



## Operating manual

## Ultrasonic label and splice sensor with one or two switched outputs

esf-1/CF  
esf-1/CDF  
esf-1/15/CDF

## Contact

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## Functional principle

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, so that a greatly attenuated sound wave is beamed from the opposite side. The receiver in the upper leg of the fork receives and evaluates this sound wave.

The esf-1 sensor can be used as a label sensor or a splice sensor.

The backing material transmits a different signal level from the level with label or from a splice. The difference between the backing material and backing with label or the web material and splice can be very subtle. To ensure reliable detection, the esf-1 sensor must therefore initially learn the signal level for the backing or web material.

With its three Teach-in methods, the esf-1 sensor can optimally be adjusted to any task configuration.

With QuickTeach, there is also a simplified Teach-in procedure available.

## Product description

- Assured detection of labels made of paper, metal or (transparent) plastic.
- Detection of splices of paper-, plastic- or metal webs.
- Detection of materials with weights from  $<20 \text{ g/m}^2$  to  $>>400 \text{ g/m}^2$ , sheet metals and plastic films up to 0.2 mm thickness.
- Three Teach-in methods + QuickTeach.
- Parameterisable with LinkControl.
- Response time of 300  $\mu\text{s}$  until label/splice is detected.
- Two fork depths of 67 mm and 150 mm.

## Safety tips

- Read instruction manual before commissioning.
- Connection, installation and adjustment may only be carried out by expert personnel.
- Not a safety component as defined by the EU Machinery Directive.

## Installation

- Install the esf-1 in such a way that the leg with the button is on top. This mounting position permits you to keep the measuring track optimally clean.
- Connect the connection line with the 4-pin M8 connector as shown in fig. 1, and with the 5-pin M12 connector as shown in fig. 2.

## Commissioning

- Turn the power supply to the esf-1 on.

## Teach-in with push-button and control input

The Teach-in process can optionally be carried out with the button on the top leg of the fork or with the Teach-in input on pin 5 on the M12 connector or pin 2 on the M8 connector.

## Notes using Teach-in

- The Teach-in/Com control input is parallel with the push-button.
- +U<sub>B</sub> connected to the control input corresponds to a key press.
- A Teach-in using the control input can also be carried out with synchronisation active.

## Standard Teach-in

There are three Teach-in methods available:

- Dynamic Teach-in of label
- Separate Teach-in for backing material and labels
- Splice sensor

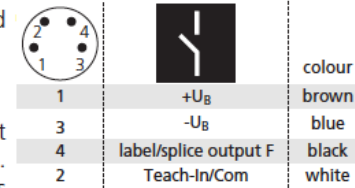


Fig. 1: Pin assignment of esf-1/CF and colour coding for microsonic connection lines

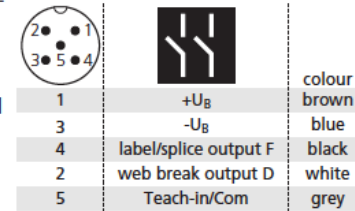


Fig. 2: Pin assignment of esf-1/CDF and esf-1/15/CDF and colour coding of the microsonic connection lines

## QuickTeach

With QuickTeach, you have a simplified Teach-in process that you have to activate once before initial commissioning.

## Notes using QuickTeach

- To use QuickTeach, you have to decide whether the sensor will act as a label or a splice detector.
- Once QuickTeach is activated, you can't switch between NCC/NOC any more.
- The QuickTeach functionality is available for sensors with lot numbers > 12xxxx.

- Insert the web material into the fork. The material does not touch the fork. Carry out one of the three standard Teach-in methods or QuickTeach.

## Operation

The esf-1 continually performs measurements and sets the switched outputs based on its results. Operation modes see fig. 3.

operation mode	LED green	LED yellow	LED red
ready to operate	on	-	-
backing material	on	off	off
label/splice	on	on	off
web break	on	off	on
error in Teach-In	on	off	on

Fig. 3: LED display

## Factory setting

The esf-1 sensors have the following settings configured at the factory:

## esf-1/CF

- Label/splice output F on NOC.
- QuickTeach is deactivated.

