

A comprehensive solution for industrial applications

# ULTRASONIC SENSORS

**microsonic-App**



Free download.

Available on the  
App Store



Extract from our online catalogue:

## esp-4 label/splice sensor

Current to: 2015-01-12

microsonic gmbh, hauert 16, d-44227 dortmund, telephone: +49 231 975151-0, fax: +49 231 975151-51, e-mail: info@microsonic.de  
microsonic® is a registered trademark of microsonic GmbH. All rights reserved.

esp-4: Label and splice sensor compact in a single unit, optionally with M12 sensor heads.



## Highlights

- > **3 Teach-in methods** ::: to be able to configure the sensor individually for any task
- > **Response time < 300 µs** ::: for use at high web and label speeds
- > **Splice detection even for thick band materials**
- > **Variants with very compact transmitters and receivers in the M12 threaded sleeve**

## Basics

- > **Label and splice sensor in a single unit**
- > **2 switching outputs** ::: for label/splice detection and web break monitoring
- > **LinkControl** ::: as optional assistance for installation and commissioning

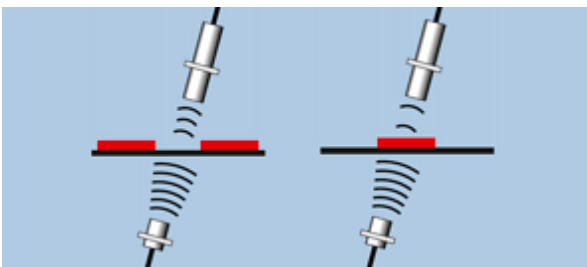
# Description

## esp-4 – one unit for all cases:

### Label and splice sensor in one appliance

With a rapid pulse sequence, an ultrasonic transmitter beams upwards against the backing material. The effect of the sound pulses inducing the backing material to vibrate is for a markedly weakened sonic wave to be emitted on the opposite side.

The receiver receives this sonic wave and analyses it. The backing material signal level is different to that of the label or splice. And this difference in signal is analysed by the esp-4. The difference between backing material and a label or between sheeting and splice can be very slight indeed. In order to differentiate, the esp-4 sensor has to learn the signal level for the backing material or sheeting.

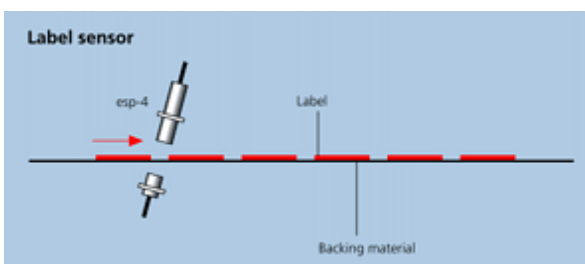


Backing material with label provides an attenuated signal level

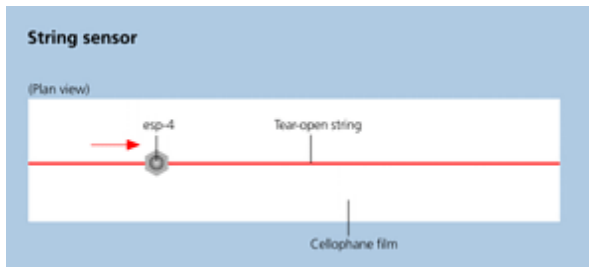
The esp-4 sensors can be used as a label and splice sensor. The 3 Teach-in methods permit the esp-4 sensor to be optimally set for each and every assignment.

### A) Dynamic Teach-in of backing material and label

During Teach-in, the backing material with the labels is led at a constant speed through the esp-4 sensor. The esp-4 sensor automatically learns signal levels for the labels and for the gaps between them. This Teach-in method is also suitable for Teach-in of a tear-open string on a cellophane film. Here, during Teach-in, the tear-open string on the cellophane film is moved a number of times through the sensor. This enables the esp-4 to gauge the changing between cellophane film and tear-open string.



