microsonic

Operating manual

Ultrasonic label and splice sensor with one or two switched outputs

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

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 vibration, so that a greatly attenuated sound save 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 g/m^2 to >>400 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 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 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 conection 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_B connected to the control input correponds 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

		colour
1	+U_B	brown
3	-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	+U_B	brown
3	-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

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 > 12xxxxx.
- 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_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 illustration of the measured values available.

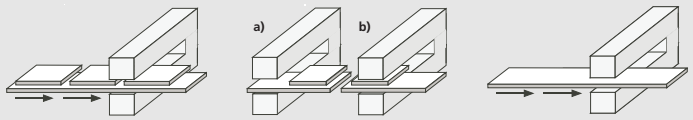
Maintenance

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.

CE

2014/30/EU

Standard Teach-in methods



Dynamic Teach-in of label

Insert the backing material with label into the fork

Press push-button[1] for 3 s, until red LED is off and yellow and green LED flash mutually

LED red: off
LED green: flashes briefly
LED yellow: on

Pull the backing material with label through the fork at a constant speed

Press push-button[1] for 1 s

Static Teach-in of label

a) Only insert backing material into the fork

Press push-button[1] for 6 s, until red and yellow LED are off and green LED flashes

LED red: off
LED green: flashes briefly
LED yellow: on

Pull some backing material through the fork

Press push-button[1] for 1 s

LED red: on
LED green: flashes briefly
LED yellow: off

b) Place label on backing material into the fork

Press push-button[1] for 1 s

LED red: off
LED green: flashes briefly
LED yellow: on

Move the label on the backing material in the fork

Press push-button[1] for 1 s

Teach-in only for sheeting (splice sensor)

Insert web material into the fork

Press push-button[1] for 9 s, until red and green LED are off and yellow LED flashes

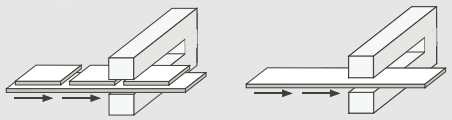
LED red: off
LED green: flashes briefly
LED yellow: on

Pull web material (without splice) through the fork

Press push-button[1] for 1 s

Normal operation

QuickTeach



Activate QuickTeach

Turn off operating voltage

Press push-button[1]

Turn on operating voltage

Hold down push-button[1] for 6 s, until red and green LED light up and yellow LED flashes

LED yellow: flashes briefly: QuickTeach label sensor
or
LED red: flashes briefly: QuickTeach splice sensor
oder
LED green: flashes briefly: Standard Teach-in method

To switch modes, press push-button[1]

Do not press push-button[1] for 10 s

QuickTeach label sensor

Insert backing material with label into the fork

Press push-button[1] (LED red: off, LED green: flashes, LED yellow: on) and continue to hold it down

Pull the backing material with labels through the fork at a constant speed

Release push-button[1]

QuickTeach splice sensor

Insert web material into the fork

Press push-button[1] (LED red: off, LED green: flashes, LED yellow: on) and continue to hold it down

Pull web material (without splice) through the fork

Release push-button[1]

Normal operation

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

Adjusting label/ splice output F to NCC/NOC

Press push-button[1] for 13 s, until red LED comes on and green and yellow LED flash simultaneously

LED red: on
LED green: flashes briefly

LED yellow: on:
output F set for label/splice
off:
output F not set for label/ splice

To switch the output function, press push-button[1]

Do not press push-button[1] for 10 s

Enable/disable Teach-in push-button[1]

Turn off operating voltage

Press push-button[1]

Turn on operating voltage

Press push-button[1] for 3 s, until red LED comes on and green and yellow LED flash mutually

LED red: on
LED green: flashes briefly

LED yellow: on:
push-button disabled
off:
push-button enabled

To switch function, press push-button[1]

Do not press push-button[1] for 10 s

Reset to factory setting

Turn off operating voltage

Press push-button[1]