## esf-1/CDF and esf-1/15/CDF

- Label/splice output F on NOC.
- Output D on web break display.
- Output web break on NOC.
- QuickTeach is deactivated.

## Synchronisation

If multiple esf-1 sensors are operated in tight space, they can influence one another. To avoid this, the esf-1 sensors can be synchronised. To do this, all Teach-in/com control inputs are connected together (see figs. 1 and 2 for the connector pinouts).

## Parameterisation with LinkControl

The esf-1 can be extensively parameterised with LinkControl. To do this, you need the optionally available LCA-2 LinkControl adapter and the LinkControl software for Windows®.

## Operation with LinkControl

- Install the LinkControl software onto your PC. Connect the LinkControl adapter to your PC using the USB cable.
- Connect esf-1 to the LCA-2 as shown in the table in fig. 4.
- Connect the cable for the power supply to the LCA-2 on the other side of the T plug.
- Start the LinkControl software and follow the instructions on the screen.

	Pin (esf-1)	adapter cable colour	Pin (LCA-2)
+U <sub>B</sub>	1	brown	1
-U <sub>B</sub>	3	blue	3
Com	2/5	grey	5

Fig. 4: Connection of esf-1 to the LCA-2

- You can change the following settings:
- NOC/NCC function of the switched outputs.
  - Switched output function D.

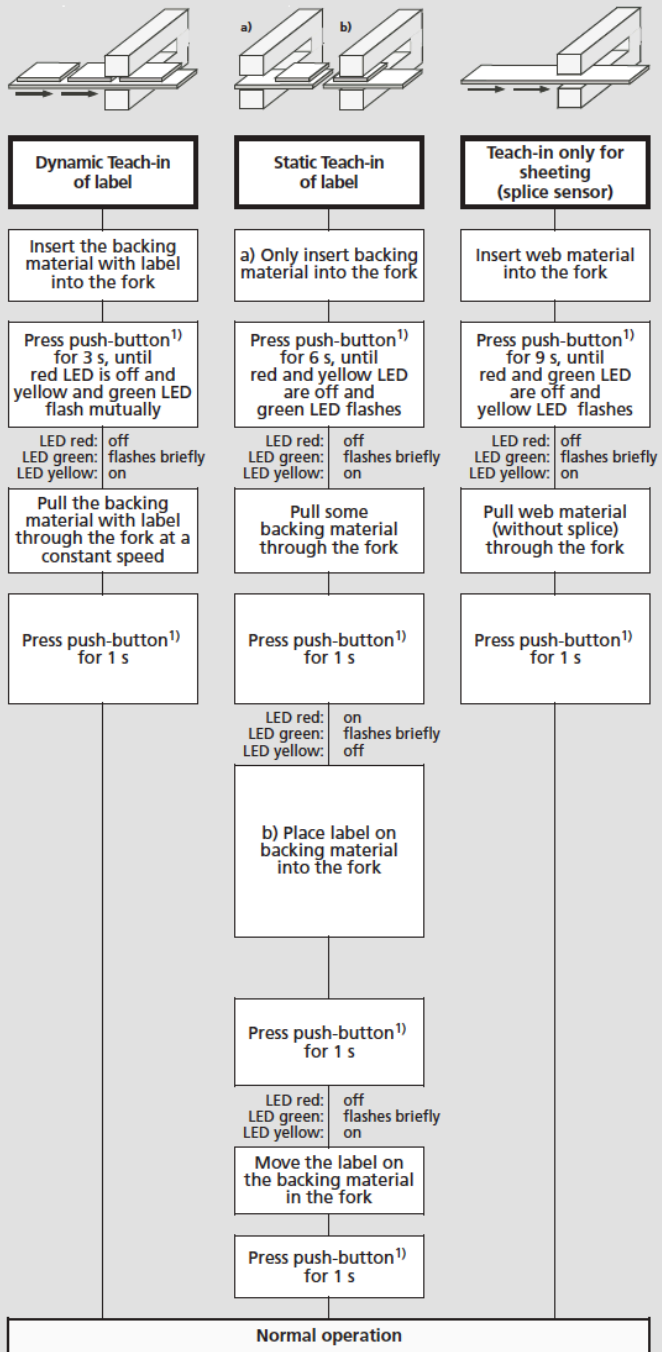
There is also a graphical illustration of the measured values available.

