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ULTRASONIC SENSORS

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Extract from our online catalogue:

esf-1 ultrasonic label and splice sensors

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The esf-1 fork sensor can detect labels reliably even at high label speeds.



Highlights

- > **3 Teach-in methods** ::: for the detection of labels even outside the standard
- > **Response time < 300 µs** ::: for use at high web speeds
- > **Housing in fork format with very compact dimensions**
- > **Quick Teach**

Basics

- > **Label and splice sensor as a fork sensor**
- > **2 switching outputs** ::: for label/splice detection and web break monitoring
- > **3 LEDs and 1 button on the top of the housing**
- > **Teach-in optionally via button or pin 5**
- > **LinkControl** ::: as optional assistance for installation and commissioning

Description

The functional principle

Labels are guided through the fork. An ultrasonic transmitter in the lower leg of the fork beams a fast sequence of pulses through the backing material. The sound pulses cause the backing material to vibrate such that a greatly attenuated sound wave is beamed from the opposite side. The receiver in the upper leg of the fork receives this sound wave.

The backing material transmits a different signal level from the label. This signal difference is evaluated by the esf-1. The signal difference between the backing material and the label can be very slight. To ensure a reliable distinction, the esf-1 has to learn the label.

The esf-1

can reliably detect high-transparency, reflective materials as well as metallised labels and labels of any colour. The measurement cycle time automatically self-adjusts to the sound power required. For thin labels and backing materials, the esf-1 can work at its maximum speed, with a response time of < 300 µs.

To be able to detect special labels, for example labels with punches or perforations, there are three different Teach-in methods available.

A) Learn both backing material and label dynamically

During the Teach-in process, the backing material and its labels are guided through the fork at a constant speed. The esf-1 sensor automatically learns the signal level for the labels and for the gaps between the labels. This is the standard Teach-in for labels.

B) Separate Teach-in for backing material and labels

The signal level difference for the backing material and labels might be very slight. In order to still scan labels with very little difference in signals, Teach-in for the signal levels is done separately: Teach-in is first done for the backing material and then for the label on it. The switching threshold then lies between these two signal levels.

C) Learn web material only

Web material is generally processed from a roll. The splice to be detected is hidden somewhere in the roll. There is a separate Teach-in method available for this purpose, in which only the sheeting is learned. The esf-1 detects the level difference at the splice and sets its output.

The Teach-in procedure

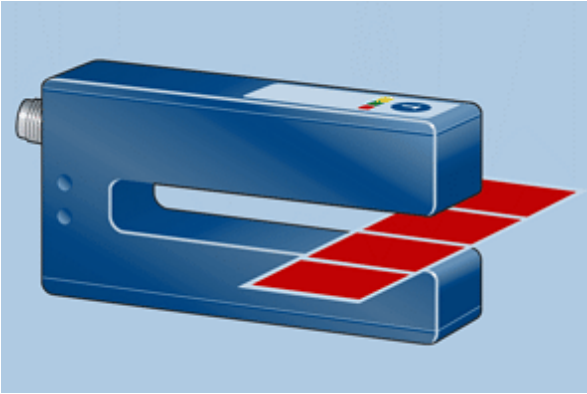
can optionally be carried out with the button on the top of the housing or with pin 5 on the unit's connector.

For QuickTeach

the esf-1 learns the material for the duration that the button is pushed or pin 5 is controlled.

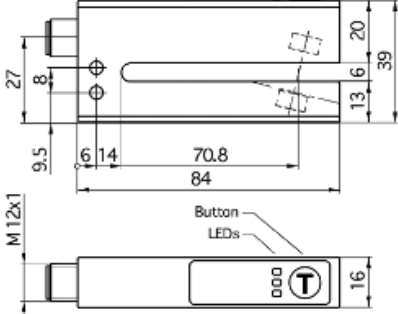

With LinkControl

the esf-1 can optionally be parameterised. Measured values can also be shown graphically.



Labels are guided through the fork. The esf-1 reacts to the signal difference between the backing material and the label.

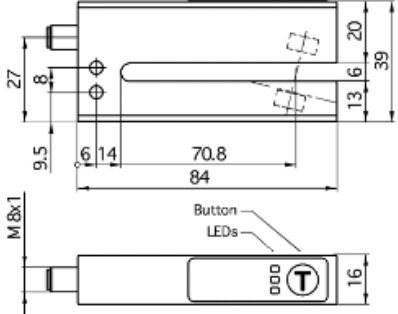

esf-1/CDF

| scale drawing | detection zone |
|--|---|
|  | |
|  1 x Push-Pull + 1 x pnp | |
| design | fork-like |
| operating mode | label/splice detection |
| ultrasonic -specific | |
| means of measurement | pulse operation with amplitude evaluation |
| transducer frequency | 500 kHz |
| working range | sheeting with weights of < 20 g/m ² up to >> 400 g/m ² , metal-laminated sheets and films up to 0.2 mm thick, self-adhesive films, labels on backing material |
| electrical data | |
| operating voltage U _B | 20 - 30 V d.c., reverse polarity protection |
| no-load current consumption | ≤ 50 mA |
| type of connection | 5-pin M12 initiator plug |

