



microsonic bks+3-FIU Ultrasonic Web Edge Sensor User Manual

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microsonic bks+3-FIU Ultrasonic Web Edge Sensor



Product Information

The bks+3/FIU Ultrasonic Web Edge Sensor is equipped with an analogue output and an IO-Link interface. It has a Teach-in button on the top and a device plug with Pin 5 that allows the sensor to be adjusted to the material to be controlled. The sensor has the capability to choose between rising and falling output characteristics. It features three LEDs that indicate the position of the web material inside the fork. The sensor is IO-Link capable in accordance with IO-Link specification V1.1. Safety notes must be read before starting up the sensor. The connection, installation, and adjustment works should only be carried out by expert personnel. The sensor is not considered a safety component in accordance with the EU Machine Directive. To ensure proper functioning, the sensor must be mounted thermally conductive, and the web material should follow Diagram 1. If two or more edge sensors are mounted in a distance, synchronization is required.

Product Usage Instructions

1. Read the safety notes carefully before starting up the bks+3/FIU Ultrasonic Web Edge Sensor.
2. Connect the sensor to the machine as per the instructions provided in the operating manual.
3. Adjust the sensor to the material to be controlled using the Teach-in button on the top or via Pin 5 on the device plug.
4. Choose between rising and falling output characteristic based on your requirement.
5. Observe the three LEDs that indicate the position of the web material inside the fork.
6. Mount the sensor thermally conductive for better performance.
7. Follow Diagram 1 to ensure that the web material is appropriately placed.
8. If two or more edge sensors are mounted in a distance, synchronization is required.
9. Contact expert personnel for connection, installation, and adjustment works.

Following these instructions will help you use the bks+3/FIU Ultrasonic Web Edge Sensor effectively and safely.

Operating manual

bks+3/FIU Ultrasonic web edge sensor with analogue output and IO-Link interface

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 that 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 received signal, which is evaluated by the internal electronics. An analog signal is output in dependent 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.

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

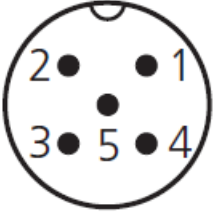


- Mount the sensor at the installation site.
- Connect a connection cable to the M12 device plug, see Fig. 1.
- For optimum measurement results the sensor should be mounted thermally conductive.

Start-Up

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

Synchronization

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

 		
1	+U _B	colour brown
3	-U _B	blue
4	F  IO-Link	black
2	I/U	white
5	Com	grey

Factory setting

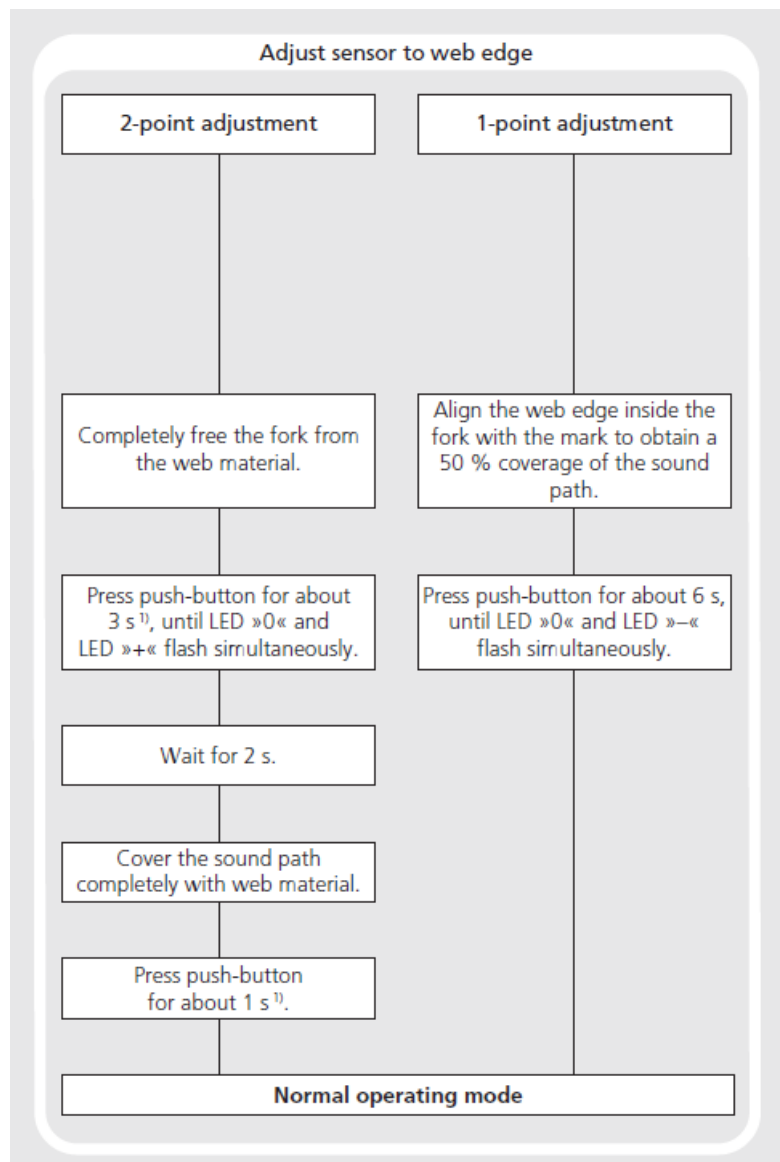
- Analog output on the voltage output
- Rising analog characteristic (0 V at maximum coverage)
- Switching output on NOC
- The switching output window is ± 1.5 mm around the zero position.

