

Product Description

The bks+ ultrasonic web edge sensor is a fork sensor for scanning the edges of sound-impermeable and slightly sound-permeable materials such as foil or paper. The fork's lower leg is equipped with an ultrasonic sensor which cyclically emits short sound impulses, which are detected by the ultrasonic receiver accommodated in the upper fork leg. Material immersing into the fork covers this sound path and thus attenuates the receive signal, which is evaluated by the internal electronics. An analogue signal and a binary value via IO-Link is output in dependence of the coverage degree. The bks+6/FIU optional can be programmed using the LinkControl-Adapter LCA-2 and LinkControl software.



Operating manual

bks+6/FIU Ultrasonic web edge sensor with analogue output and IO-Link interface

- Via the Teach-in button on the edge sensor's top or via Pin 5 on the device plug, the sensor can be adjusted to the material to be controlled.
 - Choosing between rising and falling output characteristic is possible.
 - Three LEDs indicate the position of the web material inside the fork.
- ### Safety Notes
- Read the operating manual prior to start-up.
 - Connection, installation and adjustment works may only be carried out by expert personnel.
 - No safety component in accordance with the EU Machine Directive.

IO-Link

The bks+6/FIU sensors are IO-Link-capable in accordance with IO-Link specification V1.1.

Installation

- Mount the sensor at the installation site.
- Connect a connection cable to the M12 device plug, see Fig. 1.

Start-Up

- Connect the power supply.
- Carry out the adjustment to the web material in accordance with Diagram 1.

