

# Datasheet

- Multifunctional and high precision
- Available with a max. measuring length of 48 m and a resolution of 1  $\mu\text{m}$
- Immediately after applying the supply voltage the absolute value is available via an SSI interface or optionally via a BiSS-C-mode interface.
- With BiSS additionally either an analogue or incremental real-time signal is available.



The multi-colour LED is located in the front on the side opposite the plug. During switch-on, the LED displays the following sequence:

Red – orange – green – LED off – red – orange – green – LED off – green (illuminated permanently).

Each colour is displayed for about one second until the LED is illuminated permanently green. If an error occurs or a warning appears, an error or warning sequence is displayed in place of the green LED.

## Mechanical Data

Material	Housing	zinc diecasting nickel-plated, chrome-plated
Wight		65 g
Resolution		0,97 ( $\triangleq$ 1000/ 1024); 1; 2 ; 5; 10 $\mu\text{m}$
Repeat Accuracy		< 1 $\mu\text{m}$
Hysteresis		$\leq$ 2 $\mu\text{m}$
Non-linearity of Sensor Head		max. $\pm 2 \mu\text{m}$
Non-linearity of Sensor Head (Sensor Head + Magnetic Tape)		max. $\pm 20 \mu\text{m}$
Gap (Sensor + Tape)		0,2 to 0,8 mm recommended 0,4 mm
Temperature Coefficient of the Entire System		10,5 ppm/ $^{\circ}\text{K}$
Movement Speed		max. 10 m/s
Operating Temperature		-20 $^{\circ}\text{C}$ ...+70 $^{\circ}\text{C}$
Storage temperature for sensor head		-25 $^{\circ}\text{C}$ ...+85 $^{\circ}\text{C}$
IP-Rating per IEC 60529 (when sensor head attached)		IP 67
Altitude		max. 2000 m
Relative Humidity		90 % rF, no condensed

## Electrical Data

Supply Voltage	5 V $\pm$ 5 % or 10...28 V
Power	220 mA at 5 V Supply Voltage 70 mA at 24 V Supply Voltage
Demand	< 1,5 W + controller demand
Inverse-Polarity Protection	No
Overvoltage Protection	No
Voltage Strength (GND to housing)	500 V DC
Switch-On Delay (system ready) after Applying Supply Voltage	max. 1000 ms
Output Signal absolute	RS422 Differential Signal
<b>SSI</b>	
Number of Bits	24; 25; 26; 32 incl. Error + zero bitt)
Coding	increase or decrease
Data	Error bit, Position
Pulse Frequency	70 kHz...1600 kHz at 32 Data Bit 70 kHz...900 kHz at 24/25/26 Data Bit
Scanning Frequency	Pulse Frequency $f_{clk}$ / (number of transferred bits + 3)
<b>BiSS C</b>	
Number of Bit	40 (4 zero bit + 28 Position + 1 Error + 1 Warning + 6 CRC)
Coding	binary code
Direction of Counting	increase
Data	zero bit, Position, warning bit, CRC
Pulse Frequency	100 kHz... 10MHz
Analog, Incremental Real-Time Signal	Period 2 mm
Digital, Incremental Real-Time Signal	Resolution (edge distance) as absolute
Shock Rating per EN 60068-2-271	100 g/6 ms
Continuous Shock per EN 60068-2-291	150 g/2 ms
Vibration Load per EN 60068-2-61	20 g, 10...2000 Hz
Noise per EN 60068-2-641	20 g, 5...2000 Hz
External Magnetic Fields	< 30 mT (to avoid permanent damage) < 1 mT (to avoid influencing measurement)
Pulse	RS 422 Differential Signal
Stratset	10...28 V against GND > 0,5 s

The information here compromises typical values at room temperature in conjunction with magnetic tape PMA with a gap of 0,4 mm over the magnetic tape (without cover strip).

### Maximum Movement Speed, Resolution and Edge Distance

With the AHP2L with magnetic tape, the maximum movement speed depends on the minimum edge distance and the mechanical resolution.

Min. edge distance	Vmax acc. to edge distance and resolution			
	Resolution			
	1 µm	2 µm	5 µm	10 µm
0,12 µs	4,7 m/s	10 m/s	20 m/s	20 m/s
0,29 µs	2 m/s	4 m/s	10m/s	10 m/s
0,48 µs	1 m/s	2 m/s	5,41 m/s	5,41 m/s
1 µs	0,65 m/s	1,3 m/s	2,95 m/s	2,95 m/s
2 µs	0,3 m/s	0,6 m/s	1,54 m/s	1,54 m/s
4 µs	0,15 m/s	0,3 m/s	0,79 m/s	0,79 m/s
8 µs	0,075 m/s	0,15 m/s	0,34 m/s	0,34 m/s
16 µs	0,039 m/s	0,079 m/s	0,19 m/s	0,19 m/s
24 µs	0,026 m/s	0,052 m/s	0,13 m/s	0,13 m/s