esp-4 as label sensor



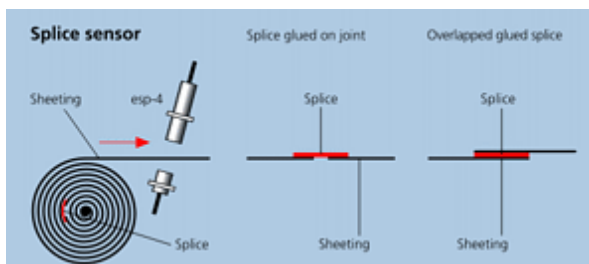
esp-4 as thread sensor

### 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) Teach-in only for sheeting

Sheeting is usually processed from the roll. Then the splice to be detected for setting the esp-4 is somewhere inaccessible in this roll. A separate Teach-in method is available here in which the Teach-in only applies to the sheeting. The esp-4 detects the splice from this difference in sound level and sets its output.



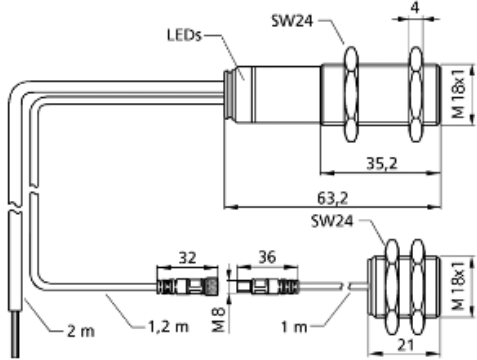

esp-4 as splice sensor

### Two housing designs with different ultrasonic frequencies

The esp-4/3CDD/M18 E+S as a receiving transducer integrated directly into the evaluation electronics is typically used for the detection of splices in thick sheetings.

The esp-4/M12/3CDD/M18 E+S has an external receiving transducer. The transmitter and receiver are each housed in M12 threaded sleeves. The variant with M12 sensor heads is preferred for the detection of labels.

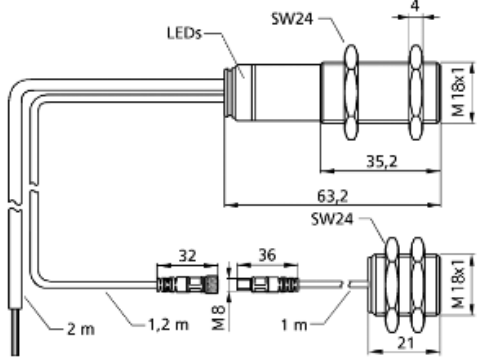

# esp-4/3CDD/M18 E+S

scale drawing	detection zone
	
 <b>2 x pnp</b>	
design	cylindrical M18
operating mode	label/splice detection
<b>ultrasonic -specific</b>	
means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver
working range	sheeting with weights of < 20 g/m <sup>2</sup> up to >> 600 g/m <sup>2</sup> , metal-laminated sheets and films up to 0.6 mm thick, self-adhesive films, labels on backing material
<b>electrical data</b>	
operating voltage U <sub>B</sub>	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
no-load current consumption	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm <sup>2</sup>
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder

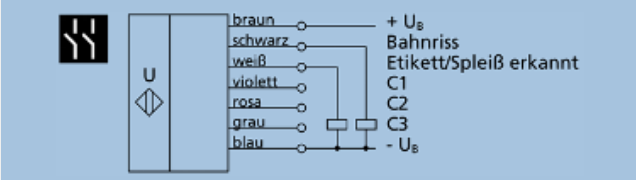
# esp-4/3CDD/M18 E+S

<b>outputs</b>	
output 1	switching output label/splice detected pnp: $I_{max} = 200 \text{ mA}$ ( $U_B - 2V$ ) NOC/NCC adjustable, short-circuit-proof
output 2	switching output web break pnp: $I_{max} = 200 \text{ mA}$ ( $U_B - 2V$ ) NOC/NCC adjustable, short-circuit-proof
response time	< 600 $\mu\text{s}$
release delay	until next edge in trigger mode, 2.5 ms in free-run mode
<b>inputs</b>	
input 1	control input
input 2	control input
input 3	control input
description	< $-U_B + 18 \text{ V}$ : logic 1; > $-U_B + 13 \text{ V}$ or control input open: logic 0
<b>housing</b>	
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
transmitter/receiver spacing	20 - 40 mm; optimal: 40 mm $\pm$ 3 mm
permissible angular deviation	recommended mounting angle: $\pm 15^\circ$ ( $\pm 10^\circ$ to $\pm 45^\circ$ ) from what is normal for the material
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	130 g
further versions	single transmitter/receiver
<b>technical features/characteristics</b>	
controls	control input
scope for settings	Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: label/splice detected / flashing red: web break
<b>documentation (download)</b>	
pin assignment	