	+U _B	colour	brown
	-U _B		blue
	F IO-Link		black
	I/U		white
	Com		grey

Fig. 1: Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

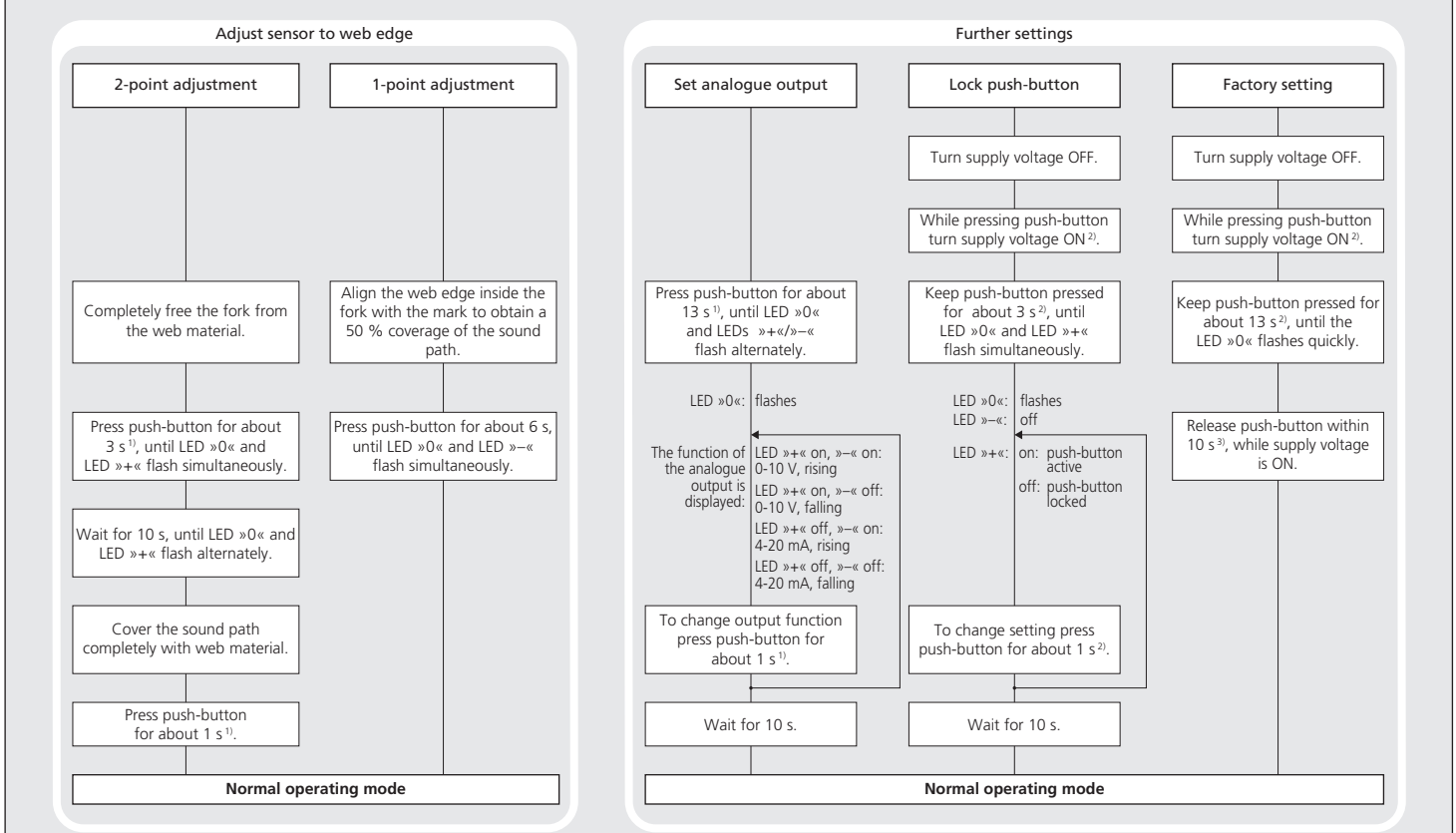
Factory setting

- Analogue output on voltage output
- Rising analogue characteristic (0 V at maximum coverage)
- Switching output on NOC
- Switching output window is ±4.5 mm around zero position.

Maintenance

microsonic sensors are maintenance-free. With heavy dirt deposits, we recommend a cleaning of the white sensor surface.

Diagram 1: Sensor adjustment via Teach-in procedure



¹⁾ or connect Pin 5 (Com) to +U_B

²⁾ or connect Pin 5 (Com) to -U_B

³⁾ or disconnect Pin 5 (Com) from -U_B

Technical data

	1 Push-Pull switching output and analogue output
fork width	60 mm
fork depth	73 mm
working range	≥40 mm (±20 mm)
transducer frequency	ca. 310 kHz
resolution	0.01 mm
reproducibility	±0.1 mm
operating voltage U_B	20 to 30 V DC, reverse polarity protection
voltage ripple	±10 %
no-load current consumption	≤60 mA
housing	zinc die cast chromed, plastic parts: PBT ultrasonic transducer: polyurethane foam, epoxy resin with glass contents
class of protection to EN 60 529	IP 65
type of connection	5-pin M12 initiator plug, brass, nickel-plated
controls	Teach-in-button and Teach-in via pin 5
indicators	LED green: centre or within switching window LEDs yellow: outside the centre/switching window
programmable	LCA-2 with LinkControl and IO-Link
synchronisation	internal synchronisation up to 10 sensors
operating temperature	+5 to +60 °C
storage temperature	-40 to +85 °C
weight	280 g
response time	6 ms
measurement cycle time	4 ms
time delay before availability	< 300 ms
order no.	bks+6/FIU
analogue output	current output 4 to 20 mA voltage output 0 to 10 V short-circuit-proof, switchable rising/falling Push-Pull, U _B -3 V, -U _B +3 V, I _{max} = 100 mA
switching output	switchable NOC/NC; short-circuit-proof

Notes

- Working range and gradient of the analogue output curve depend on the ultrasonic transducers and cannot be adjusted. The working range always is ≥ 40 mm.
- For sound-impermeable materials the sensor can be adjusted to the environmental conditions by the 1-point adjustment procedure.
- For slightly sound-permeable materials the sensor has to be set up to the material and the environmental conditions by using the 2-point adjustment. Carry out a practical test to find out whether a material is slightly sound-permeable.
- For optimum measurement results the material to be detected should be kept in a range of ± 5 mm around the centre between the upper and lower fork leg.
- The sensor can be reset to its factory settings (see »Further settings«, Diagram 1).
- Using the LinkControl-Adapter LCA-2 (optional accessory) and the LinkControl-Software V7.6 additional sensor parameters can be adjusted and Teach-in procedures can be carried out.
- Depending on the function the ultrasonic transducers in the upper and lower fork leg are mounted with a slope of 2° .

IO-Link Mode

The bks+6/FIU sensors are IO-Link-capable in accordance with IO-Link specification V1.1 and compatible to specification V1.0.

Note

In IO-Link mode Teach-in and Link-Control are not available.

Process data

The bks+ cyclically transmits the value corresponding to the measured coverage degree with a resolution of 0.01 mm.

Service data

The following sensor parameters may be set via IO-Link.