### Max. Measuring Length SSI + max. Movement Speed

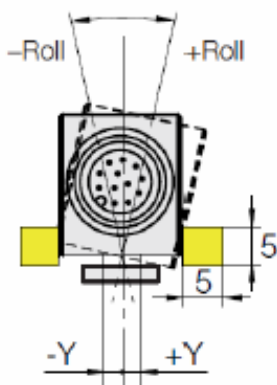
max. Measuring Length	Number of Bits	Resolution	Interpolation Factor
2	24	0,9765625 µm (1000/1024 µm)	2048 at v = 0...10 m/s
4	25		
8	26		
48	32		
2	24	1 µm	2000 at v = 0...5 m/s
4	25		
8	26		
48	32		
4	24	2 µm	1000 at v = 0...10 m/s
8	25		
16	26		
48	32		
10	24	5 µm	400 at v = 0...10 m/s
20	25		
40	26		
48	32		
20	24	10 µm	200 at v = 0...10 m/s
40	25		
48	26		
48	32		

# Datasheet

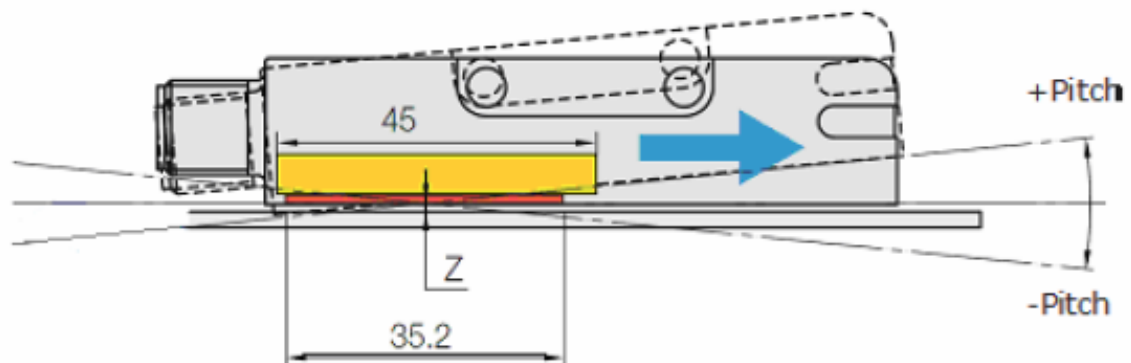
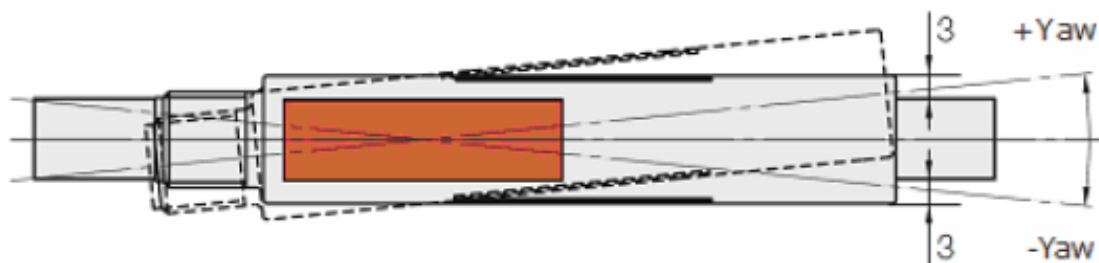
## Distance and Tolerances

During assembly, make sure that the sensor head is correctly positioned over the magnetic tape. The distances and tolerances must be complied with to ensure the correct function and linearity class of the system. We recommend an air gap of 0.1 mm (about a paper thickness).

	Distances/angles
<b>Z</b> (sensor/magnetic tape gap)	0,2...0,8 mm (0,05...0,65 mm with cover strip), optimum measurement at 0,4 mm (0,25 mm with cover strip)
<b>Y</b> (side offset)	$\pm 0,5$ mm
<b>Pitch</b>	$\leq \pm 0,5^\circ$
<b>Yaw</b>	$\leq \pm 0,2^\circ$
<b>Roll</b>	$\leq \pm 0,5^\circ$



