



Operating Instructions

Ultrasonic label and splice sensor with 1 or 2 switched outputs

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

Functional principle

An ultrasonic transmitter in the lower tine of the fork beams a fast sequence of pulses through the backing material. The sound pulses cause the backing material to vibration, so that a greatly attenuated sound wave is beamed from the opposite side. The receiver in the upper tine of the fork receives and evaluates this sound wave. 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. The esf-1 sensor can be used as a label sensor or a splice sensor. 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 paperwebs, plastic webs or metal webs.
- Detection of materials with weights from <math><20 \text{ g/m}^2</math> to >>400 g/m²; sheet metals and plastic films up to 0,2 mm thickness.
- 3 Teach-in methods + QuickTeach.
- Parameterisable with LinkControl.
- Response time of 300 µs 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 trained technicians.
- Not a safety component as defined by the EU Machinery Directive.

Installation

- Install the esf-1 in such a way that the tine with the button is on top. This installation orientation 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 that with the 5-pin M12 connector as shown in Fig. 2.

		colour
1	operating voltage +U _B	brown
3	operating voltage -U _B	blue
4	label/splice output F	black
2	Teach-In/Com	white

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

		colour
1	operating voltage +U _B	brown
3	operating voltage -U _B	blue
4	label/splice output F	black
2	web break output D	white
5	Teach-in/Com	grey

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

Commissioning

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

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

Teach-in with push-button and control input

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

Pointer

- The Teach-in/Com control input is parallel with the push-button.
- +U_B connected to the control input corresponds to a key press.

Standard Teach-in

- There are 3 Teach-in methods available:
- Dynamic Teach-in of label
 - Separate Teach-in for backing material and labels
 - Splice sensor

QuickTeach

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

Pointer

- 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 and carry out one of the three standard Teach-in methods or QuickTeach.
- Every Teach-in should be performed with at least 0,5 m of label or web material to ensure that the sensor is able to detect the whole range of the material inhomogeneities.

Working

The esf-1 continually performs measurements and sets the switched outputs based on its results.

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 D2 on web break display.
 - Output web break on NOC.
 - QuickTeach is deactivated.

Synchronisation

If multiple esf-1 sensors are operated in tight quarters, 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).

Pointer

- A Teach-in using the control input can also be carried out with synchronisation active.

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®.

Use in 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 _B	1	brown	1
-U _B	3	blue	3
Com	2/5	grey	5

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

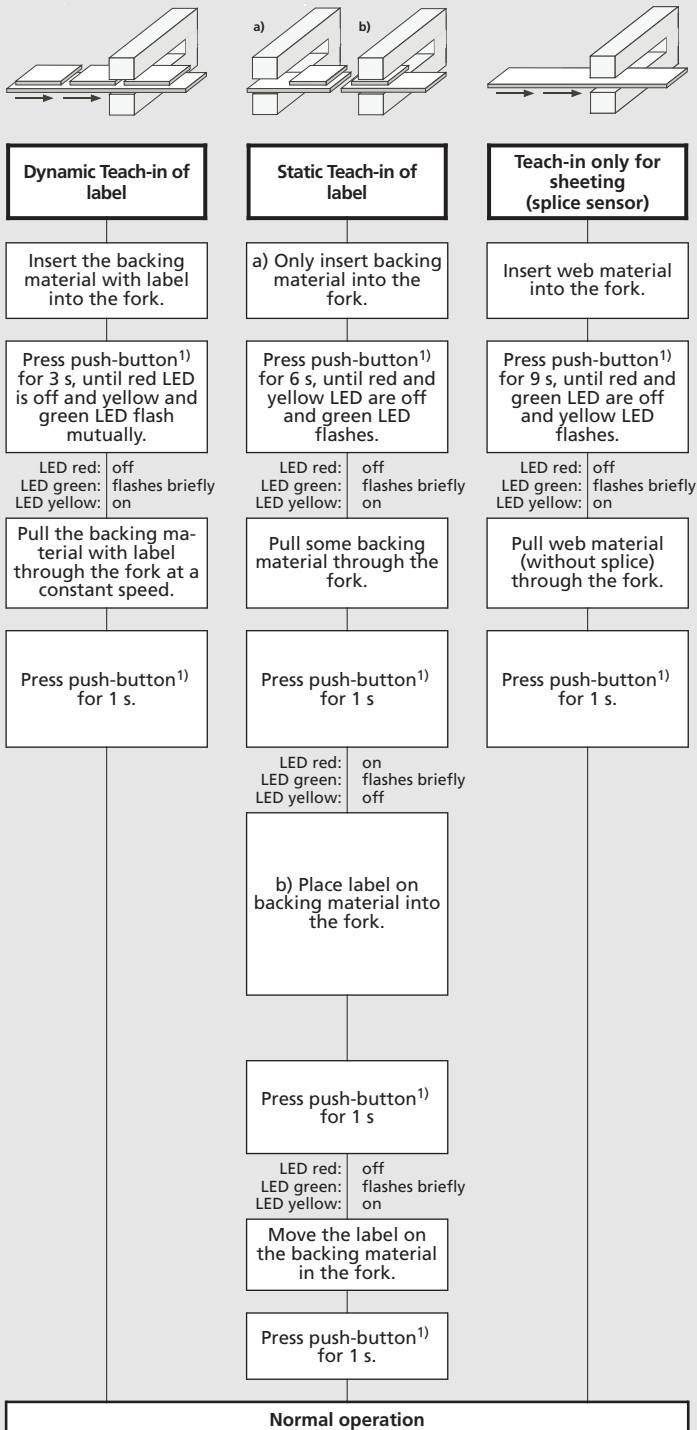
- You can change the following settings:
- NOC/NCC function of the switched outputs.
 - Switched output function D.

