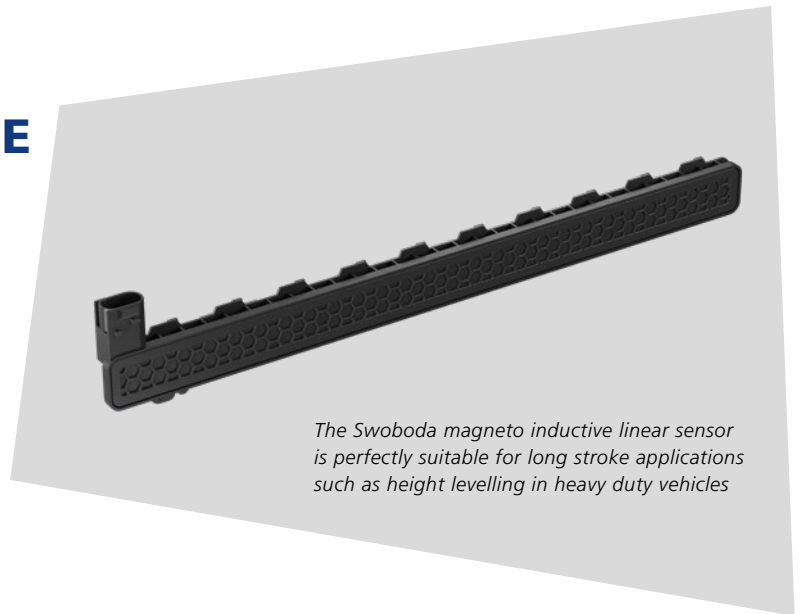


# SWOBODA MAGNETO INDUCTIVE LINEAR SENSOR FOR AUTOMOTIVE APPLICATIONS



*The Swoboda magneto inductive linear sensor is perfectly suitable for long stroke applications such as height levelling in heavy duty vehicles*

## INTRODUCTION

Linear sensors are used in a wide variety of commercial, industrial and automotive applications. Typical automotive applications are functional safety relevant.

The Swoboda magneto inductive linear sensor is able to measure long strokes up to 400 mm with high accuracy of less than 1% full scale. It features a very robust design and provides an absolute position output signal with true power on capability. The sensor is fully automotive qualified and can be tailored to customer specific design and building space requirements.

## FEATURES & BENEFITS

- Available with different output configurations:  
Analog, PWM, SENT (A.2 or A.3 format)
- Contactless absolute position measurement in combination with a magnetic target (NdFeB)
- Scalable sensor length from 10 to 400 mm depending on application requirements
- Handles nominal air gaps up to 3.7 mm
- Accuracy: < 1 % full scale (over lifetime & temperature)
- Resolution: 12 bit full scale
- Functional Safety (ISO 26262): ASIL-B  
dual redundant sensor design supports up to ASIL-D
- Power supply: 5 V  
(Optional: 12 V or 24 V with embedded DC/DC converter)
- Current consumption: max. 20 mA
- Temperature range: -40 °C to +110 °C
- Protection class (typical application): IP67
- Fully automotive qualified

## ADVANTAGES

- Highly accurate measurement of linear strokes up to 400 mm
- Immune against mechanical tolerances (± 2.8 mm)
- Capable of handling large nominal air gaps (up to 3.7 mm)
- Contactless measurement through non ferromagnetic materials
- ISO 26262 ASIL-B compliant

## APPLICATION AREAS

- Chassis height levelling
- Steer by wire
- Clutch position
- Transmission
- Brake by wire
- Seat position
- Pneumatic cylinders

Any questions about this product?