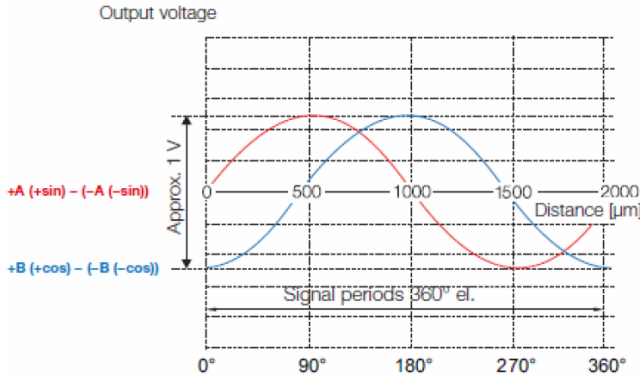
- Active measuring surface
- Free area of magnetizable material
- Direction of travel  
Forwards, A (sin) before B (cos),  
SSI or BiSS position rising



# Datasheet

## Interface

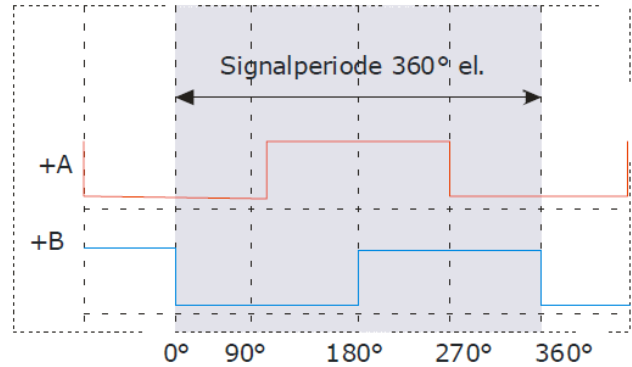
### Additional analog, incremental real-time signal



Signals of the sine and cosine sensor (2 mm pole pitch) in forward direction

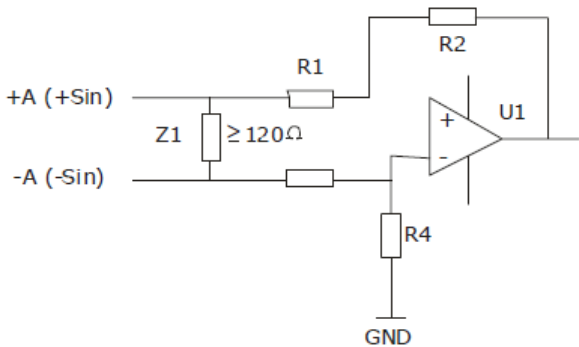
The sensor transmits the measurement as an analog sine/cosine differential signal with an amplitude of approx. 1V<sub>ss</sub> (peak/peak value within the assembly tolerances to the controller). The period is 2 mm.

### Additional digital, incremental real-time signal

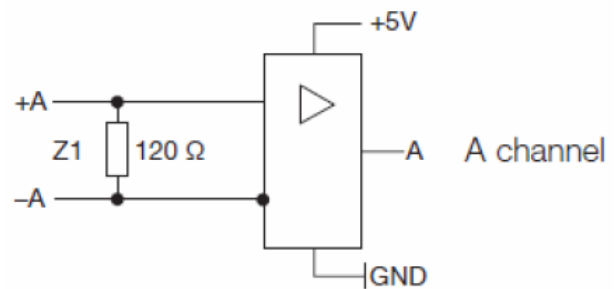


Digital output signals for forward movement

The sensor transmits the measurement to the controller as a digital voltage signal (RS422). Edge distances A/B corresponds to the resolution of the sensor head (note minimum edge distance)

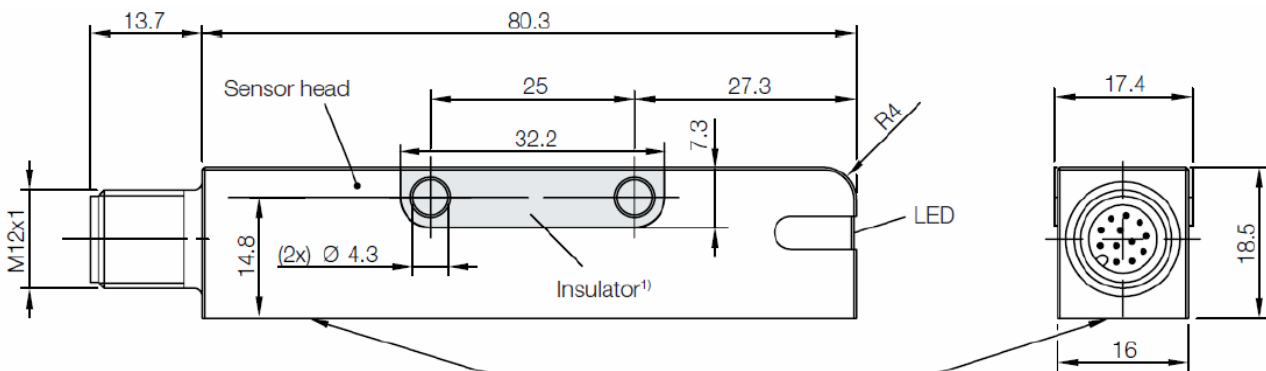


Circuitry example of subsequent electronics with analog output  
+A (+Sin) - (-A (-Sin)) (+B (+Cos) - (-B (-Cos))) correspondingly



