

ULTRASONIC

Fork Sensors



Content:

Technical Data Technical2
Drawing Description2
Teach-In & Fork Widths3
Electrical Connection Order4
Code & Accessories5

Series UBA fork sensor

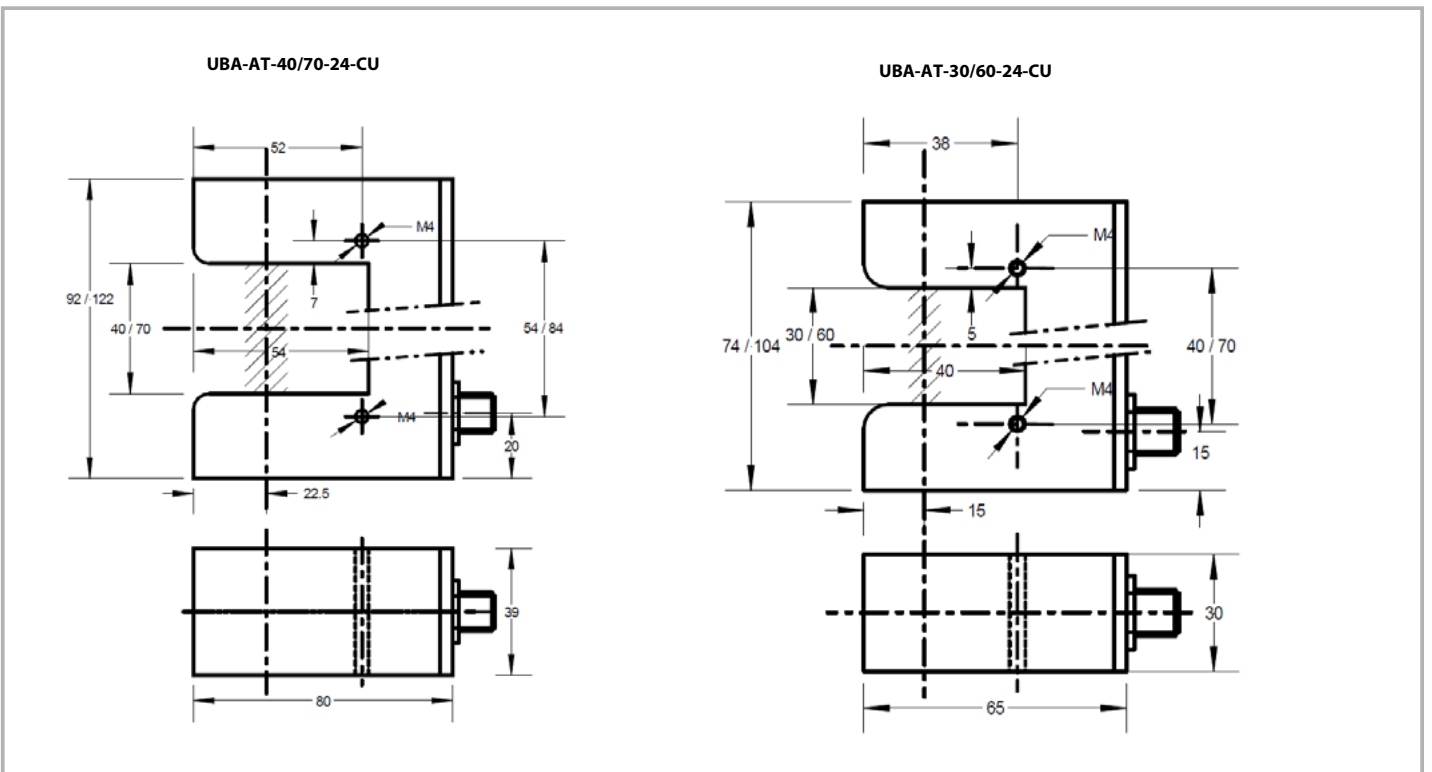
Key-Features:

- Ultrasonic fork sensor with analogue output 0...10 V, where the analogue signal is a function of the lateral covering
- For edge control and web guidance systems
- For transparent foils
- Works in contaminated air
- High accuracy and temperature stability
- High detection width
- Very small plane change influence
- High sampling rate
- Measurement range teachable

