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ULTRASONIC SENSORS

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Extract from our online catalogue:

bks+ ultrasonic web edge sensors

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The bks+ edge sensor facilitates the contact-free web edge scanning of foils, paper and other soundimpermeable materials.



Highlights

- > **2 housing designs** ::: with 30 and 60 mm fork width
- > **Available in 12 mm or 40 mm measurement range**
- > **IO-Link interface** ::: for support of the new industry standard
- > **0.01 mm to 0.02 mm resolution**
- > **Very compact housing dimensions**

Basics

- > **Contact-free detection of the path edge** ::: for regulation of the web path
- > **Analogue output 4–20 mA and 0–10 V** ::: switchable between current and voltage output
- > **3 LEDs and 1 button on the top of the housing**
- > **Parameterisable with LinkControl**
- > **Robust metal housing**

Description

The bks+ ultrasonic web edge sensor

is a fork sensor for scanning the edges of sound-impermeable materials such as foil or paper.

This is why the bks+ is ideally suited for the web control of high-transparency foils, light-sensitive materials, materials with greatly varying transparency and paper subject to high paper dust loads.

The functional principle

Both transducer and receiver are placed in a single, slim fork housing. The transducer in the lower leg emits short, cyclical sound pulses. These are detected by the ultrasonic receiver in the upper leg of the fork. A material embedded in the fork covers the sound gap and thereby dampens the receiving signal in depending on the coverage. This is analysed by internal electronics.

An analogue signal is output depending of coverage, resp. data word via IO-Link.



1 Push-Pull switching output with pnp or npn switching technology and 1 analogue output 4-20 mA or 0-10 V

The working range for the bks+3/FIU is 12 mm and for the bks+6/FIU is 40 mm.



With a fork width of only 30 mm and 60 mm respectively and a depth of 33 mm and 73 mm respectively, it has a very compact design. Its working range of 12 mm and 40 mm respectively and its high accuracy of 0.1 mm permit a wide variety of applications.

Using the Teach-in button

on the upper side of the edge sensor sets the zero point for the local edge. This calibration can be done in two ways:

- > clear the fork completely of any web material,
- > push the button for approx. 3 seconds
- > cover the fork sensor completely and push the button briefly (< 1s). Ready. Or
- > adjust the path edge within the fork to both markings so that 50 % of the sound gap is covered,
- > then push the button for approx. 6 seconds. Ready.

The edge sensor bks+3 has a fork width of 30 mm and a fork depth of 43 mm. The bks+6 web edge sensor has a fork width of 60 mm and a fork depth of 73 mm. Other fork widths and depths are available upon request. The housing side is equipped with two consistent bores for the edge sensor's mounting. The electrical connection is established via an M12 circular plug.

Three LEDs

show the position of the web material within the fork. When using light-sensitive materials, the LEDs can be switched off.

Swichting over

between current and voltage outputs is done by using the button or LinkControl. The bks+ is preset and can be used immediately. Optionally, it can also be comprehensively parameterised using LinkControl adapter LCA-2 (see accessories).

IO-Link version 1.1

is integrated as standard.

Keep your eyes open in data communications!

IO-Link: The new standard at the fieldbus level

The IO-Link interface in the bks+ sensors gives you everything you need to implement continuous communication on all levels of the system architecture, right down to the sensor. In this way, both machinery and equipment can be run in a more productive manner. IO-Link can enormously simplify the startup and maintenance of either a machine or appliance.

IO-Link in detail

Following every switch-on, bks+ is in the SIO mode (Standard I/O mode) and functions just like any normal ultrasonic sensor with push/pull output stage.

With the wake-up signal, an IO-Link enabled controller can transfer the bks+ into the communication or IO-Link modes. The controller can now exchange both process and service data with the bks+.

An IO-Link master can have one or a number of inputs and outputs. Only one IO-Link device is attached at each input/output. A standard 3-wire cable joins up the sensors and actuators. This non-shielded line can be up to 20 metres in length.

A mixed operation is possible thanks to complete compatibility to the SIO mode (Standard-IO mode): at a master a number of sensors and actuators can be run in the IO-Link and others in the SIO mode.

Continuous communication permits process/service data to be transmitted between sensors/actuators and the controller.

An IO-Link system consists of IO-Link devices – mainly sensors, actuators or combinations of them – a standard 3-wire sensor/actuator cable and an IO-Link master.



