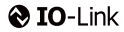




Operating manual

Ultrasonic label and splice sensor with one or two switching outputs with IO-Link interface

- esf-1/CF/A
- esf-1/CDF/A
- esf-1/7/CDF/A
- esf-1/15/CDF/A



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 and/or a splice sensor.

The backing material transmits a different signal level from the level with label or rather from the backing material with 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 standard Teach-in methods and optional QuickTeach.
- Parameterisable with LinkControl.
- Response time of 300 μs until label resp. splice is detected.
- Three fork depths of 70 mm, 86 mm and 165 mm.
- The esf-1 sensors are IO-Link capable according to specification V1.1.

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 5-pin M12 connector as shown in fig. 2.

Commissioning

- Turn the power supply.

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.

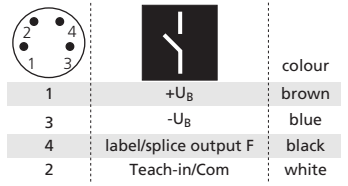


Fig. 1: Pin assignment of esf-1/CF and colour coding for microsonic connection lines

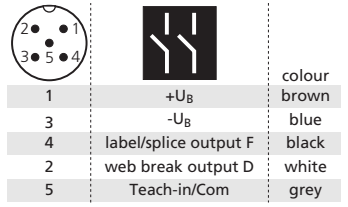


Fig. 2: Pin assignment of esf-1/7, CDF/A and colour coding of the microsonic connection lines

Notes using Teach-in

- The Teach-in/Com control input is parallel with the push-button.
- +U_B 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.
- 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.
- A failed teach-in is indicated by the flashing of the 3 LEDs.

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

QuickTeach

With QuickTeach, you have optional 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.

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	flash	flash	flash

Fig. 3: LED display

Factory setting

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

- esf-1/CF/A**
 - Label/splice output F on high active.
 - QuickTeach is deactivated.
- esf-1/7, CDF/A**
 - Label/splice output F on high active.
 - 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 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 LinkControl-software at your PC. Connect the adapter to your PC using the usb cable.
- Connect the power supply cable at the T-connector of the LCA-2.
- Start the LinkControl-Software and follow the instructions on the screen.
- To connect the esf-1/CF/A with the LinkControl-Adapter you need an adapter cable M8 to M12.

You can make the following settings:

- NC/NO function of the switching outputs
- Function of the switching output D
- Teach-in procedure
- QuickTeach change

In addition, the measured values are shown in a graph.

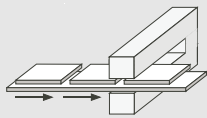
IO-Link

- The latest IODD file and information about start-up and configuration of esf sensors with IO-Link, you will find online at: www.microsonic.de/esf.

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



Dynamic Teach-in of label

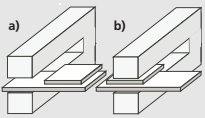
Insert the backing material with label into the fork

Press push-button¹⁾ 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

Wait until the flashing stops



Static Teach-in of label

a) Only insert backing material into the fork

Press push-button¹⁾ 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-button¹⁾ for 1 s

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

b) Place backing material with label into the fork

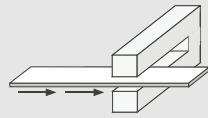
Press push-button¹⁾ for 1 s

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

Move the backing material with the label slightly in the fork, only the label should be detected.

Press push-button¹⁾ for 1 s

Normal operation



Teach-in only for sheeting (splice sensor)

Insert web material into the fork

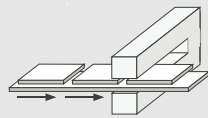
Press push-button¹⁾ for 9 s, until red and green LED are off and yellow LED flashes

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

Pull web material (without splice) through the fork

Press push-button¹⁾ for 1 s

QuickTeach



Activate QuickTeach

Turn off operating voltage

Press push-button²⁾

Turn on operating voltage

Hold down push-button²⁾ for 6 s, until red and green LED light up and yellow LED flashes

LED yellow: flashes briefly: QuickTeach label sensor or

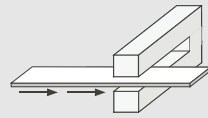
LED red: flashes briefly: QuickTeach splice sensor oder

LED green: flashes briefly: Standard Teach-in method

To switch modes, press push-button²⁾

Do not press push-button²⁾ for 10 s

Normal operation



QuickTeach label sensor

Insert backing material with label into the fork

Press push-button¹⁾ until LED red: off, LED green: flashes, LED yellow: on

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

Wait until the flashing stops

QuickTeach splice sensor

Insert web material into the fork

Press push-button¹⁾ (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-button¹⁾

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

Adjusting label/splice output F to NCC/NOC

Press push-button¹⁾ 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-button¹⁾

Do not press push-button¹⁾ for 10 s

Enable/disable Teach-in

Turn off operating voltage

Press push-button²⁾

Turn on operating voltage

Press push-button²⁾ 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 enabled
off:
push-button disabled

To switch function, press push-button²⁾

Do not press push-button²⁾ for 10 s

Reset to factory setting

Turn off operating voltage

Press push-button²⁾

Turn on operating voltage

Press push-button²⁾ for 10 s until red and yellow LED light up and green LED flashes