esf-1/CDF

| | |
|---|---|
| outputs | |
| output 1 | Schaltausgang Push-Pull, $U_B - 3\text{ V}$, $-U_B + 3\text{ V}$, $I_{\text{max}} = 100\text{ mA}$ |
| output 2 | switching output pnp: $I_{\text{max}} = 200\text{ mA}$ ($U_B - 2\text{ V}$) NOC/NCC adjustable, short-circuit-proof |
| response time | 300 μs up to 2,25 ms, dependent on the material |
| delay prior to availability | < 300 ms |
| release delay | 300 μs up to 2,25 ms, dependent on the material |
| inputs | |
| input 1 | com input synchronisation input |
| housing | |
| material | aluminium anodized |
| ultrasonic transducer | polyurethane foam, epoxy resin with glass contents |
| fork width | 6 mm |
| fork depth | 67 mm |
| class of protection to EN 60529 | IP 65 |
| operating temperature | +5°C to +60°C |
| storage temperature | -40°C to +85°C |
| weight | 90 g |
| further versions | larger fork width/depth |
| further versions | esf-1/15/CDF |
| technical features/characteristics | |
| controls | 1 Taster Com-Eingang |
| scope for settings | Teach-in via push-button Teach-in via com input on pin 5 LCA-2 with LinkControl |
| indicators | 1 x LED green: working, 1 x LED yellow: label/splice detected, 1 x LED red: web break |
| documentation (download) | |
| pin assignment | |

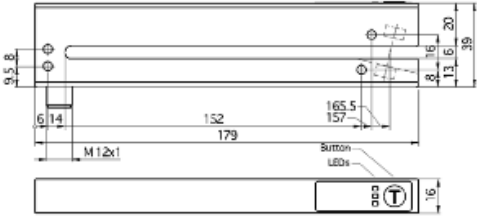

esf-1/CF

| scale drawing | detection zone |
|--|---|
|  | |
|  1 x Push-Pull | |
| design | fork-like |
| operating mode | label/splice detection |
| ultrasonic -specific | |
| means of measurement | pulse operation with amplitude evaluation |
| transducer frequency | 500 kHz |
| working range | sheeting with weights of < 20 g/m ² up to >> 400 g/m ² , metal-laminated sheets and films up to 0.2 mm thick, self-adhesive films, labels on backing material |
| electrical data | |
| operating voltage U_B | 20 - 30 V d.c., reverse polarity protection |
| no-load current consumption | ≤ 50 mA |
| type of connection | 4-pin M8 initiator plug |

esf-1/CF

| | |
|---|---|
| outputs | |
| output 1 | Schaltausgang Push-Pull, $U_B - 3\text{ V}$, $-U_B + 3\text{ V}$, $I_{\text{max}} = 100\text{ mA}$ |
| response time | 300 μs up to 2,25 ms, dependent on the material |
| delay prior to availability | < 300 ms |
| release delay | 300 μs up to 2,25 ms, dependent on the material |
| inputs | |
| input 1 | com input |
| housing | |
| material | aluminium anodized |
| ultrasonic transducer | polyurethane foam, epoxy resin with glass contents |
| fork width | 6 mm |
| fork depth | 67 mm |
| class of protection to EN 60529 | IP 65 |
| operating temperature | +5°C to +60°C |
| storage temperature | -40°C to +85°C |
| weight | 90 g |
| technical features/characteristics | |
| controls | 1 push-button |
| scope for settings | Teach-in via push-button Teach-in via com input on pin 2 LCA-2 with LinkControl |
| indicators | 1 x LED green: working, 1 x LED yellow: label/splice detected, 1 x LED red: web break |
| documentation (download) | |
| pin assignment | |

esf-1/15/CDF

| scale drawing | detection zone |
|---|---|
|  <p>The drawing shows a side view of the sensor with dimensions: 5.5, 6, 14, 152, 179, 165.5, 157, 8, 11.6, 20, 39, and 16. It also indicates an M12x1 connector and 'Sumon LEDs'.</p> | |
|  <p>1 x Push-Pull + 1 x pnp</p> | |
| design | fork-like |
| operating mode | label/splice detection |
| ultrasonic -specific | |
| means of measurement | pulse operation with amplitude evaluation |
| transducer frequency | 500 kHz |
| working range | sheeting with weights of < 20 g/m ² up to >> 400 g/m ² , metal-laminated sheets and films up to 0.2 mm thick, self-adhesive films, labels on backing material |
| electrical data | |
| operating voltage U _B | 20 - 30 V d.c., reverse polarity protection |
| no-load current consumption | ≤ 50 mA |
| type of connection | 5-pin M12 initiator plug |

esf-1/15/CDF

| | |
|---|---|
| outputs | |
| output 1 | Schaltausgang Push-Pull, $U_B-3\text{ V}$, $-U_B+3\text{ V}$, $I_{\text{max}} = 100\text{ mA}$ |
| output 2 | switching output pnp: $I_{\text{max}} = 200\text{ mA}$ ($U_B-2\text{ V}$) NOC/NCC adjustable, short-circuit-proof |
| response time | 300 μs up to 2,25 ms, dependent on the material |
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| release delay | 300 μs up to 2,25 ms, dependent on the material |
| housing | |
| material | aluminium anodized |
| ultrasonic transducer | polyurethane foam, epoxy resin with glass contents |
| fork width | 6 mm |
| fork depth | 67 mm |
| class of protection to EN 60529 | IP 65 |
| operating temperature | +5°C to +60°C |
| storage temperature | -40°C to +85°C |
| weight | 90 g |
| technical features/characteristics | |
| controls | 1 Taster Com-Eingang |
| scope for settings | Teach-in via push-button Teach-in via com input on pin 5 LCA-2 with LinkControl |
| indicators | 1 x LED green: working, 1 x LED yellow: label/splice detected, 1 x LED red: web break |
| documentation (download) | |
| pin assignment | |