Please contact us:

Sales Department

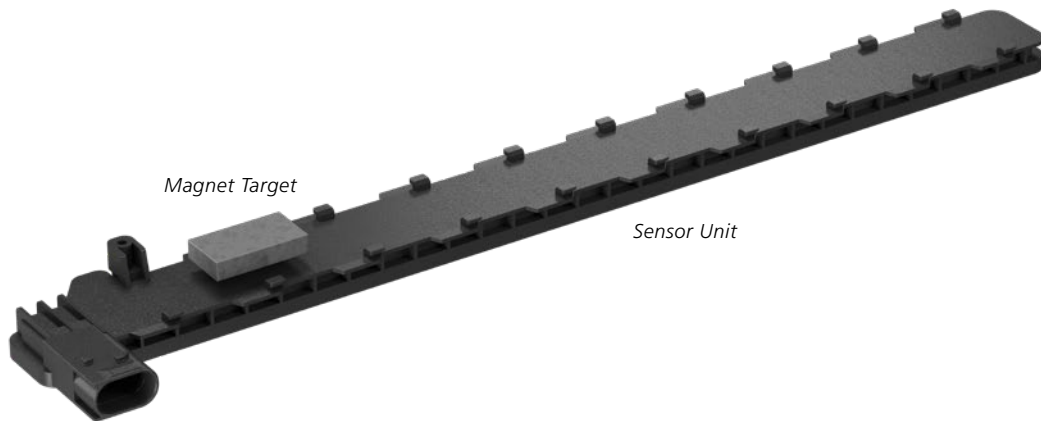
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## SENSOR PRINCIPLE

The magneto inductive sensor combines the advantages of two different sensor types. The sensor features a precise measurement based on inductive coils as well as an increased robustness against large air gap tolerances by making use of the Hall effect principle. Another advantage is the possibility of mounting a non ferromagnetic housing into the two sensor parts. In a typical sensor system the magnet target is mounted inside on the moving part while the sensor unit sits outside the housing. This enables applications with spatial separation of magnet target and sensor unit, such as pneumatic cylinders and chassis shock absorbers.



## PRINCIPLE OF OPERATION

The magneto inductive linear sensor measures the position of a magnet target which is fixed on a moving object. The moving magnet target causes a change in the magnetic flow in the sensor element (refer to figure 1) which is then detected by an underlying inductive sensor coil. This results in a linear relationship between position and output signal (refer to figure 2).

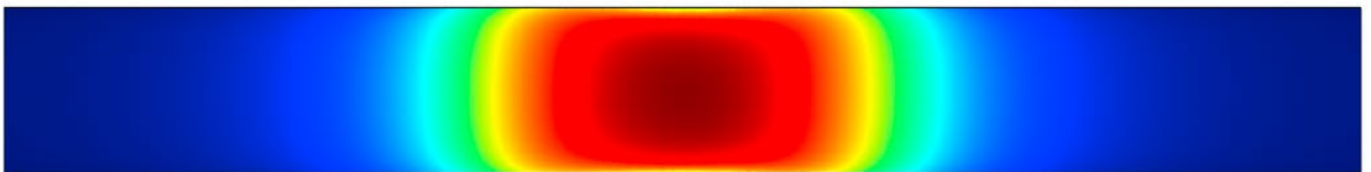


Figure 1: Magnetic saturation of the sensor element.

