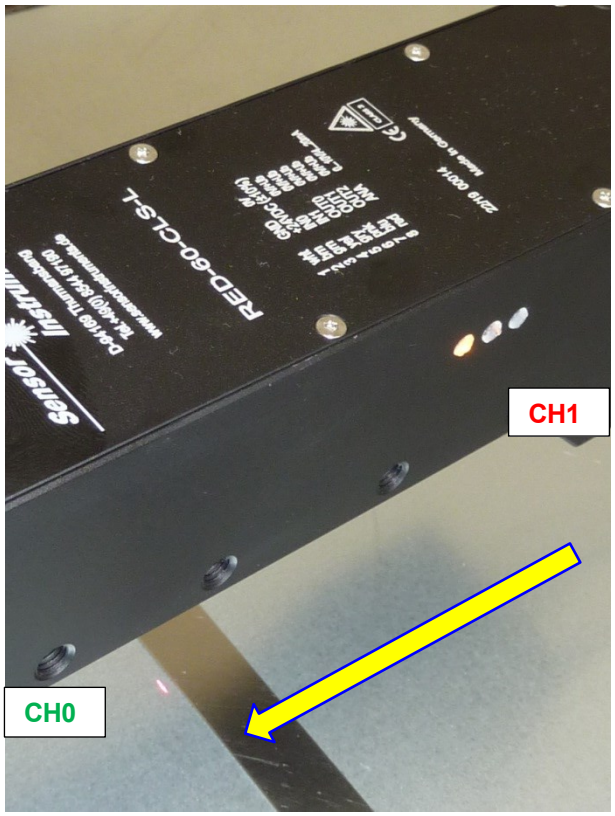

Image-2: Sensors laser line short before rising edge

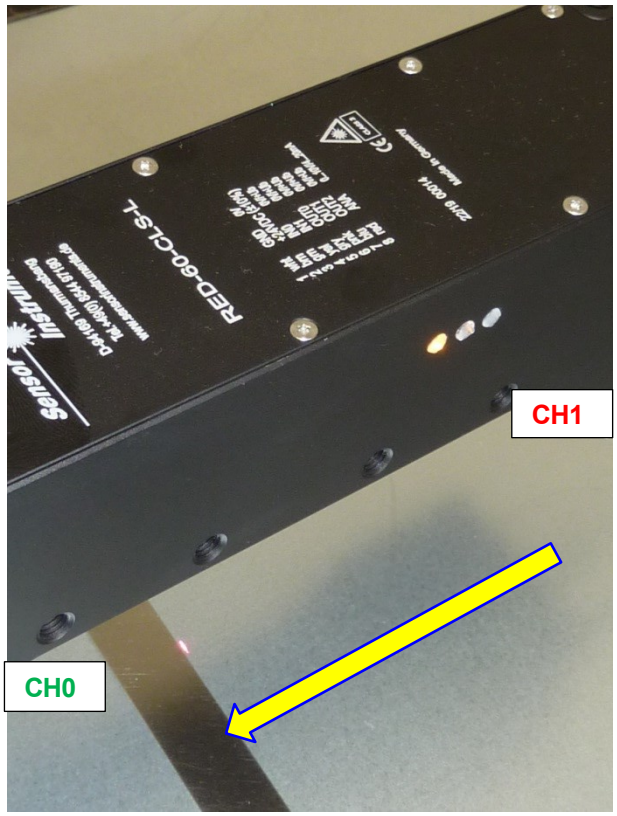

Image-3: Sensors laser line short after falling edge

Depending on the surface of the background and the strap, different signal conditions at **CH0** and **CH1** (ANA CHANNELS) could occur.

Due to its automatic power adjustment the sensor is capable to handle a broad dynamic range of surfaces to optimize the analog Raw Signals, which are AD-converted with 12-bit and processed.

Image-4 on the next page depicts the ANA CHANNELS conditions while moving the test sample underneath the RED-CLS-60-L. The phases depicted are:

I. ANA CHANNELS while laser line is on background before the strap
II. ANA CHANNELS during rising edge
III. ANA CHANNELS while laser line is on the strap
IV. ANA CHANNELS during falling edge
V. ANA CHANNELS after laser line is on background again

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Image-4: ANA CHANNEL (CH0, CH1) conditions while moving the test sample underneath the sensor

At the rising edge **CH1** is deflected by the rising edge for a moment, whereas **CH0** gets slightly more diffusely reflected light. On the background and on the strap, we see an almost steady signal for **CH1**. At the falling edge **CH0** is blocked for a short period of time, and **CH1** is not.