## Maintenance

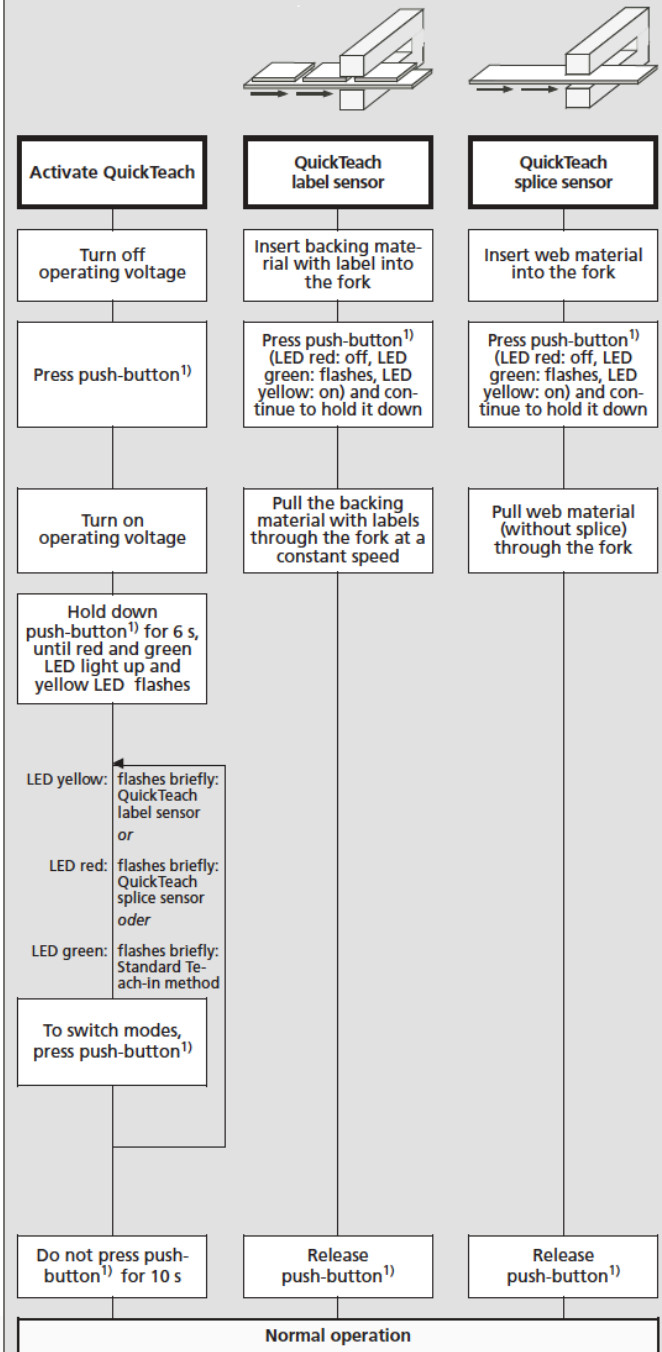
The esf-1 is maintenance-free. For significant deposits of dirt, we recommend carefully blowing out the measuring track with clean, oil-free compressed air.