# esp-4/Empf/3CDD/M18

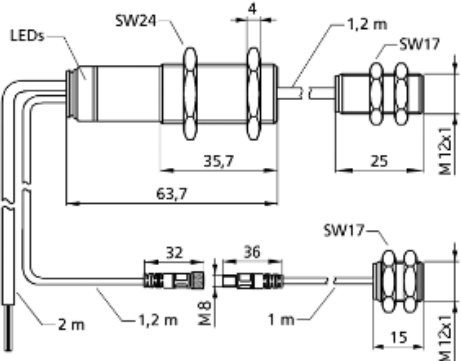

scale drawing	detection zone
	
 <b>2 x pnp</b>	
design	cylindrical M18
operating mode	label/splice detection
particularities	receiver for ultrasonic label/splice sensor
<b>ultrasonic -specific</b>	
means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver
working range	sheeting with weights of < 20 g/m <sup>2</sup> up to >> 600 g/m <sup>2</sup> , metal-laminated sheets and films up to 0.6 mm thick, self-adhesive films, labels on backing material
<b>electrical data</b>	
voltage ripple	± 10 %
no-load current consumption	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm <sup>2</sup>
transmitter cable	1.2 m PUR cable with M8 initiator plug

# esp-4/Empf/3CDD/M18

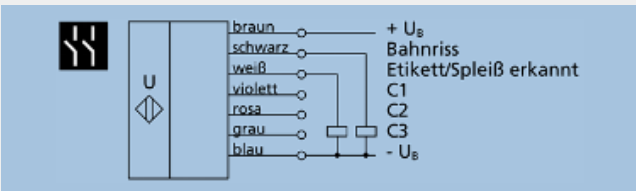
<b>outputs</b>	
output 1	switching output label/splice detected pnp: $I_{max} = 200 \text{ mA}$ ( $U_B - 2V$ ) NOC/NCC adjustable, short-circuit-proof
output 2	switching output web break pnp: $I_{max} = 200 \text{ mA}$ ( $U_B - 2V$ ) NOC/NCC adjustable, short-circuit-proof
response time	< 600 $\mu\text{s}$
<b>inputs</b>	
input 1	control input
input 2	control input
input 3	control input
description	< $-U_B + 18 \text{ V}$ : logic 1; > $-U_B + 13 \text{ V}$ or control input open: logic 0
<b>housing</b>	
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
transmitter/receiver spacing	20 - 40 mm; optimal: 40 mm $\pm$ 3 mm
permissible angular deviation	recommended mounting angle: $\pm 15^\circ$ ( $\pm 10^\circ$ to $\pm 45^\circ$ ) from what is normal for the material
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	100 g
<b>technical features/characteristics</b>	
controls	control input
scope for settings	Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: label/splice detected / flashing red: web break
particularities	receiver for ultrasonic label/splice sensor
<b>documentation (download)</b>	
pin assignment	




# esp-4/M12/3CDD/M18 E+S

scale drawing	detection zone
	
 <b>2 x pnp</b>	
design	cylindrical M12 with a swapped-out ultrasonic transducer
operating mode	label/splice detection
particularities	swapped-out ultrasonic transducer M12
<b>ultrasonic -specific</b>	
means of measurement	pulse operation with amplitude evaluation
transducer frequency	500 kHz
blind zone	5 mm in front of transmitter and receiver
working range	sheeting with weights of < 20 g/m <sup>2</sup> up to >> 400 g/m <sup>2</sup> , metal-laminated sheets and films up to 0.2 mm thick, self-adhesive films, labels on backing material
<b>electrical data</b>	
operating voltage $U_B$	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
no-load current consumption	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm <sup>2</sup>
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder; zum ausgelagerten Empfangswandler: 1,2 m PVC-Kabel

