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Extract from our online catalogue:

# esf-1/CDF/A

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

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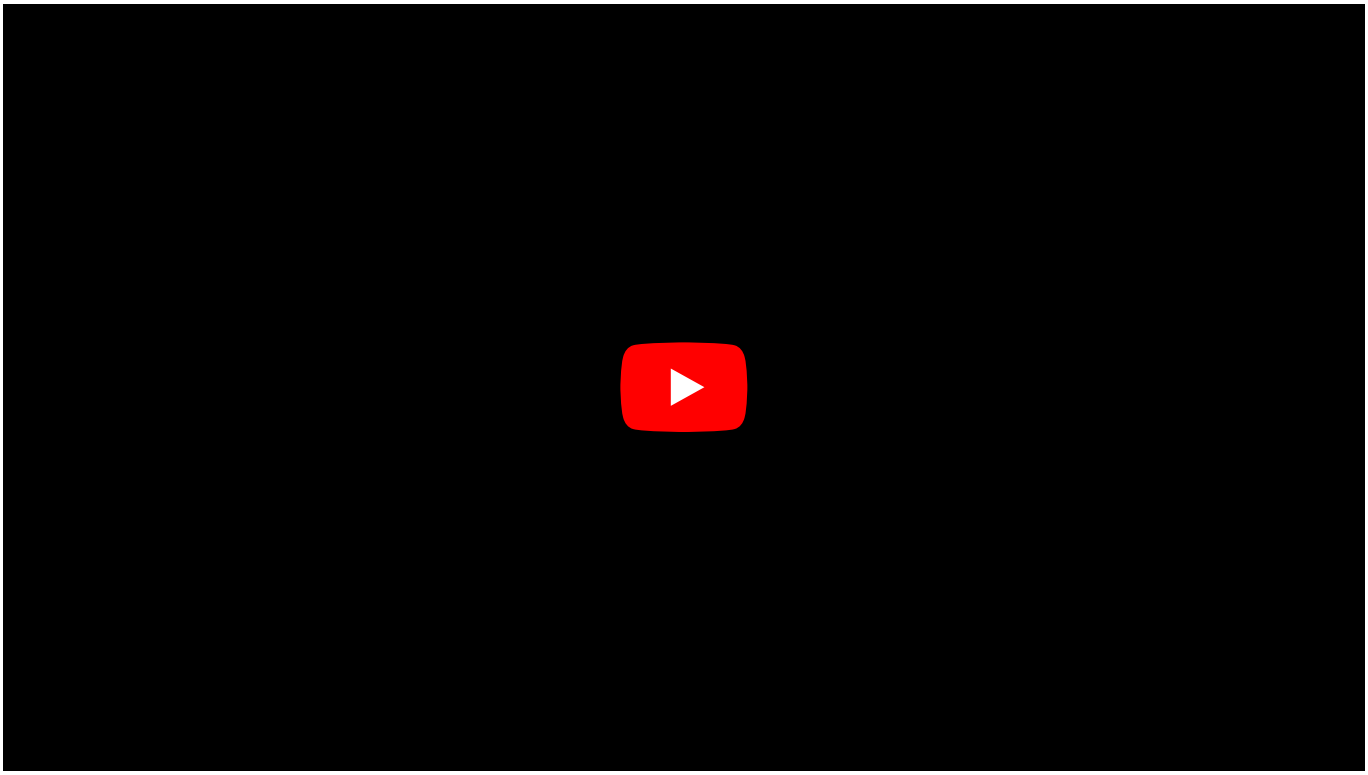
## HIGHLIGHTS

- 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
- QuickTeach › simplified Teach-in process
- IO-Link interface › for support of the new industry standard
- Smart Sensor Profile › more transparency between IO-Link Devices
- Smart Sonic Function › recipe management via IO-Link
- UL Listed to Canadian and US safety standards

## 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 save is beamed from the opposite side. The receiver in the upper leg of the fork receives this sound wave.