Teach-in via push-button

The push-button can be activated/deactivated for sensor settings with Teach-in.

Temperature compensation

The temperature compensation is used for measurement value correction for varying ambient temperatures and can be disabled.

Analogue output mode

For the analogue output either voltage or current output can be selected.

Rising/falling analogue characteristic

The analogue characteristic can be set on rising (0 V/4 mA at full coverage) or falling characteristic.

Set NOC/NCC

The NCC or NOC output function can be preset for the switching output.

Switching off the LEDs

When activated, the LEDs are turned off 30 seconds after a key press. After a new key press they will run for 30 seconds. This automatic shutdown can be deactivated.

Measurement filter

bks+ ultrasonic sensors provide for a choice of 3 filter settings:

- F00 (no filter)**
Each ultrasonic measurement acts on the output in an unfiltered manner.
- F01 (average value filter)**
Forms approximately the arithmetic mean of several measurements. According to the mean value the output is set. The number of measurements, from which the mean is formed is dependent on the chosen filter strength.
- F02 (median filter)**
Finds the median of several measurements. According to the median the output is set. The number of measurements, for which the median is determined is dependent on the selected filter strength.

Filter strength

For both measurement value filters, a filter strength between P00 (weak filter effect) and P09 (strong filter effect) can be selected.

Switching window

If the web edge is within the switching window the switching output is set. The switching window is defined by the adjusted centre and the width.

Note

The switching window has to be

within the operating range.

System commands

With 5 system commands the following settings may be carried out:

- restore IO-Link parameters to their factory settings (system command 130)
- sensor adjustment: fork cleared.
- sensor adjustment: fork 50 % covered
- sensor adjustment: fork 100 % covered
- reset all sensor parameters including the IO-Link parameters to their factory settings (system command 164)

Events

The bks+ sensor sends the following events:

- parameter was changed
- sensor adjustment successful
- sensor adjustment failed

IODD file

The latest IODD file you will find on the internet under www.microsonic.de/en/IODD.

For further informations on IO-Link see www.io-link.com.

IO-Link Data					
bks+6/FIU					
physical layer:					
IO-Link revision:	V1.1				
compatibility:	V1.0				
block parameter:	yes				
data storage:	yes				
SIO mode support:	yes				
min cycle time:	4 ms				
baud rate:	COM 2				
format of process data:	16 Bit, R, UNI16				
content of process data:	Bit 0-15: degree of coverage with 0.01 mm resolution				
service data IO-Link specific:	index	access	value		
vendor name:	0x10	R	microsonic GmbH		
vendor text:	0x11	R	www.microsonic.de		
product name:	0x12	R	bks+		
product ID:	0x13	R	bks+6/FIU		
product text:	0x14	R	Ultraschall-Sensor		
service data sensor specific:	index	format	access	range	default
Teach-in via push-button:	0x40	UIINT8	R/W	0: activated; 1: deactivated	0
temperature compensation:	0x42	UIINT8	R/W	0: deactivated; 1: activated	1
analogue output mode:	0x44	UIINT8	R/W	2: current output, 3: voltage output	3
rising/falling output characteristic curve:	0x45	UIINT8	R/W	0: rising characteristic curve; 1: falling characteristic curve	0
NCC/NOC:	0x46	UIINT8	R/W	0: NOC; 1: NCC	0
automatic turning-off LEDs:	0x48	UIINT8	R/W	0: deactivated; 1: activated	1
measurement filter:	0x4D	UIINT8	R/W	0-2: F00-F02	0
filter strength:	0x4E	UIINT8	R/W	0-9: P00-P09	0
centre of switching window:	0x4F	INT16	R/W	0-4095 ¹⁾	2047
width of switching window:	0x50	UIINT16	R/W	0-4095 ¹⁾	1023
system commands:	index	access	value		
restore IO-Link parameter:	0x02	W	130		
sensor adjustment: fork cleared:	0x02	W	161		
sensor adjustment: fork 50 % covered:	0x02	W	162		
sensor adjustment: fork 100 % covered:	0x02	W	163		
reset to factory setting:	0x02	W	164		
events:	code	type	name		
	0x8ca0	Notification	parameter was changed		
	0x8ca1	Notification	sensor adjustment successful		
	0x8ca2	Notification	sensor adjustment failed		
observe:	index	format	access	range	
measurement value:	0x54	UIINT16	R	0-4095 ¹⁾	

¹⁾ The value range 0-4,095 corresponds with the working range of the sensor.