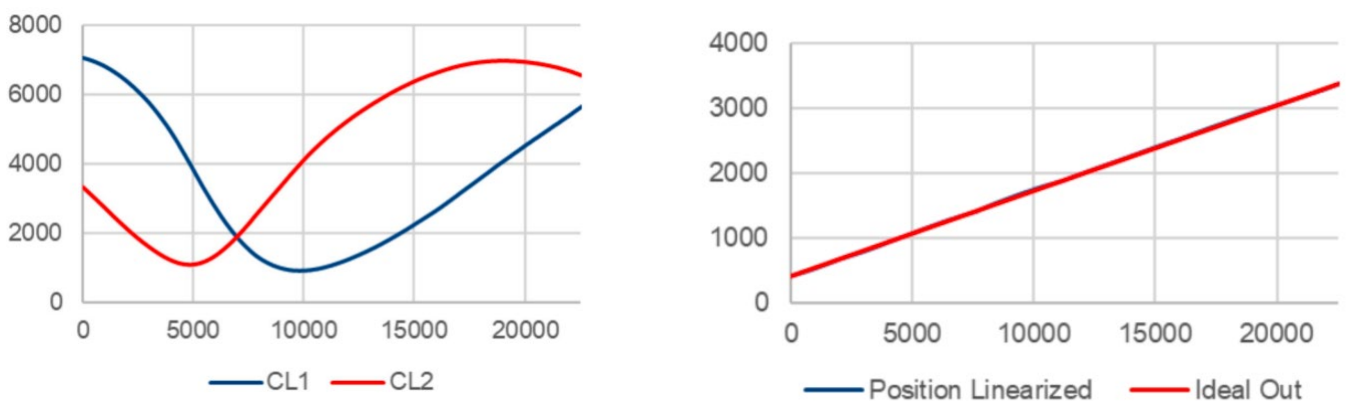
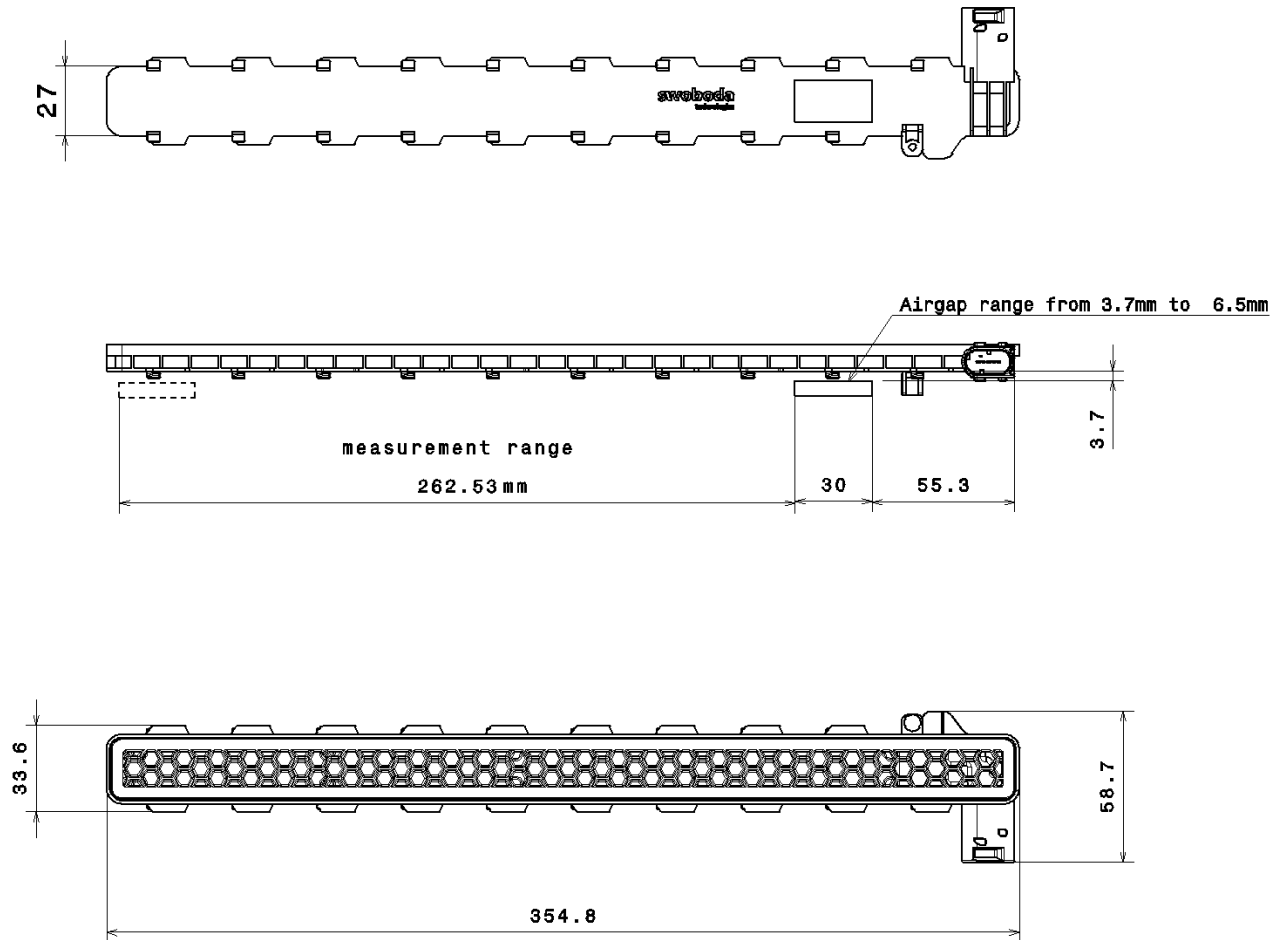


