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EVERY THING ULTRA SONIC

extract from our online catalogue:

esf-1 ultrasonic label and splice sensors

current to: 2026-10-16

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esf-1 ultrasonic label and splice sensors

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

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

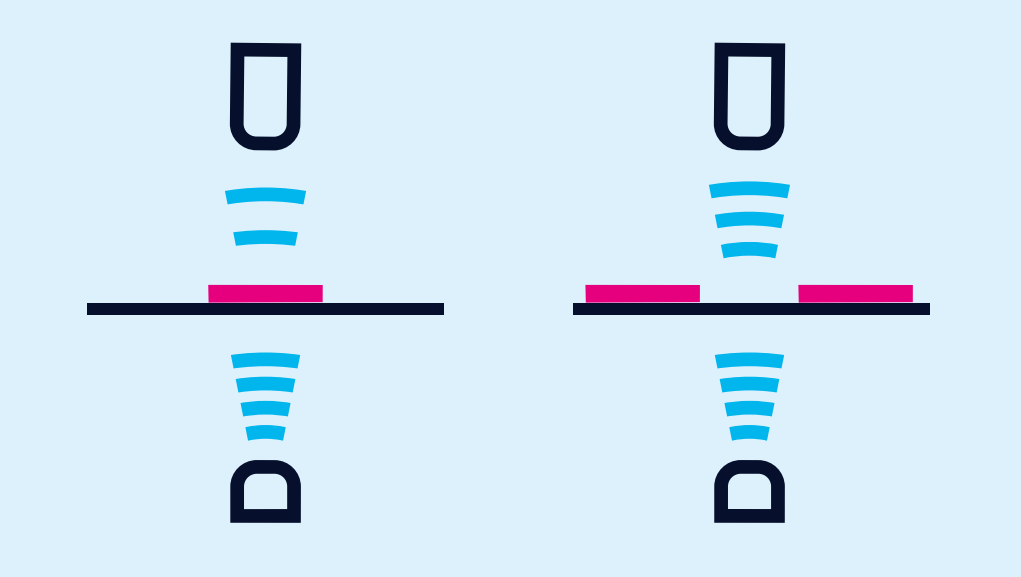
Basics

- 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

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.

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.

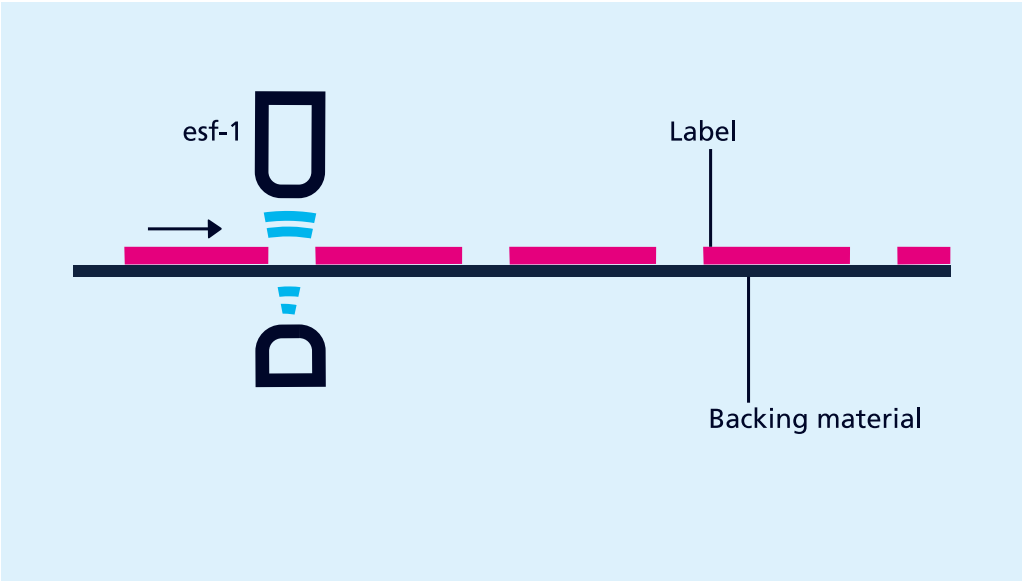
To be able to detect special labels, for example labels with punches or perforations, there are three different Teach-in methods available.