Maintenance

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

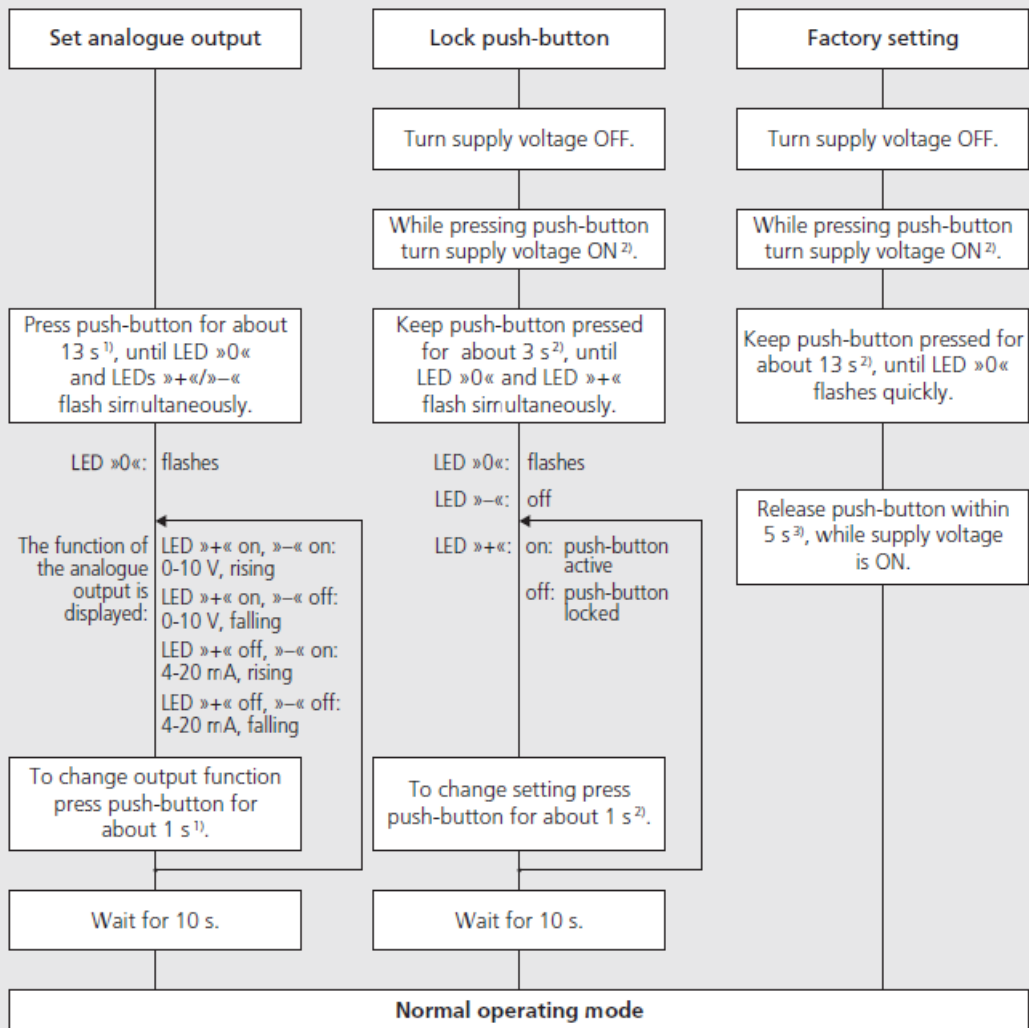
Sensor adjustment via Teach-in procedure