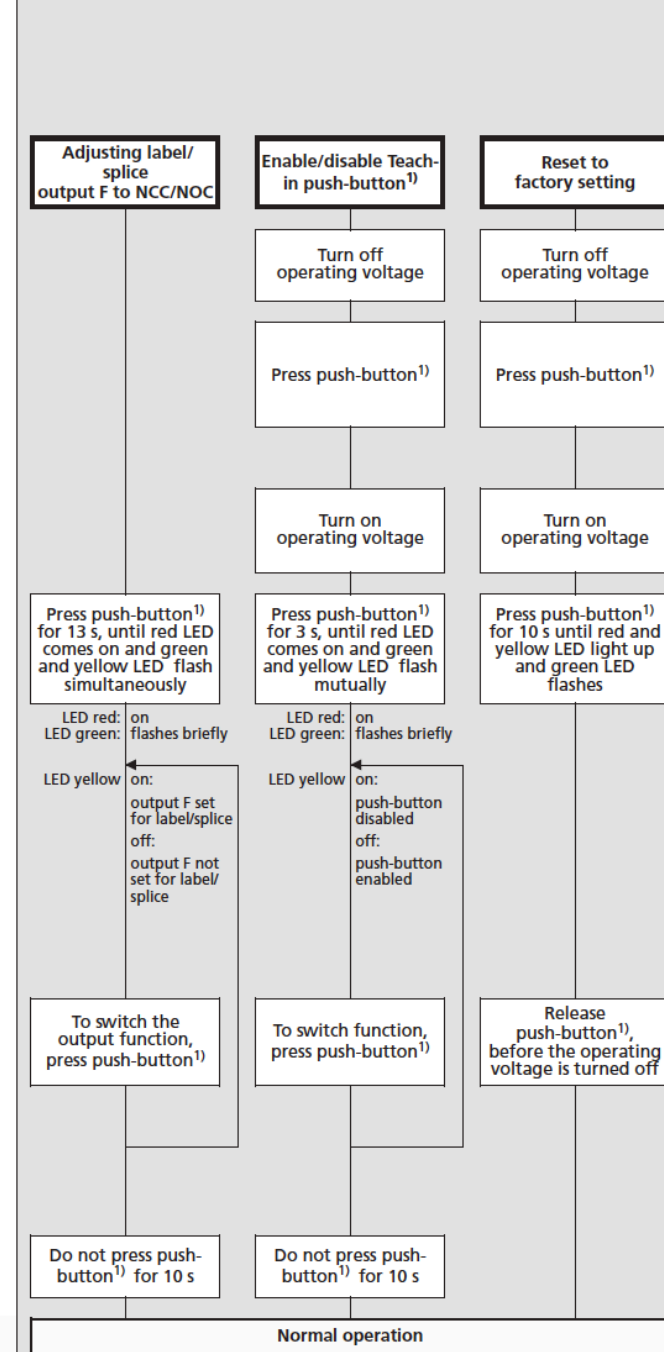
### Standard Teach-in methods



### QuickTeach

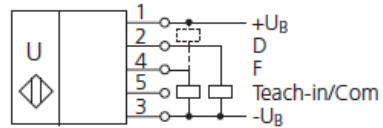


### Further settings (only available in standard Teach-in methods)

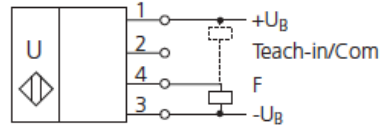


1) All settings via push-button can alternatively be made by connecting the Teach-in/control input Com to +U<sub>B</sub>.