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.



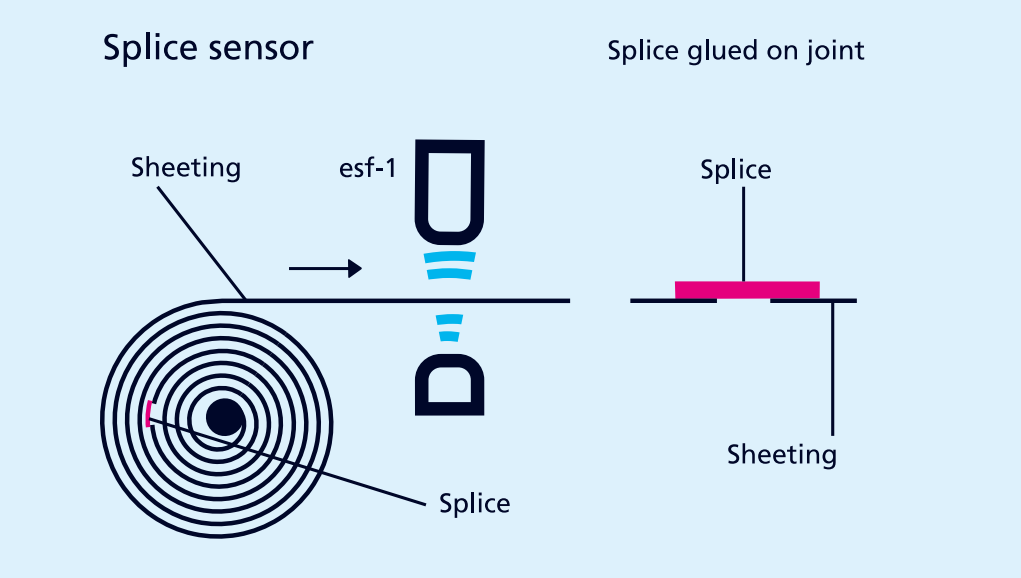
esf-1 as label sensor

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 a splice sensor

The Teach-in procedure

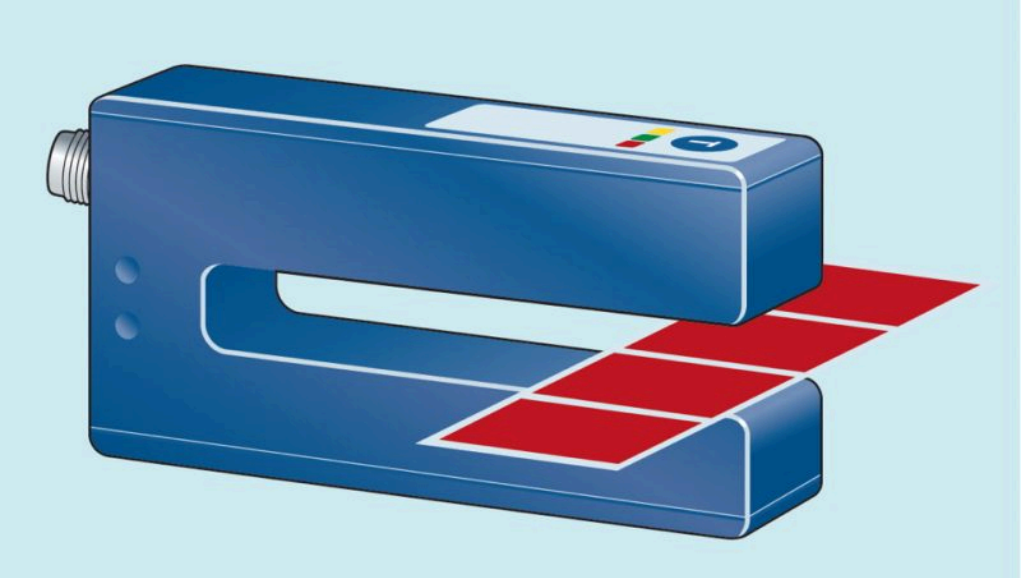
can optionally be carried out with the button on the top of the housing or with pin 5 on the unit's connector.