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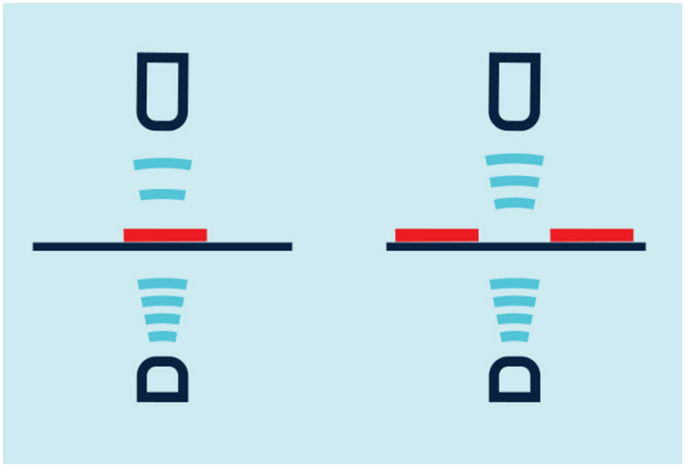
The backing material transmits a different signal level from the label. This signal difference is evaluated by the esf-1. The signal difference between the backing material and the label can be very slight. To ensure a reliable distinction, the esf-1 has to learn the label.



*Backing material with a label provides an attenuated signal level*

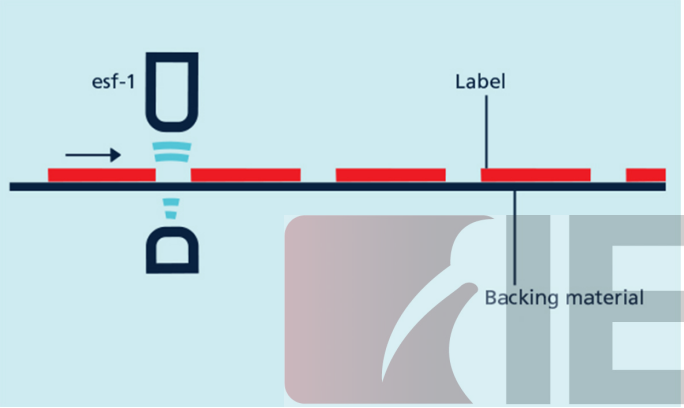
## The esf-1

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.




*esf-1 as label sensor*

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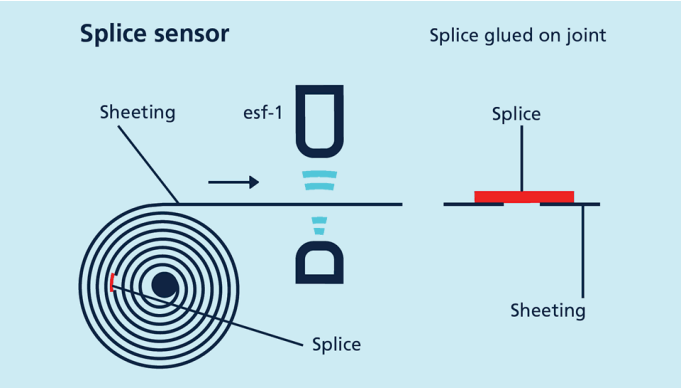
### B) Separate Teach-in for backing material and labels

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.




*esf-1 as splice sensor*

### The Teach-in procedure

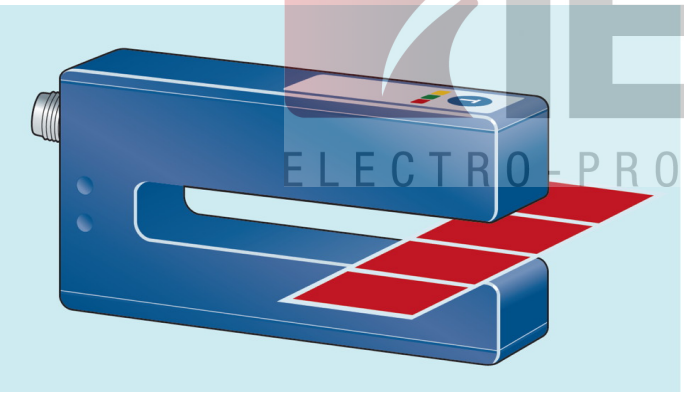
can optionally be carried out with the button on the top of the housing or with pin 5 on the unit's connector.

