



Product Description
 The bks+ ultrasonic web edge sensor is a fork sensor for scanning the edges of sound-impermeable 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 is output in dependence of the coverage degree. Using the LinkControl-Adapter LCA-2 and LinkControl software, the switched output can be programmed in window mode around the zero position.

Operating manual

bks+3/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.

IO-Link
 The bks+3/FIU sensors are IO-Link-capable in accordance with IO-Link specification V1.1.

- 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.

- Installation**
- Mount the sensor at the installation site.
 - Connect a connection cable to the M12 device plug, see Fig. 1.
 - For optimum measurement results the sensor should be mounted thermally conductive.

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

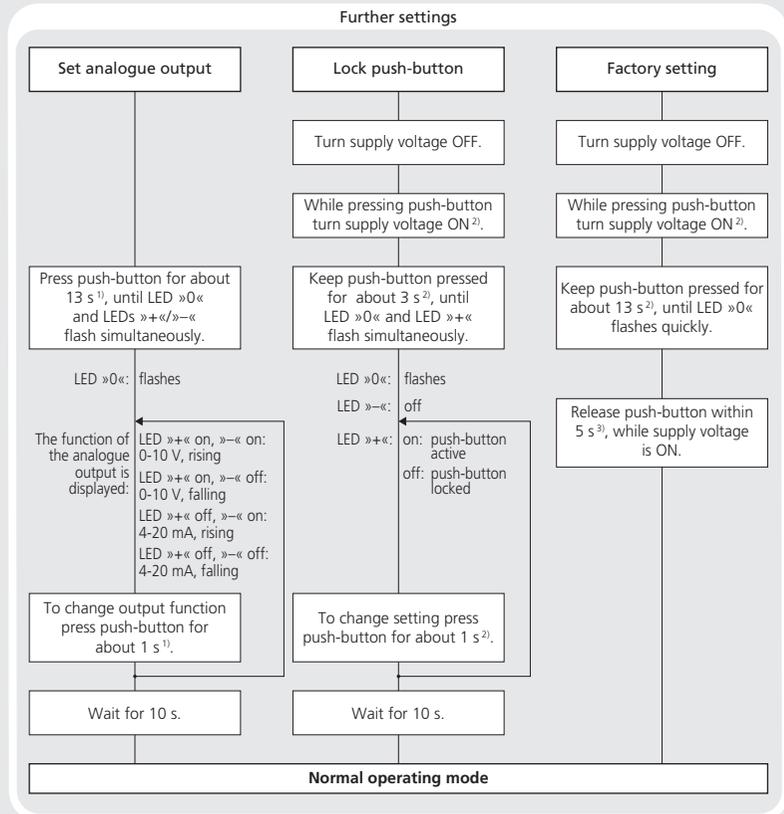
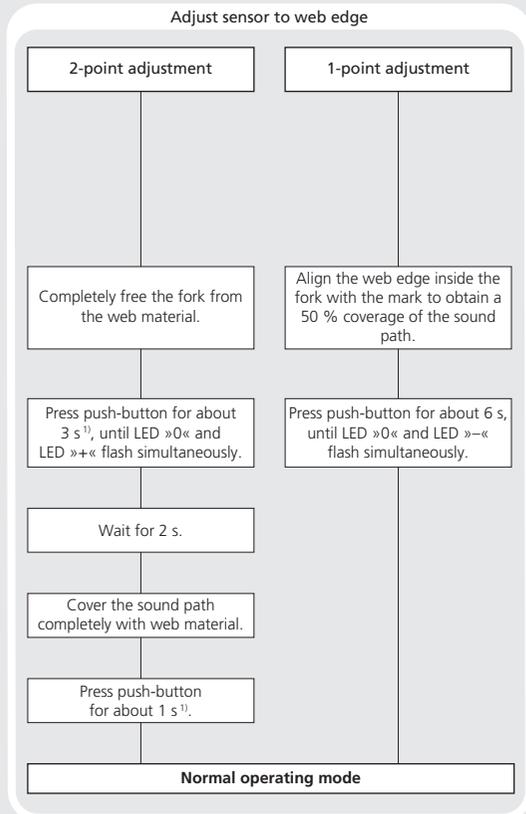
Synchronisation
 If two or more edge sensors are mounted in a distance <400 mm the internal synchronisation should be used. Connect Sync-channels (Pin 5 at the units receptacle) of all sensors.

	+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 ±1.5 mm around zero position.

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	+U _B
	2	I/U
	3	-U _B
	4	F
	5	Com

1 Push-Pull switching output and analogue output

Notes

- 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).
- Carry out the adjustment only after reaching the operating temperature (approx. 20 min).
- 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+3/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 LinkControl are not available.

Process data

The bks+ cyclically transmits the value corresponding to the measured coverage degree with a resolution of 0.003 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.

Linearisation of the output characteristic

The linearisation of the output characteristic increases the accuracy in the central measuring range of the sensor. If higher accuracy is required in the edge areas, the linearisation of the output characteristic can be deactivated.

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.

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+3/FIU			
physical layer	bks+3/FIU				
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 0.003 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+3/FIU		
product text	0x14	R	Ultraschall-Sensor		
service data sensor specific	index	format	access	range	default
Teach-in via push-button	0x40	UINT8	R/W	0: activated; 1: deactivated	0
linearisation of the output characteristic	0x41	UINT8	R/W	0: deactivated; 1: activated	1
temperature compensation	0x42	UINT8	R/W	0: deactivated; 1: activated	1
analogue output mode	0x44	UINT8	R/W	2: current output, 3: voltage output	3
rising/falling output characteristic curve	0x45	UINT8	R/W	0: rising characteristic curve; 1: falling characteristic curve	0
NCC/NOC	0x46	UINT8	R/W	0: NOC; 1: NCC	0
automatic turning-off LEDs	0x48	UINT8	R/W	0: deactivated; 1: activated	1
measurement filter	0x4D	UINT8	R/W	0-2: F00-F02	0
filter strength	0x4E	UINT8	R/W	0-9: P00-P09	0
centre of switching window	0x4F	INT16	R/W	0-4095 ¹⁾	2047
width of switching window	0x50	UINT16	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	UINT16	R	0-4095 ¹⁾	

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