TECHNICAL DATA

		UBA-AT-30/60-24-CU	UBA-AT-40/70-24-CU
Fork width	[mm]	30/60	40/70
Detection width	[mm]	approx. 8 (±4)	approx. 13 (±6.5)
Resolution (noise): - when 20...80 % covered - when 0...100 % covered	[mm] [mm]		approx. 0.1 approx. 0.15
Plane change (influence of position between transmitter S and receiver E): <7 mm off E or S >7 mm off E or S <5 mm off E or S >5 mm off E or S	[mm] [mm] [mm] [mm]		≤ ±0.5 ≤ ±0.1
Linearity at 10...90% covered (typical)	[%FS]	≤ 2	≤ 4
Ultrasonic frequency	[kHz]	approx. 180	approx. 130
Sampling frequency (in non synchronized mode)	[Hz]	500	285
Output signal	[V]		0...10
Temperature stability 0...60°C (typical)	[%]		±5
Power supply voltage	[VDC]		8...30
Ripple of supply voltage	[%]		10
Current consumption at 24 VDC	[mA]		35
Power consumption	[W]		0.9
Power indicator		3 LED yellow/green/yellow in keyboard	
Working temperature	[°C]	0...+60	
Storage temperature	[°C]	-10...+70	
Synchronization input (connector pin 2) - square wave signal (on rising edge) - min. signal duration - max. sampling frequency (for proper signal)	[V] [ms] [Hz]	3.5 ... 30 0.02 500	3.5 ... 30 0.02 285
Max. cable length	[m]	20	
Protection class		IP67	
Housing material		black anodized aluminium	
Electrical connection		M12-connector, 4-pole	
Weight	[g]	200/220	360/400