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

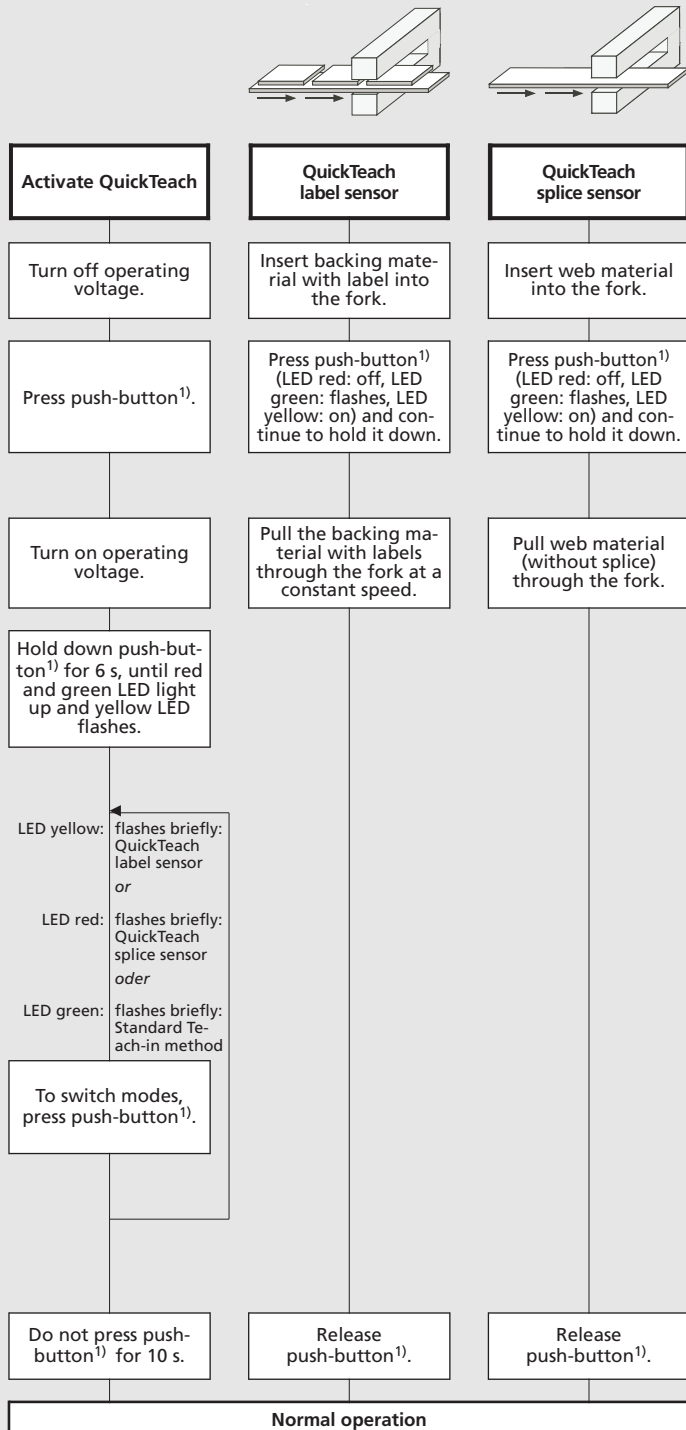
Maintenance

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.