1. or connect Pin 5 (Com) to +UB

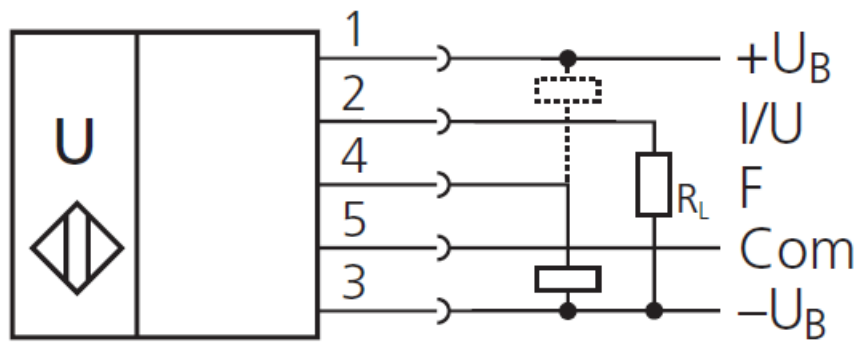


2. or connect Pin 5 (Com) to –UB
3. or disconnect Pin 5 (Com) from –UB

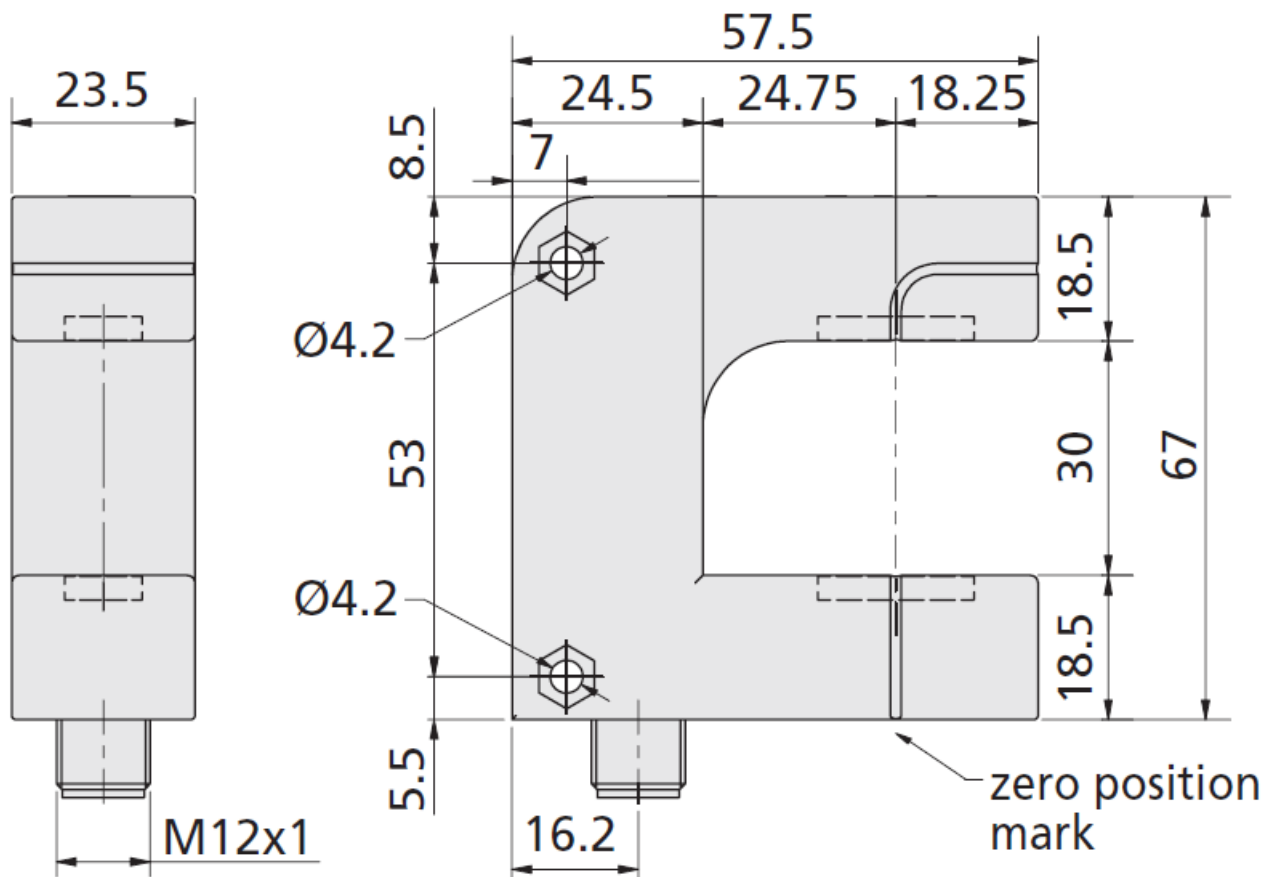
Further settings



Technical data



1 Push-Pull switching output and analogue output



- fork width 30 mm
- fork depth 43 mm
- working range min. 12 mm (± 6 mm)
- transducer frequency 170 kHz
- resolution $< 0,003$ mm
- reproducibility $\pm 0,1$ 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 lacquered, 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 190 g
- response time 5,1 ms
- measurement cycle time 4 ms
- time delay before availability <300 ms
- order no. bks+3/FIU
- analogue output current output 4 to 20 mA, voltage output 0 to 10 V short-circuit-proof, switchable rising/falling
- switching output Push-Pull, UB–3 V, –UB+3 V, I_{max} = 100 mA switchable NOC/NCC; short-circuit-proof

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

bks+3/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 0.003 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

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.

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

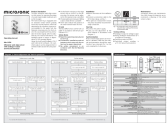
IODD file

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.

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The content of this document is subject to technical changes. Specifications in this document are presented in a descriptive way only. They do not warrant any product features.

Documents / Resources

	microsonic bks+3-FIU Ultrasonic Web Edge Sensor [pdf] User Manual bks 3-FIU Ultrasonic Web Edge Sensor, bks 3-FIU, Ultrasonic Web Edge Sensor, Web Edge Sensor, Edge Sensor, Sensor
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References

-  [IO-Link](http://www.io-link.com)