Turn on operating voltage

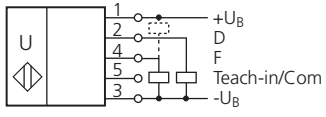
Press push-button[1] for 10 s until red and yellow LED light up and green LED flashes

Release push-button[1], before the operating voltage is turned off

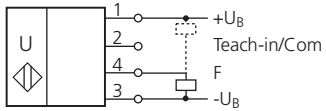
Normal operation

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

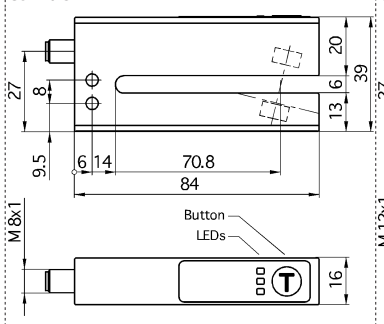
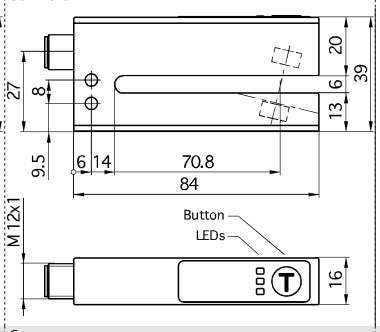
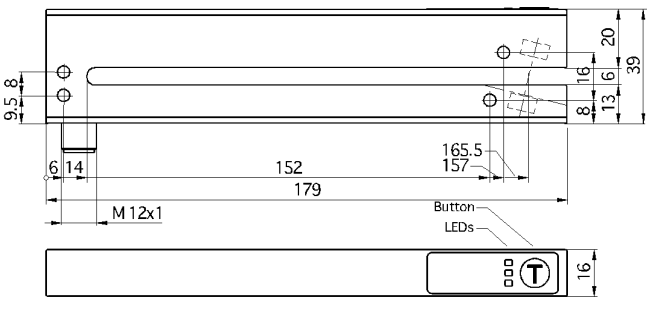
Technical data



1 Push-Pull and 1 pnp switched output



1 Push-Pull switched output

	esf-1/CF	esf-1/CDF	esf-1/15/CDF
			
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 < 20 g/m² to >> 400 g/m², metal-laminated paper and films up to 0.2 mm thick, self-adhesive films, labels on backing material	web material with grammages of < 20 g/m² to >> 400 g/m², metal-laminated paper and films up to 0.2 mm thick, self-adhesive films, labels on backing material	web material with grammages of < 20 g/m² to >> 400 g/m², metal-laminated paper and films up to 0.2 mm thick, self-adhesive films, labels on backing material
operating voltage U_B	20 V to 30 V DC	20 V to 30 V DC	20 V to 30 V DC
voltage ripple	± 10 %	± 10 %	± 10 %
no-load current consumption	≤ 50 mA	≤ 50 mA	≤ 50 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 °C to +60 °C	+5 °C to +60 °C	+5 °C to +60 °C
storage temperature	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °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 availibility	< 300 ms	< 300 ms	< 300 ms
order no.	esf-1/CF	esf-1/CDF	esf-1/15/CDF
label/splice output F	Push-Pull, +U_B-4 V, -U_B+2 V, $I_{max.}$ = 100 mA, short-circuit-proof, switchable NOC/NCC	Push-Pull, +U_B-4 V, -U_B+2 V, $I_{max.}$ = 100 mA, short-circuit-proof, switchable NOC/NCC	Push-Pull, +U_B-4 V, -U_B+2 V, $I_{max.}$ = 100 mA, short-circuit-proof, switchable NOC/NCC
web break output D		pnp, +U_B-3 V, $I_{max.}$ = 100 mA, short-circuit-proof	pnp, +U_B-3 V, $I_{max.}$ = 100 mA, short-circuit-proof

[1)] Can be programmed with Teach-in and LinkControl