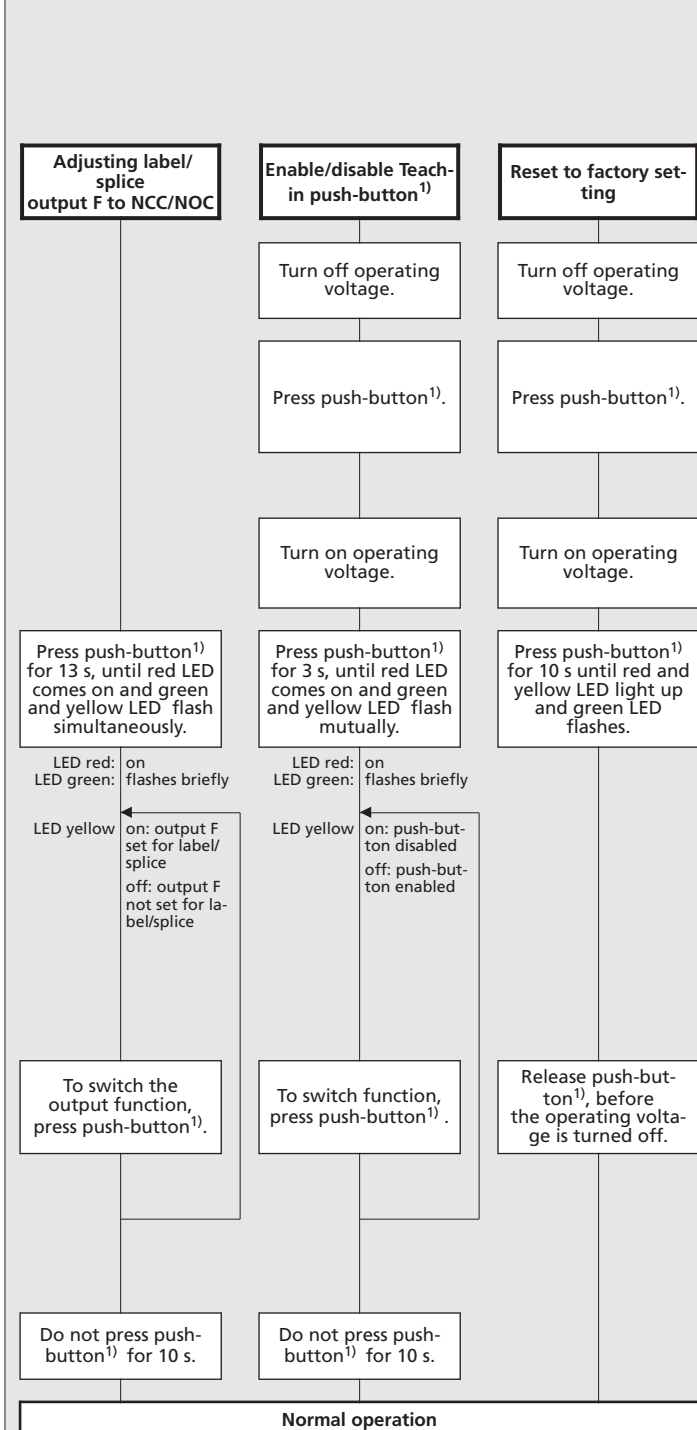
Standard Teach-in methods



QuickTeach

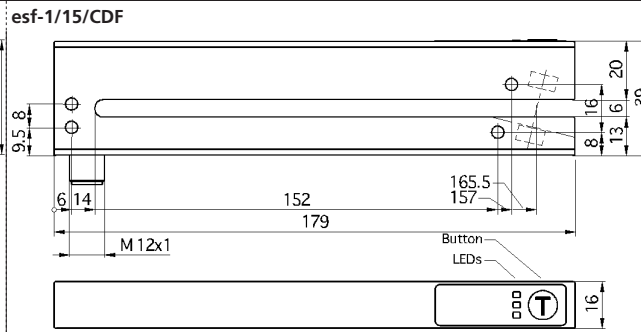
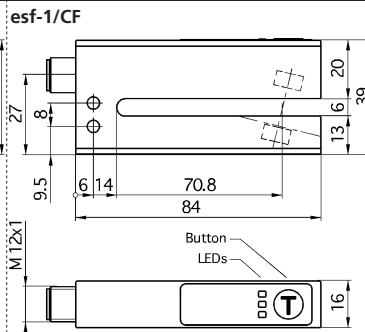
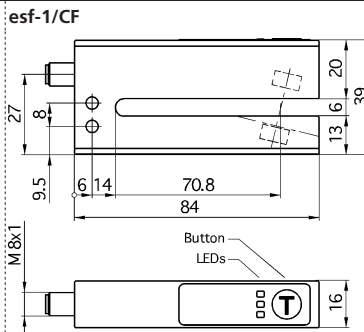
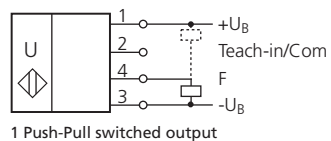
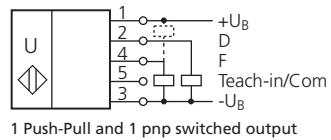