TECHNICAL DRAWING



DESCRIPTION

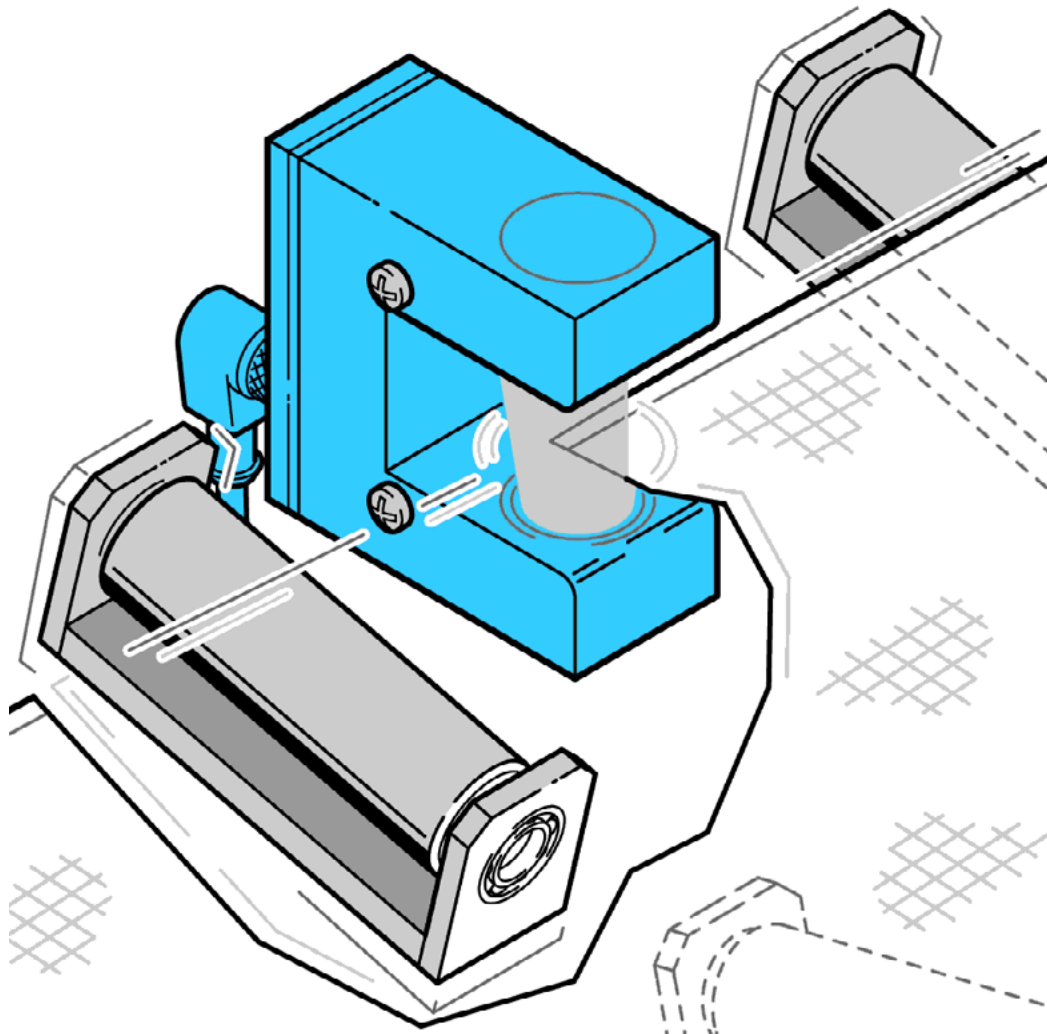
Advantages of ultrasonic fork sensors

- 1) The UBA ultrasonic transducers have a large diameter.
Result: large measurement range combined with high linearity and resolution.
- 2) The signals are compensated with computed data as well as with a temperature sensor. *Result: precise operation up to 60°C.*
- 3) The sensors have the teach-in function.
Result: They can be adapted to the actual air condition and the material.
- 4) Software and transducers are designed to eliminate the influence of multiple echoes.

The UBA are ultrasonic through beam sensors with separated transmitter and receiver. They are suited for edge detection on web guiding systems. In contrast to conventional barriers they do not offer a simple on/off output signal, but they measure the degree of covering of the ultrasonic receiver as an analogue output signal. If the receiver is fully covered, the output is 0 V and if not covered at all 10 V.

But the ultrasonic fork barrier is much less sensitive to dirt and dust compared to optical sensors. Furthermore transparent materials such as foils can be perfectly handled.

The relative humidity of air and the air pressure as well (sea level) have an influence on the output signal due to physical laws (attenuation of sound). Higher air humidity or decreasing air pressure do reduce the output signal at a given edge position.



TEACH-IN

Teach-In

With the teach-in the signal output can be defined at fully closed fork (status A) as well as at fully open fork (status B).

Status A:

If there is an acoustically non transparent material in the fork, no signal is recorded by the receiver and thus the sensor shows 0 V. However if the material is partly acoustically transparent (e.g. textiles), the sensor would show an offset. By teaching this status the offset can be eliminated and the full 10V span is available. For teaching the status A the material must be fully introduced into the fork.

Status B:

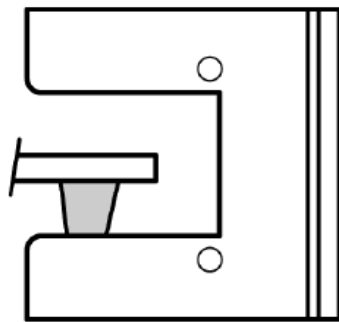
If there is nothing between transmitter and receiver, the sensor should show the full signal of 10 V. As explained above, the signal can slightly vary depending on air conditions. By teaching this status the full range signal can be adjusted to exactly 10 V. For teaching the status B the fork must be fully free of material.

In addition, the output signal can also be inverted via teach-in, i.e. either rising or falling signal with increasing coverage of the sensor.