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.

Smart Sonic Function

The sensor has an additional recipe management function integrated via IO-Link. To use this function, the different labels with carrier material are first taught in and the material parameters are stored in the controller. If the label is changed, the operator selects the label type on the controller. The controller then writes the label-specific parameters back to the sensor.

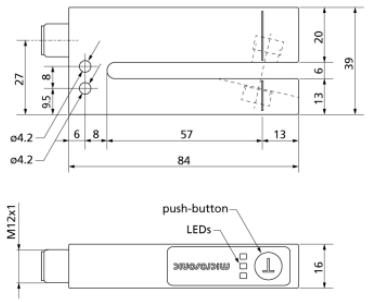
esf+1
new label sensor

Experience speed and precision

The new esf+1 ultrasonic label sensors combine a slim, flat housing with maximum positioning accuracy and ultra-fast measurement times.

esf-1/CDF/A

scale drawing



1 x Push-Pull + 1 x pnp

design	fork-like
operating mode	IO-Link label/splice detection
working range	sheeting with weights of < 20 g/m^2 up to >> 400 g/m^2, metal-laminated sheets and films up to 0.2 mm thick, self-adhesive films, labels on backing material
particularities	IO-Link Smart Sensor Profile UL Listed

Ultrasonic-Specific

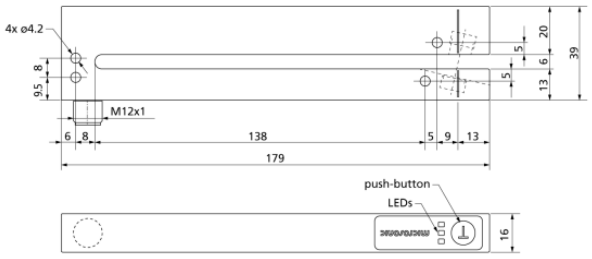
means of measurement	pulse operation with amplitude evaluation
transducer frequency	500 kHz

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-1/15/CDF/A

scale drawing



1 x Push-Pull + 1 x pnp

design	fork-like
operating mode	IO-Link label/splice detection
working range	sheeting with weights of < 20 g/m^2 up to >> 400 g/m^2, metal-laminated sheets and films up to 0.2 mm thick, self-adhesive films, labels on backing material
particularities	größere Gabelweite/-Tiefe IO-Link Smart Sensor Profile UL Listed

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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

outputs

output 1	switching output label/splice detected Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA NOC/NCC adjustable, short-circuit-proof
Ausgang 2	switching output label/splice detected web break pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response delay	300 µs up to 2,25 ms, de-pendent on the material
delay prior to availability	< 300 ms

Inputs

input 1	com input synchronisation input teach-in input

housing

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	esf-1/15/CDF/A
further versions	larger fork width/depth

Technical Features/Characteristics

controls	1 push-button com input
scope for settings	Teach-in and QuickTeach via push-button Teach-in via com input on pin 5 LCA-2 with LinkControl IO-Link
synchronization	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status Pin 4, 1 x LED red: switch status Pin 2

outputs

output 1	switching output label/splice detected Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA NOC/NCC adjustable, short-circuit-proof
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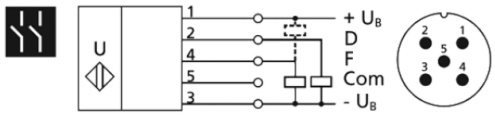
Technical Features/Characteristics

controls	1 push-button com input
scope for settings	Teach-in and QuickTeach via push-button Teach-in via com input on pin 5 LCA-2 with LinkControl IO-Link
synchronization	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status Pin 4, 1 x LED red: switch status Pin 2