# esp-4/M12/3CDD/M18 E+S

<b>outputs</b>	
output 1	switching output label/splice detected pnp: $I_{max} = 200 \text{ mA}$ ( $U_B - 2V$ ) NOC/NCC adjustable, short-circuit-proof
output 2	switching output web break pnp: $I_{max} = 200 \text{ mA}$ ( $U_B - 2V$ ) NOC/NCC adjustable, short-circuit-proof
response time	< 600 $\mu\text{s}$
release delay	until next edge in trigger mode, 2.5 ms in free-run mode
<b>inputs</b>	
input 1	control input
input 2	control input
input 3	control input
description	< $-U_B + 18 \text{ V}$ : logic 1; > $-U_B + 13 \text{ V}$ or control input open: logic 0
<b>housing</b>	
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
transmitter/receiver spacing	20 - 30 mm; optimal: 20 mm $\pm$ 3 mm
permissible angular deviation	recommended mounting angle: $\pm 15^\circ$ ( $\pm 10^\circ$ to $\pm 45^\circ$ ) from what is normal for the material
max. tightening torque of nuts	M18: 15 Nm, M12: 3 Nm
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
further versions	single transmitter/receiver
<b>technical features/characteristics</b>	
controls	control input
scope for settings	Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: label/splice detected / flashing red: web break
particularities	swapped-out ultrasonic transducer M12
<b>documentation (download)</b>	
pin assignment	

# esp-4/Empf/M12/3CDD/ M18

scale drawing	detection zone
 <b>2 x pnp</b>	
<b>design</b>	cylindrical M12 with a swapped-out ultrasonic transducer
<b>operating mode</b>	label/splice detection
<b>particularities</b>	receiver for ultrasonic double sheet control swapped-out ultrasonic transducer M12
<b>ultrasonic -specific</b>	
<b>means of measurement</b>	pulse operation with amplitude evaluation
<b>transducer frequency</b>	500 kHz
<b>blind zone</b>	5 mm in front of transmitter and receiver
<b>working range</b>	sheeting with weights of < 20 g/m <sup>2</sup> up to >> 400 g/m <sup>2</sup> , metal-laminated sheets and films up to 0.2 mm thick, self-adhesive films, labels on backing material
<b>electrical data</b>	
<b>voltage ripple</b>	± 10 %
<b>no-load current consumption</b>	≤ 50 mA
<b>type of connection</b>	2 m PUR cable, 7 x 0.25 mm <sup>2</sup>
<b>transmitter cable</b>	1 m PUR cable with M8 initiator plug to the transmitter, 1.2 m PVC cable to the swapped out receiver

# esp-4/Empf/M12/3CDD/ M18

<b>outputs</b>	
output 1	switching output label/splice detected pnp: $I_{max} = 200 \text{ mA}$ ( $U_B - 2V$ ) NOC/NCC adjustable, short-circuit-proof
output 2	switching output web break pnp: $I_{max} = 200 \text{ mA}$ ( $U_B - 2V$ ) NOC/NCC adjustable, short-circuit-proof
response time	< 600 $\mu\text{s}$
<b>inputs</b>	
input 1	control input
input 2	control input
input 3	control input
description	< $-U_B + 18 \text{ V}$ : logic 1; > $-U_B + 13 \text{ V}$ or control input open: logic 0
<b>housing</b>	
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
transmitter/receiver spacing	20 - 30 mm; optimal: 20 mm $\pm$ 3 mm
permissible angular deviation	recommended mounting angle: $\pm 15^\circ$ ( $\pm 10^\circ$ to $\pm 45^\circ$ ) from what is normal for the material
max. tightening torque of nuts	M18: 15 Nm, M12: 3 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	140 g
<b>technical features/characteristics</b>	
controls	control input
scope for settings	Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: label/splice detected / flashing red: web break
particularities	receiver for ultrasonic double sheet control swapped-out ultrasonic transducer M12
<b>documentation (download)</b>	
pin assignment	