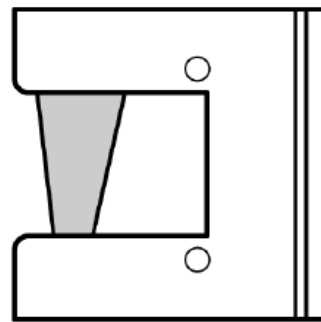
- Status A (material is fully introduced): push key A for min. 2 s until yellow LED near A blinks 3x (acknowledgment by lighting of all 3 LEDs)
- Status B (no material in fork): push key B for min. 2 s until yellow LED near B blinks 3x (acknowledgment by lighting of all 3 LEDs)
- Inverting the signal: push both keys A and B simultaneously for min. 5 s until yellow LED near A lights up. Then release keys. Acknowledgement by lighting of all 3 LEDs. Reverse the inverting by the same procedure.
- Factory reset: push both keys A and B simultaneously for 10 s until green LED lights up. Then release keys. Acknowledgment by lighting of all 3 LEDs.
- Key lock: push both keys A and B simultaneously for 15 s until yellow LED near B lights up. Then release keys. Acknowledgement by lighting of all 3 LEDs. Unlock the keys in the same way.

Teach-In by the connector

Pin 2 of the connector has besides the function synchronization also the same teach function as Key B. The adjustment of the max. signal output at fully open fork can therefore also be done by connecting pin 2 with power supply voltage (nom. 24 VDC) during min. 2 s. Subsequently, the pin 2 must be removed from the supply. The sensor can e.g. be operated after the teaching process with a 3 wire cable as well. Teach via connector is possible also if the key lock is enabled.



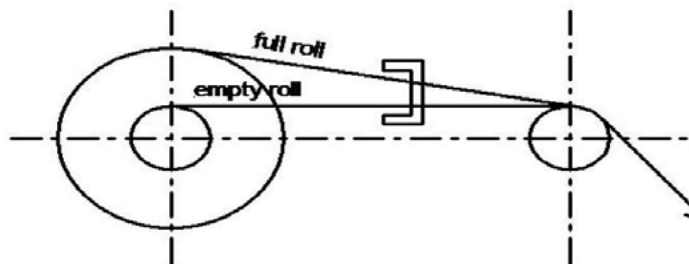
Status A:
0 V or 10 V inverted



Status B:
10 V or 0 V inverted

FORK WIDTH

Larger fork widths are of importance if the material web is vertically heavily fluttering or if it does not always pass at the same position during unroll or roll up (see picture below).

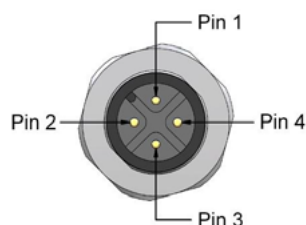


SYNCHRONIZATION

The internal sampling clock of the sensor can be overcome with an external repeating signal. This can be helpful if several sensors are measuring along a fast moving web.

ELECTRICAL CONNECTION

Sensor: M12 connector, 4 pole (View on the sensor)

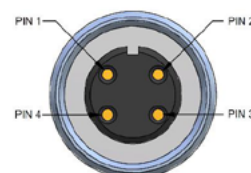


PIN	Function
Pin 1	+24 V
Pin 2	Synchronisation-/Teach-In Input
Pin 3	0 V
Pin 4	Analog output 0...10 V

Connection cable

Cable with connector M12, 4 poles, shielded

K4P2M-S-M12	2 m, connector straight
K4P5M-S-M12	5 m, connector straight
K4P10M-S-M12	10 m, connector straight
K4P2M-SW-M12	2 m, connector angular
K4P5M-SW-M12	5 m, connector angular
K4P10M-SW-M12	10 m, connector angular



PIN No.	cable colour	PIN No.	cable colour
Pin 1	brown	Pin 3	blue
Pin 2	white	Pin 4	black

ORDER CODE

UBA -AT - - 24 -CU

Measurement range [mm] 30 /
40 / 60 / 70

e. g. 40

OVERVIEW

UBA-AT-30-24-CU 30 mm, 0...10 V

UBA-AT-40-24-CU 40 mm, 0...10 V

UBA-AT-60-24-CU 60 mm, 0...10 V

UBA-AT-70-24-CU 70 mm, 0...10 V

ACCESSORIES

Connection cable with M12 connector, 4 pole, shielded

K4P2M-S-M12 2 m, straight connector

K4P5M-S-M12 5 m, straight connector

K4P10M-S-M12 10 m, straight connector

K4P2M-SW-M12 2 m, angular connector

K4P5M-SW-M12 5 m, angular connector

K4P10M-SW-M12 10 m, angular connector