## Technical data

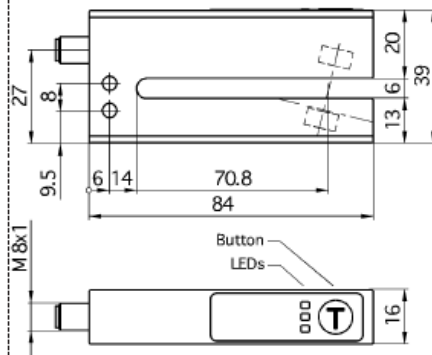


1 Push-Pull and 1 pnp switched output

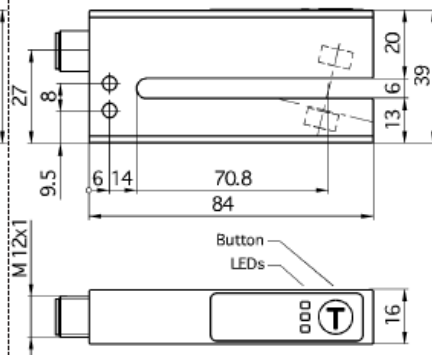


1 Push-Pull switched output

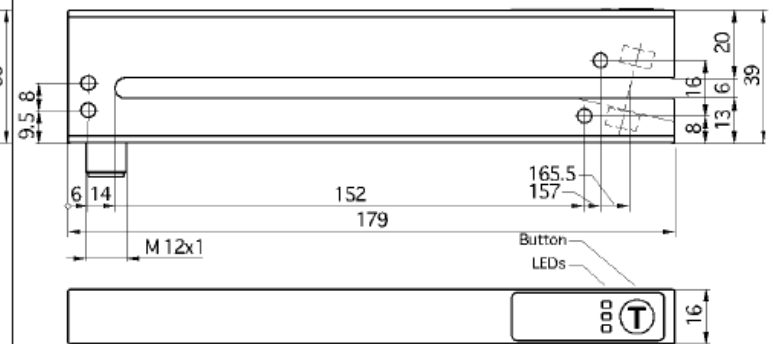
esf-1/CF



esf-1/CF



esf-1/15/CDF



**fork width:** 6 mm  
**fork depth:** 67 mm  
**transducer frequency:** 500 kHz  
**working range:** web material with grammages of < 20 g/m<sup>2</sup> to >> 400 g/m<sup>2</sup>, metal-laminated paper and films up to 0.2 mm thick, self-adhesive films, labels on backing material  
**operating voltage U<sub>B</sub>:** 20 V to 30 V DC  
**voltage ripple:** ± 10 %  
**no-load current consumption:** ≤ 50 mA  
**type of connection:** 4-pin M8 initiator plug  
**controls:** Teach-in push-button, control input Pin 2  
**programmable:** Teach-in, LinkControl  
**response time<sup>1)</sup>:** 300 μs – 2 ms, depending on the material  
**indicator:** LED green: working/backing material  
 LED yellow: label/splice  
 LED red: web break, Teach-in dismissed  
**housing:** aluminium anodized; plastic parts: PBT, PA; ultrasonic transducer: polyurethane, epoxy resin with glass content  
**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  
**norm conformity:** EN 60947-5-2  
**time delay before availability:** < 300 ms

**fork width:** 6 mm  
**fork depth:** 67 mm  
**transducer frequency:** 500 kHz  
**working range:** web material with grammages of < 20 g/m<sup>2</sup> to >> 400 g/m<sup>2</sup>, metal-laminated paper and films up to 0.2 mm thick, self-adhesive films, labels on backing material  
**operating voltage U<sub>B</sub>:** 20 V to 30 V DC  
**voltage ripple:** ± 10 %  
**no-load current consumption:** ≤ 50 mA  
**type of connection:** 5-pin M12 initiator plug  
**controls:** Teach-in push-button, control input Pin 5  
**programmable:** Teach-in, LinkControl  
**response time<sup>1)</sup>:** 300 μs – 2 ms, depending on the material  
**indicator:** LED green: working/backing material  
 LED yellow: label/splice  
 LED red: web break, Teach-in dismissed  
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**weight:** 160 g  
**norm conformity:** EN 60947-5-2  
**time delay before availability:** < 300 ms

**order no.:** esf-1/CF  
**label/splice output F:** Push-Pull, +U<sub>B</sub>-4 V, -U<sub>B</sub>+2 V, I<sub>max</sub> = 100 mA, short-circuit-proof, switchable NOC/NCC  
**web break output D:**

**order no.:** esf-1/CDF  
**label/splice output F:** Push-Pull, +U<sub>B</sub>-4 V, -U<sub>B</sub>+2 V, I<sub>max</sub> = 100 mA, short-circuit-proof, switchable NOC/NCC  
**web break output D:** pnp, +U<sub>B</sub>-3 V, I<sub>max</sub> = 100 mA, short-circuit-proof

**order no.:** esf-1/15/CDF  
**label/splice output F:** Push-Pull, +U<sub>B</sub>-4 V, -U<sub>B</sub>+2 V, I<sub>max</sub> = 100 mA, short-circuit-proof, switchable NOC/NCC  
**web break output D:** pnp, +U<sub>B</sub>-3 V, I<sub>max</sub> = 100 mA, short-circuit-proof

<sup>1)</sup> Can be programmed with Teach-in and LinkControl