Figure 2: Sensor signals (input & output)

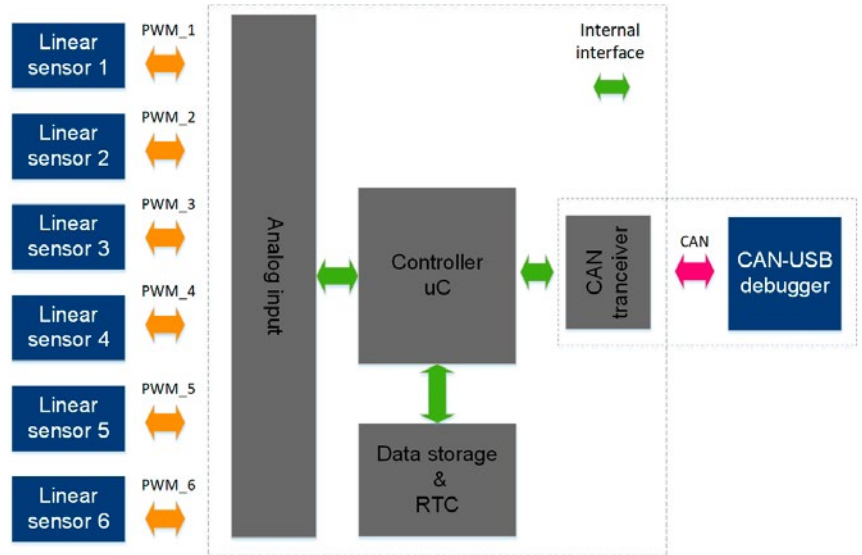
**DRAWING**



**NOMINAL OPERATING CHARACTERISTICS**

SIGNAL DESCRIPTION	UNITS	MIN.	NOM.	MAX.	REMARKS
Positionsignal	[mm]	10	-	400	Range depends on customer design
Air gap range	[mm]	0.9	3.7	6.5	Air gap tolerances $\pm 2.8$ mm
Ambient temperature	[°C]	-40	-	110	
V <sub>DD</sub>	[V]	4.5	5.0	5.5	5.0 V version
	[V]	11.5	12.0	12.5	12.0 V version
	[V]	23.5	24.0	24.5	24.0 V version
I <sub>DD</sub>	[mA]	-	10	20	Supply current
t <sub>PON</sub>	[us]	-	-	200	Power on time
A <sub>OUT</sub>	[V]	0.0	-	5.0	Analog signal output
PWM <sub>OUT</sub>	[%]	10	-	90	Digital output
SENT <sub>OUT</sub>	[Frame]	-	-	12 Bit	A.2 or A.3 frame format
Accuracy			<1%		full scale within working range @ maximum nominal air gap of 3.7 mm

## EVALUATION KIT FOR LINEAR SENSOR APPLICATIONS



### FEATURES & BENEFITS

- Real time sensor signal tracking
- Tracing & measuring of up to 6 linear sensors
- Recording data for up to 7 days with 2 samples/second
- Supported sensor interfaces: PWM
- Configurable over USB or CAN-Interface
- Sealed against dust & water (IP6K4K)
- Reverse polarity & overvoltage protection
- More information available on request

### ELECTRICAL OPERATING CHARACTERISTICS

PARAMETER DESCRIPTION	UNITS	MIN.	NOM.	MAX.	REMARKS
Operating temperature	[°C]	-20	-	70	
V <sub>DD</sub>	[V]	11.4	12.0	12.6	DC supply voltage
	[V]	22.8	24.0	25.2	Optional
I <sub>DD</sub>	[mA]	-	-	300	Current consumption