Circuitry of subsequent electronics for digital output

## Dimensions

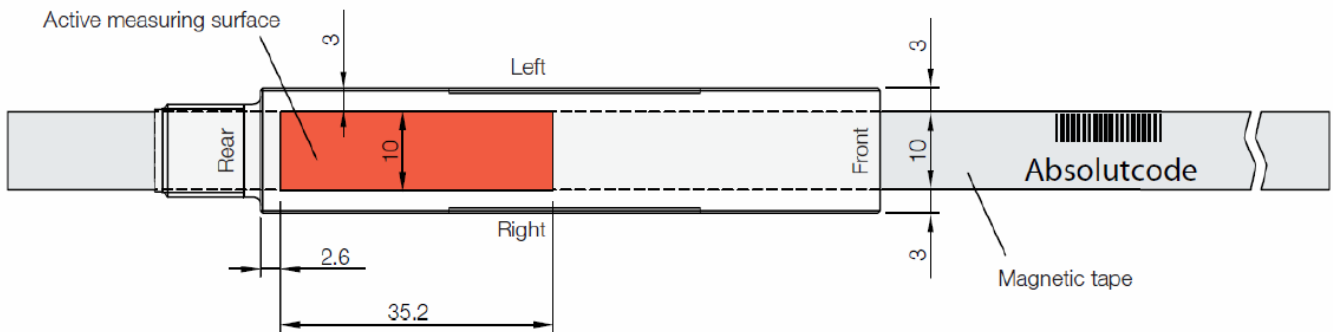


<sup>1)</sup> Included in scope of delivery

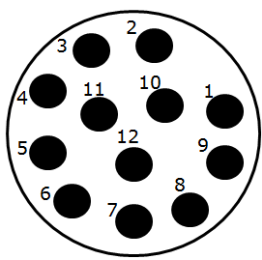
Active measuring surface

# Datasheet

## Mounting Position



## Pin Assignment

Pin		Signal			Description
		O-	AB- (Digital real-time signal)	VSS- (Analog real-time signal)	
1	WH	no used <sup>1)</sup>	+B	-	Rectangular signal, 90° phase-delayed to A
				+B(+Cos)	Cosine-shaped voltage signal
2	BN	no used <sup>1)</sup>	-B	-	Rectangular signal, 90° phase-delayed to A
			-	-B(-Cos)	Cosine-shaped voltage signal, inverted
3	GN		+Clk		Clock signal (RS422)
4	YE		-Clk		Clock signal (RS422)
5	GY		-Data		Data signal (RS422)
6	PK		+Data		Data signal (RS422)
7	BU		GND		Sensor ground (0V)
8	RD		U <sub>B</sub>		Supply voltage +5 V DC, 10...28 V DC
9	BK	no used <sup>1)</sup>	-A	-	Rectangular signal, inverted
				-A(-Sin)	Sine-shaped voltage signal
10	VT	no used <sup>1)</sup>	+A		Rectangular signal
				+A(Sin)	Sine-shaped voltage signal
11	GY PK		Start set		Define the current position as approx. 10 mm
12	RD BU	no used <sup>1)</sup>	must remain free	no used <sup>1)</sup>	-
PH	Shield		PE		Connector housing/ shield

1) Unassigned leads that are not used can be connected to the GND on the controller side but not to the shield.

# Datasheet

## Ordering Example

**Type**                    **AHP2L** - **1** - **SSI** - **GS** - **24** - **0** - - - **CO** - **24**

### Resolution

0,97 = 0,9765625 µm  
**1**    = 1 µm  
2     = 2 µm  
5     = 5 µm  
10    = 10 µm

### Interface

**B**     = BiSS-C (32 Bit, binary rising)  
**SSI**

### Code [SSI]

**GS**    = gray rising  
**GF**    = gray falling  
**BS**    = binary rising  
**BF**    = binary falling

### Nominal Length [Bit]

**24**; 25; 26; 32

### Additional Trail/ Real-Time Signal

**0**     = without  
**VSS** = analog, 1 Vss        (sin/ cos 2 mm)  
**AB**   = incremental\*  
**G**     = safety-related analogue realsignal (sin/cos)

### \*Edge Distance [µs]

0; 0,3; 0,5; 1; 2; 4; 8; 12; 16; 24

### El. Connection

**CO**    = Connector    (M12A - 12-pol.)

### Operating Voltage [VDC]

5  
**24**  
10 - 28