Further settings (only available in standard Teach-in methods)



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

Technical data



fork width	6 mm	6 mm	6 mm
fork depth	67 mm	67 mm	149,5 mm
transducer frequency	500 kHz	500 kHz	500 kHz
working range	web material with grammages of <math>< 20 \text{ g/m}^2 \text{ to } >> 400 \text{ g/m}^2</math>, metal-laminated paper and films up to 0,2 mm thick, self-adhesive films, labels on backing material	web material with grammages of <math>< 20 \text{ g/m}^2 \text{ to } >> 400 \text{ g/m}^2</math>, metal-laminated paper and films up to 0,2 mm thick, self-adhesive films, labels on backing material	web material with grammages of <math>< 20 \text{ g/m}^2 \text{ to } >> 400 \text{ g/m}^2</math>, metal-laminated paper and films up to 0,2 mm thick, self-adhesive films, labels on backing material
operating voltage <math>U_B</math>	20 V to 30 V DC	20 V to 30 V DC	20 V to 30 V DC
voltage ripple	$\pm 10\%$	$\pm 10\%$	$\pm 10\%$
no-load current consumption	$\le 50 \text{ mA}$	$\le 50 \text{ mA}$	$\le 50 \text{ mA}$
type of connection	4-pin M8 initiator plug	5-pin M12 initiator plug	5-pin M12 initiator plug
controls	Teach-in push-button, control input Pin 2	Teach-in push-button, control input Pin 5	Teach-in push-button, control input Pin 5
programmable	Teach-in, LinkControl	Teach-in, LinkControl	Teach-in, LinkControl
response time ¹⁾	300 μs – 2 ms, depending on the material	300 μs – 2 ms, depending on the material	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	LED green: working/backing material LED yellow: label/splice LED red: web break, Teach-in dismissed	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	aluminium anodized; plastic parts: PBT, PA; ultrasonic transducer: polyurethane, epoxy resin with glass content	aluminium anodized; plastic parts: PBT, PA; ultrasonic transducer: polyurethane, epoxy resin with glass content
class of protection to EN 60529	IP 65	IP 65	IP 65
operating temperature	+5 $^\circ\text{C}$ to +60 $^\circ\text{C}$	+5 $^\circ\text{C}$ to +60 $^\circ\text{C}$	+5 $^\circ\text{C}$ to +60 $^\circ\text{C}$
storage temperature	-40 $^\circ\text{C}$ to +85 $^\circ\text{C}$	-40 $^\circ\text{C}$ to +85 $^\circ\text{C}$	-40 $^\circ\text{C}$ to +85 $^\circ\text{C}$
weight	80 g	80 g	160 g
norm conformity	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
time delay before availability	<math>< 300 \text{ ms}</math>	<math>< 300 \text{ ms}</math>	<math>< 300 \text{ ms}</math>
order no.	esf-1/CF	esf-1/CDF	esf-1/15/CDF
label/splice output F	Push-Pull, $+U_B - 4 \text{ V}$, $-U_B + 2 \text{ V}$, $I_{\text{max}} = 100 \text{ mA}$, short circuit proof, switchable NOC/NCC	Push-Pull, $+U_B - 4 \text{ V}$, $-U_B + 2 \text{ V}$, $I_{\text{max}} = 100 \text{ mA}$, short circuit proof, switchable NOC/NCC	Push-Pull, $+U_B - 4 \text{ V}$, $-U_B + 2 \text{ V}$, $I_{\text{max}} = 100 \text{ mA}$, short circuit proof, switchable NOC/NCC
web break output D	pnp, $+U_B - 3 \text{ V}$, $I_{\text{max}} = 100 \text{ mA}$, short circuit proof,	pnp, $+U_B - 3 \text{ V}$, $I_{\text{max}} = 100 \text{ mA}$, short circuit proof,	pnp, $+U_B - 3 \text{ V}$, $I_{\text{max}} = 100 \text{ mA}$, short circuit proof,

¹⁾ Can be programmed with Teach-in and LinkControl