Operating Instructions

Ultrasonic label and splice sensor with 2 switched outputs

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

Functional principle
With a rapid pulse sequence, an ultrasonic transmitter beam aligns 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 conditions of LED 1 and 2 are shown in Fig. 6.

Synchronization
If two or more esp-4 shall work close together, they may influence one another. To avoid this the esp-4 can be synchronized. To do this all control inputs C3 have to be connected with each other.

Factory setting
The esp-4 are delivered with the following factory settings:
- Output label/splice output D1 on NOC.
- Output D2 on fuction web break.
- Output web break on NOC.
- 40 or 20 mm spacing.
- Operation mode on automatic tracking on/off via input C2.

Automatic tracking
After a Teach-in the esp-4 can track the working point automatically. In this way variations in the material to be scanned and fluctuation in the ambient temperature can be compensated.

Fig. 1: Mounting and installation positions

Fig. 2: Colour coding of the control line

Fig. 3: Function of control inputs

Fig. 4: Assignment of control inputs

Fig. 5: Voltage level of the logic states at the control inputs

Fig. 6: LED displays

Mode normal operation Teach-in automatic tracking C1 C2 C3
open or -U1 +U1 +U1 open or -U1 +U1 +U1 open or -U1 +U1 +U1

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Product description
- Assured detection of labels made of paper, metal or (transparent) plastic
- Detection of splices of paper web, plastic web or metal web
- Label/splice and web break output as npn or npn switched outputs.
- Scanning of material weights from <20 g/m² to >>600 g/m²; sheet metals and plastic films up to 0.6 mm thickness.
- 3 Teach-in modes.
- Synchronization.
- Parametrization via LinkControl.
- Response time of 300 µs until label/splice is detected.
- Transmitter - receiver spacing can be selected from 20 to 40 mm

Safety tips
- Read the operating instructions before start-up.
- Only qualified personnel are to undertake connection, mounting and settings.
- Not a safety component in keeping with the EC Machinery Directive.

Mounting
Mount transmitter and receiver in keeping with Fig 1 at the line between transmitter and receiver of the esp-4. The max. torque of the nuts is 15 Nm for the esp-4 and 8 Nm for the M12 sleeves respectively.
- The drill hole must be ≥ 12 mm given that the transmitter is recess-mounted or a sheet feed is envisaged between transmitter and receiver.
- The line between transmitter and receiver is not to be bridged with an external potential.

Start-up
- For normal operation mode leave all the 3 control inputs unconnected (see Figs 3 and 4).
- Switch on the esp-4 voltage supply.

Input Function
C1 Teach-in
C2 Automatic tracking on/off
C3 Synchronization/communication

Teach-in
Teach-in is carried out via control input C1.
- There are 3 Teach-in methods:
  Dynamic teach-in of backing material and label
  Separate teach-in for backing material and label
  Teach-in only for sheeting

Pointer
- The coaxiality of transmitter and receiver must be ≤ 0.5 mm.
- Transmitter and receiver are not to be inclined to each other in excess of 2°.
- In case of thicker plastic films the esp-4 is to be mounted at 27° inclination to sheet normal (Fig. 1b).
- Other materials may make a special fitting position necessary. Do contact microsonic when you work with these special materials.
- The esp-4 are fitted at any position.

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Start-up
- For normal operation mode leave all the 3 control inputs unconnected (see Figs 3 and 4).
- Switch on the esp-4 voltage supply.
Parameterization with LinkControl
The esp-4 can be extensively parameterized under LinkControl. Here you need the optionally available LinkControl adapter LCA-2 and the LinkControl software for Windows®.

Operation onto LinkControl
- Install the LinkControl software onto your PC.
- Connect the LinkControl adapter to your PC with the USB cable.
- Connect esp-4 to the LCA-2 in keeping with the Fig 7 table. For this, use the adapter cable in the LCA-2 case.
- Connect the voltage supply cable to the LCA-2 on the other side of the T connector.
- Start the LinkControl software and follow the instructions on the screen.

Teach-in methods
- Teach-in label dynamic
  - Place backing material with label between transmitter and receiver.
  - Place control input C1 on logic 1 for 3 s until both LED flash mutually.
  - Pull backing material with labels among transmitter and receiver with constant speed.
  - Place control input C1 on logic 1 for 1 s.
  - One LED flashes green briefly, one LED is static green.

- Teach-in label static
  - Place only backing material between transmitter and receiver.
  - Place control input C1 on logic 1 for 6 s until one LED turns off and one LED is on.
  - One LED flashes green, one LED is static green.

- Teach-in only for sheeting (optic sensor)
  - Place web material between transmitter and receiver.
  - Place control input C1 on logic 1 for 9 s until both LEDs turn off.
  - One LED flashes green briefly, one LED is static green.

Normal operation
- Place control input C1 on logic 1 for 1 s.
  - Move backing material with label between transmitter and receiver.
  - One LED flashes green briefly, one LED is static  red.
  - One LED is static green, one LED flashes green.

Maintenance
No maintenance is need on the esp-4. We would recommend cleaning the sensor surfaces at the transmitter and receiver should they become very dirty. The best thing is to apply some isopropanol onto a cotton cloth and then wipe the surface clean. Make sure that the reaction time of the cleaner is kept down. That means quickly wiping dry the transducer surfaces.

The following settings can be undertaken:
- Teach-in of web or label material.
- Spacing between transmitter and receiver.
- NOC/NCC function of the switched outputs.
- Function of switched output D2.
### Technical data

**esd-4/3CDD/M18 E+S**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spacing transmitter-receiver</td>
<td>20 to 40 mm</td>
</tr>
<tr>
<td>Optimum spacing transmitter-receiver</td>
<td>20 mm ± 3 mm</td>
</tr>
<tr>
<td>Blind zone (in front of transmitter and receiver)</td>
<td>7 mm</td>
</tr>
<tr>
<td>Permissible angular deviation</td>
<td>10° ± 27° from the perpendicular of the sheet</td>
</tr>
<tr>
<td>Ultrasonic frequency</td>
<td>600 kHz</td>
</tr>
<tr>
<td>Working range</td>
<td>Web material with grammages of &lt; 20 g/m² to 600 g/m²; paper, metal, plastic</td>
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<tr>
<td>Nominal voltage (UB)</td>
<td>20 V to 30 V DC</td>
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<td>Voltage ripple</td>
<td>± 10 %</td>
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<tr>
<td>No-load current consumption</td>
<td>≤ 50 mA</td>
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<tr>
<td>Type of connection</td>
<td>PUR cable, 7 x 0.25 mm²</td>
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<td>Controls</td>
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<tr>
<td>Indicator</td>
<td>Green: working/backing material Red: label/splice Red: double sheet</td>
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<tr>
<td>Housing</td>
<td>Brass sleeve, nickel-plated, plastic parts: PBT, PA; Cable: PUR; ultrasonic transducer: Polyurethane, epoxy resin with glass content</td>
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<td>Max. tightening torque of nuts</td>
<td>M18: 15 Nm; M12: 8 Nm</td>
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<tr>
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<tr>
<td>Operating temperature</td>
<td>+5 °C to +60 °C</td>
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<td>Storage temperature</td>
<td>-40 °C to +85 °C</td>
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<tr>
<td>Weight</td>
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