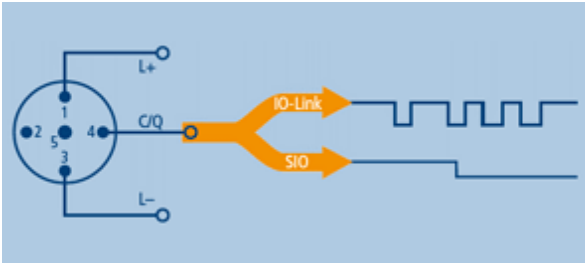
More information on the IO-Link can be found in www.io-link.com

The advantages of IO-Link:

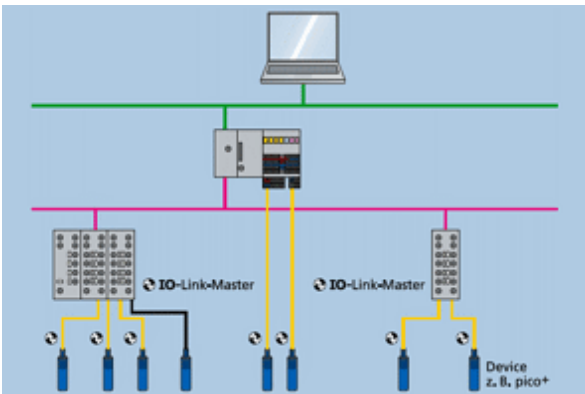
- In the IO-Link mode the distances measured are cyclically transmitted to the master; thus the IO-Link mode can replace an analogue output at no significant expense!
- Following a sensor failure, the controller can automatically re-load all the settings into the new sensor.
- Reduction in planning outlay achieved from a standardised integration of devices into the controller via a

manufacturer-independent IO-Link IODD description file

- > Reduced startup times thanks to a centralized provision of data and parameters in the controller
- > Greater equipment availability levels coming from maximum transparency and system-wide diagnosis all the way down into the device itself




Push-Pull output stage permits switching from SIO mode to IO-Link mode



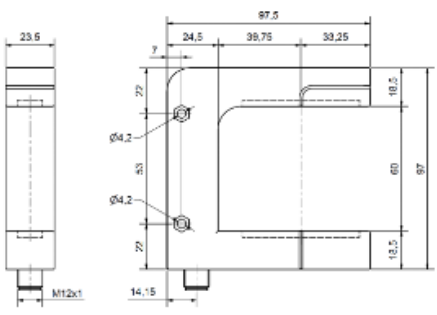

Example of the system architecture

Download IO-Link IODD library

scale drawing	detection zone
 1 x Push-Pull + 1 x analogue 4-20 mA / 0-10 V	
design	fork-like
operating mode	path edge detection
particularities	IO-Link
ultrasonic -specific	
means of measurement	pulse operation with amplitude evaluation
transducer frequency	170 kHz
blind zone	5 mm in front of transmitter and receiver
resolution/sampling rate	0,01 mm
reproducibility	± 0,1 mm bei konstanten Umgebungsbedingungen
working range	≥ 12 mm (±6 mm)
electrical data	
operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
no-load current consumption	≤ 60 mA
type of connection	5-pin M12 initiator plug

bks+3/FIU

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V, short-circuit-proof switchable rising/falling
output 2	Schaltausgang Push-Pull, $U_B-3\text{ V}$, $-U_B+3\text{ V}$, $I_{\max} = 100\text{ mA}$
response time	5,1 ms
delay prior to availability	< 300 ms
inputs	
input 1	com input synchronisation input teach-in input
housing	
material	zinc die-casting, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
fork width	30 mm
fork depth	43 mm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
further versions	larger fork width/depth
technical features/characteristics	
controls	1 push-button
scope for settings	Teach-in via push-button LCA-2 with LinkControl IO-Link
particularities	IO-Link

scale drawing	detection zone
	
 1 x Push-Pull + 1 x analogue 4-20 mA / 0-10 V	
design	fork-like
operating mode	path edge detection
particularities	IO-Link
ultrasonic -specific	
means of measurement	pulse operation with amplitude evaluation
transducer frequency	310 kHz
blind zone	5 mm in front of transmitter and receiver
resolution/sampling rate	0,02 mm
reproducibility	± 0,1 mm bei konstanten Umgebungsbedingungen
working range	≥ 40 mm (±20 mm)
electrical data	
operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
no-load current consumption	≤ 60 mA
type of connection	5-pin M12 initiator plug

bks+6/FIU

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V, short-circuit-proof switchable rising/falling
output 2	Schaltausgang Push-Pull, $U_B - 3\text{ V}$, $-U_B + 3\text{ V}$, $I_{\text{max}} = 100\text{ mA}$
response time	6 ms
delay prior to availability	< 300 ms
inputs	
input 1	com input synchronisation input teach-in input
housing	
material	zinc die-casting, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
fork width	60 mm
fork depth	73 mm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
technical features/characteristics	
controls	1 push-button
scope for settings	Teach-in via push-button LCA-2 with LinkControl IO-Link
particularities	IO-Link