### 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.*

### IO-Link

esf-1 ultrasonic label and splice sensors have a Push-Pull switching output and support IO-Link in version 1.1.

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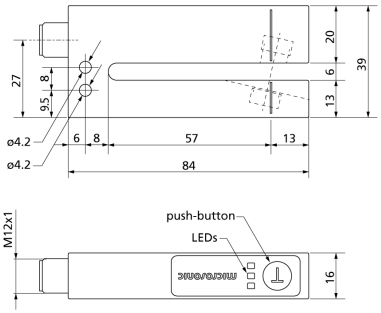
## scale drawing




## detection zone

1 x Push-Pull + 1 x pnp

| | |
|---|---|
| working range | sheeting with weights of < 20 g/m² up to >> 400 g/m², metal-laminated sheets and films up to 0.2 mm thick, self-adhesive films, labels on backing material |
| design | fork-like |
| operating mode | IO-Link<br>label/splice detection |
| particularities | IO-Link<br>Smart Sensor Profile<br>UL Listed |

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### ultrasonic-specific

| | |
|---|---|
| means of measurement | pulse operation with amplitude evaluation |
| transducer frequency | 500 kHz |

### electrical data

| | |
|---|---|
| operating voltage $U_B$ | 20 - 30 V d.c., reverse polarity protection |
| voltage ripple | ± 10 % |
| no-load current consumption | ≤ 50 mA |
| type of connection | 5-pin M12 initiator plug |

# esf-1/CDF/A

| outputs | |
|---|---|
| output 1 | switching output<br>label/splice detected<br>Push-Pull, $U_B$-3 V, -$U_B$+3 V,$I_{max}$ = 100 mA<br>NOC/NCC adjustable, short-circuit-proof |
| output 2 | switching output<br>label/splice detected<br>web break<br>pnp: $I_{max}$ = 200 mA ($U_B$-2V)<br>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 |

| inputs | |
|---|---|
| input 1 | com input<br>synchronisation input<br>teach-in input |

| IO-Link | |
|---|---|
| product name | esf-1/CDF/A |
| product ID | 16950 |
| SIO mode support | yes |
| COM mode | COM2 (38,4 kBaud) |
| min. cycle time | 4 ms |
| format of process data | 32 Bit PDI |
| content of process data | Bit 0: initial state Pin 4; Bit 1: initial state Pin 2; Bit 2: web break; Bit 8-15: scale (Int. 8); Bit 16-31: measured value (Int. 16) |
| ISDU paramter | Identification, switched output, add-ons, temperature compensation, operation |
| system commands | SP1 Teach-in, SP2 Teach-in, factory settings |
| Smart Sensor Profile | yes |
| IODD version | IODD version 1.1 |

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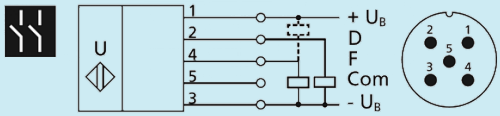
| housing | |
|---|---|
| fork width | 6 mm |
| fork depth | 70 mm |
| material | aluminium anodized |
| ultrasonic transducer | polyurethane foam, epoxy resin with glass contents |
| class of protection to EN 60529 | IP 65 |
| operating temperature | +5°C to +60°C |
| storage temperature | -40°C to +85°C |
| weight | 80 g |
| further versions | larger fork width/depth |
| further versions | esf-1/15/CDF/A |

| technical features/characteristics | |
|---|---|
| controls | 1 push-button<br>com input |
| scope for settings | Teach-in and QuickTeach via push-button<br>Teach-in via com input on pin 5<br>LCA-2 with LinkControl<br>IO-Link |
| Synchronisation | yes |
| indicators | 1 x LED green: working, 1 x LED yellow: switch status Pin 4, 1 x LED red: switch status Pin 2 |
| particularities | IO-Link<br>Smart Sensor Profile<br>UL Listed |

pin assignment




| order no. | **esf-1/CDF/A** |
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