RED-CLS-60-L – EVALuation SIGnal

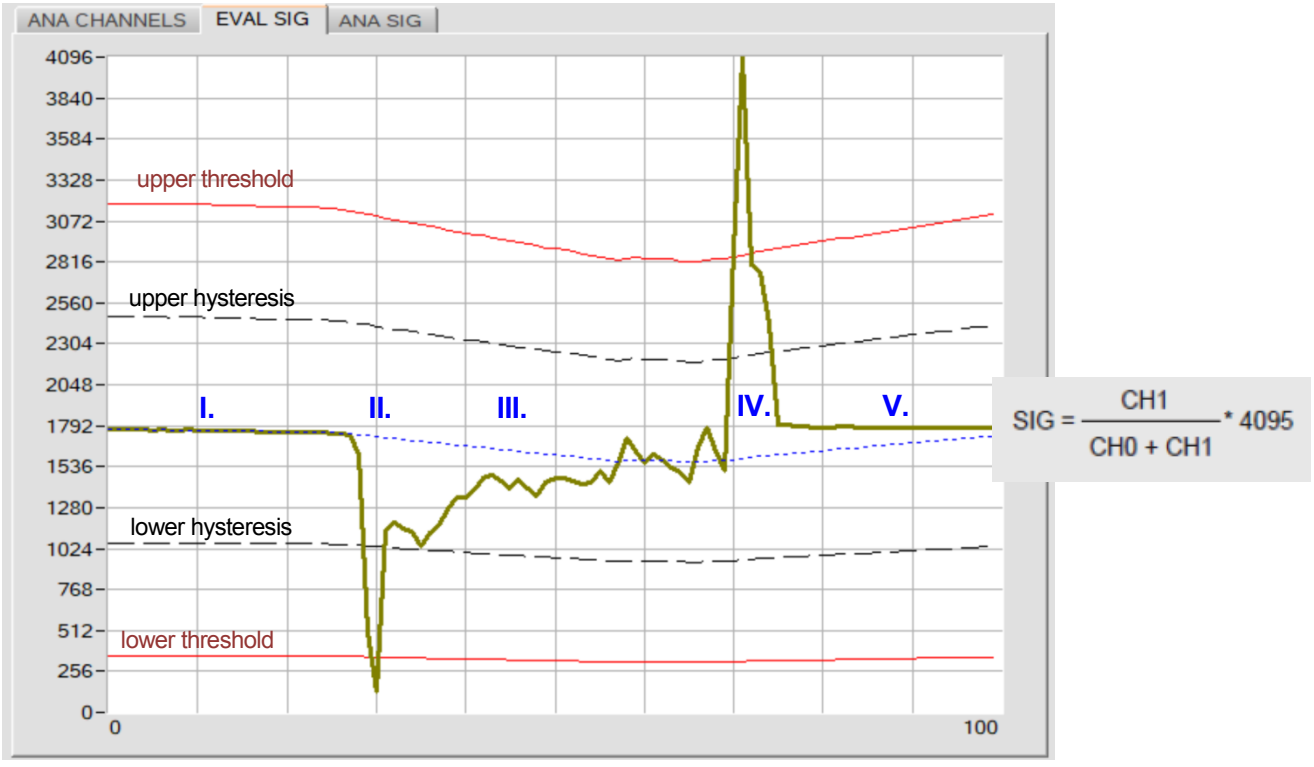

Image-5: SIGnal (computet out of CH0 and CH1) while moving the test sample underneath the sensor. The automatic threshold tracing function (adjustable by software) is also depicted (blue dotted line).

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By using two thresholds for the evaluation SIGnal, the state of a and a falling rising edge can be recognized and signaled via digital output to a PLC.

The next image shows the relation of **CH0**, **CH1**, **SIG** and the two digital outputs (OUT0 and OUT1) of the RED-CLS-60-L for another application example. The information could be extracted by using the SCOPE function of the RED-Scope Windows® software.

Image-6: SIG, CH0, and CH1 while moving another test sample with a more shiny surface underneath the sensor. OUT0 and OUT1 are extended to 100ms (software adjustable HOLD time), once SIG is cutting the lower threshold (rising edge) or the upper threshold (falling edge).

Due to its ability to differentiate between rising and falling edges the RED-CLS-60-L could be used for a number of applications. This could be detecting bands on rolled products for de-strapping / de-banding, for instance, or in general, for any kind of scanning surface inspection where falling and rising edges, respectively their timely occurrence is of significance.

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