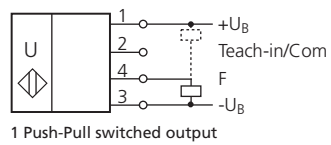
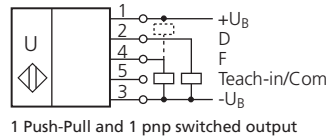
Release push-button²⁾ before the operating voltage is turned off

Normal operation

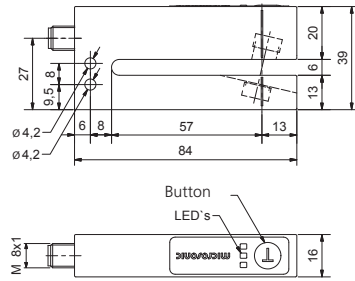
1) All settings via push-button can alternatively be made by connecting the Teach-in/control input Com to +U_B.

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

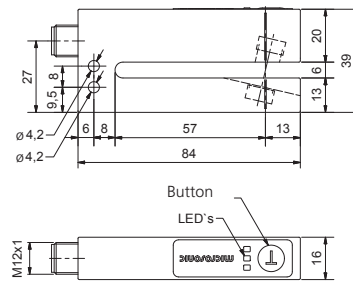
Technical data



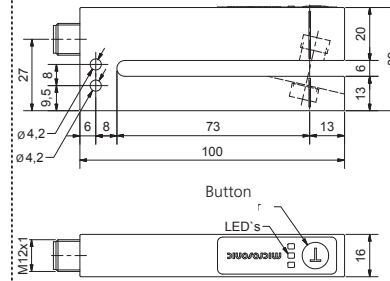
esf-1/CF/A



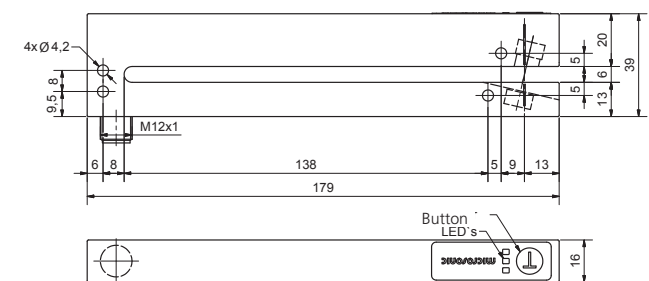
esf-1/CDF/A



esf-1/7/CDF/A



esf-1/15/CDF/A



fork width: 6 mm

fork depth: 70 mm

transducer frequency: 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

operating voltage UB: 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, IO-Link, LinkControl

response time¹⁾:

300 μs – 2 ms, depending on the material

indicator:

LED green: working/backing material

LED yellow: label/splice

LED red: web break

LEDs flash: 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

order no.: esf-1/CF/A

label/splice output F:

Push-Pull, +UB-3 V, -UB+3 V, I_{max} = 100 mA, short-circuit-proof, switchable active/low active

web break output D:

pnp, +UB-3 V, I_{max} = 100 mA, short-circuit-proof, switchable NOC/NCC

fork width: 6 mm

fork depth: 70 mm

transducer frequency: 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

operating voltage UB: 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, IO-Link, LinkControl

response time¹⁾:

300 μs – 2 ms, depending on the material

indicator:

LED green: working/backing material

LED yellow: label/splice

LED red: web break

LEDs flash: 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

order no.: esf-1/CDF/A

label/splice output F:

Push-Pull, +UB-3 V, -UB+3 V, I_{max} = 100 mA, short-circuit-proof, switchable active/low active

web break output D:

pnp, +UB-3 V, I_{max} = 100 mA, short-circuit-proof, switchable NOC/NCC

fork width: 6 mm

fork depth: 86 mm

transducer frequency: 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

operating voltage UB: 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, IO-Link, LinkControl

response time¹⁾:

300 μs – 2 ms, depending on the material

indicator:

LED green: working/backing material

LED yellow: label/splice

LED red: web break

LEDs flash: 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: 90 g

norm conformity: EN 60947-5-2

time delay before availability: < 300 ms

order no.: esf-1/7/CDF/A

label/splice output F:

Push-Pull, +UB-3 V, -UB+3 V, I_{max} = 100 mA, short-circuit-proof, switchable active/low active

web break output D:

pnp, +UB-3 V, I_{max} = 100 mA, short-circuit-proof, switchable NOC/NCC

fork width: 6 mm

fork depth: 165 mm

transducer frequency: 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

operating voltage UB: 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, IO-Link, LinkControl

response time¹⁾:

300 μs – 2 ms, depending on the material

indicator:

LED green: working/backing material

LED yellow: label/splice

LED red: web break

LEDs flash: 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: 160 g

norm conformity: EN 60947-5-2

time delay before availability: < 300 ms

order no.: esf-1/15/CDF/A

label/splice output F:

Push-Pull, +UB-3 V, -UB+3 V, I_{max} = 100 mA, short-circuit-proof, switchable active/low active

web break output D:

pnp, +UB-3 V, I_{max} = 100 mA, short-circuit-proof, switchable NOC/NCC

¹⁾ Can be programmed with Teach-in, IO-Link and LinkControl