Accessories

deployable accessory	KST5A-2/M12 KST5A-5/M12 KST5G-2/M12 KST5G-5/M12 LCA-2 LCA-2 Koffer

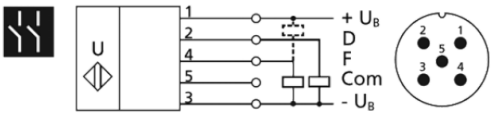
pin assignment



Accessories

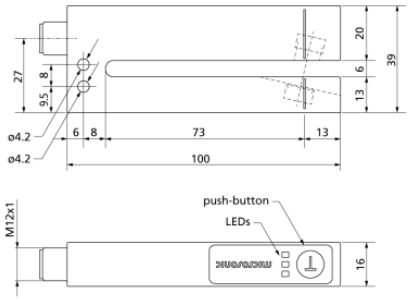
deployable accessory	KST5A-2/M12 KST5A-5/M12 KST5G-2/M12 KST5G-5/M12 LCA-2 LCA-2 Koffer

pin assignment



esf-1/7/CDF/A

scale drawing



1 x Push-Pull + 1 x pnp

design	fork-like
operating mode	IO-Link label/splice detection
working range	sheeting with weights of < 20 g/m^2 up to >> 400 g/m^2, metal-laminated sheets and films up to 0.2 mm thick, self-adhesive films, labels on backing material
particularities	größere Gabelweite/-Tiefe IO-Link Smart Sensor Profile UL Listed

Ultrasonic-Specific

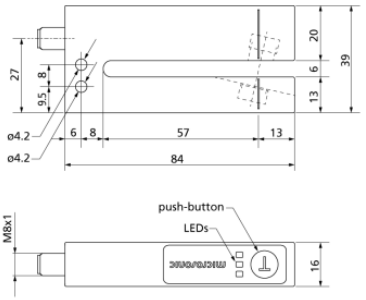
means of measurement	pulse operation with amplitude evaluation
transducer frequency	500 kHz

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/CF/A

scale drawing



1 x Push-Pull

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operating mode	IO-Link label/splice detection
working range	sheeting with weights of < 20 g/m^2 up to >> 400 g/m^2, metal-laminated sheets and films up to 0.2 mm thick, self-adhesive films, labels on backing material
particularities	IO-Link Smart Sensor Profile UL Listed

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	4-pin M8 initiator plug

outputs

output 1	switching output label/splice detected Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA NOC/NCC adjustable, short-circuit-proof
Ausgang 2	switching output label/splice detected web break pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response delay	300 µs up to 2,25 ms, de-pendent on the material
delay prior to availability	< 300 ms

Inputs

input 1	com input synchronisation input teach-in input

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further versions	larger fork width/depth

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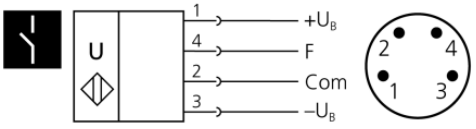
Technical Features/Characteristics

controls	1 push-button
scope for settings	Teach-in und QuickTeach über Taster Teach-in über Com-Eingang an Pin 2 LCA-2 mit LinkControl IO-Link

Accessories

deployable accessory	KST4A-2/M8 KST4G-2/M8 LCA-2 LCA-2 Koffer

pin assignment



Accessories

deployable accessory	KST5A-2/M12
	KST5A-5/M12
	KST5G-2/M12
	KST5G-5/M12
	LCA-2
	LCA-2 Koffer

pin assignment

