

# PRODUCT SPECIFICATION LIST

108-32378

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Revision: 2

## ED33

Magnetic linear Encoder



### CUSTOMER ACCEPTANCE

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Company: Schunk Sonosystems GmbH  
Address: Hauptstrasse 95 D-35435 Wettenberg

Function: \_\_\_\_\_

Signature: \_\_\_\_\_

Printed name: \_\_\_\_\_

Date: \_\_\_\_\_

## HISTORY

Revision	Modification	Date	Author
1.0	Creation, First Draft	27.03.2012	A.Voss
1.1	Add details	19.04.2012	A.Voss
1.2	Add Test condition	06.06.2012	A.Voss
1.4	Change to Final Version	19.02.2016	A.Voss
2	Systems-TS-ED33-001 (Roxtra number) replayed by PDM Link number	15.03.2022	Moe

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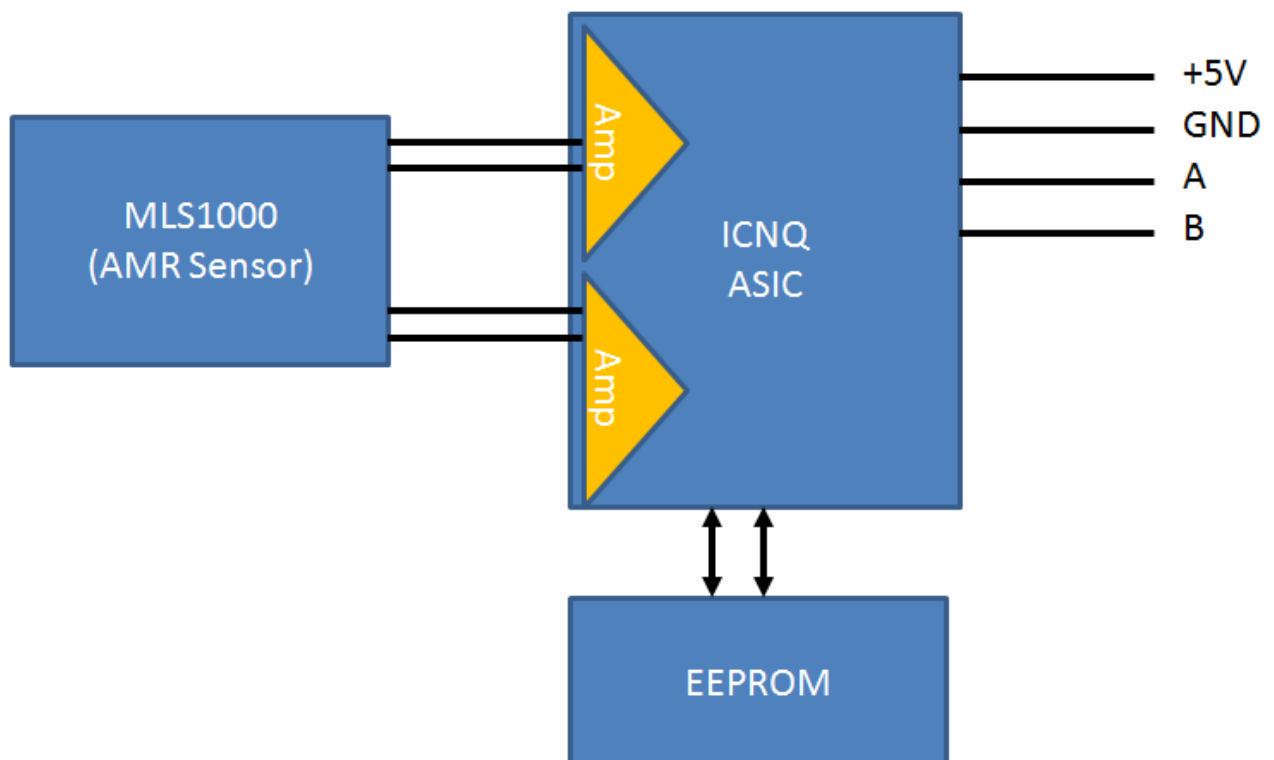
## 1 Abstract

This document has been created in order to determine, and clarify the product specifications. The customer and MEAS Deutschland GmbH will agree the common technical clarifications by signing the first page of this document.

## 2 General

The ED33 is a linear incremental encoder based on the well established magnetoresistive sensor technology. The contactless magnetic measuring principle is used for precise incremental displacement measurement by utilizing a magnetized scale with alternating north and south poles. Air gaps up to 0.4 mm are possible between scale and the read head. The encoder device is equipped with an internal sine / cosine interpolation unit which supports an A/B quadrature output with reliable position information. The small housing could be well integrated into machineries where position feedback is needed. The contactless AMR technology is well suited for applications covered by pollution like dust or oil which could not affect the measurement. The system accuracy of this encoder is directly influenced by the used magnetic scale. This encoder system is developed to be used with magnetic scales of 1mm pole pitch.

### 2.1 Functional Block Diagram



**Figure 1** Functional Block Diagramm

### 3 Mechanical Information

#### 3.1 Label information

The sensor system will be marked with one silver label glued on the top of the encoder housing. The label is printed with a thermal label printer.

Label dimensions: 12 x 7 mm

The label contains the following information in numerical data:

- Model / Item number G-MRED-110
- Week and Year of PCB production 1139
- Serial number 0710



Additional to this label there will be a second label with a 2D datamatrix barcode on the housing side of the grub screw. This label is also containing the same information as the numerical data from above.



**Figure 2** Labels on ED33

### 3.2 Terminal Connections

Contact Binder Type: 09-9764-70-04

Pin	Name	Description	Color
1	GND	Ground	brown
2	VCC	Supply 5V	green
3	A	Channel A	white
4	B	Channel B	yellow

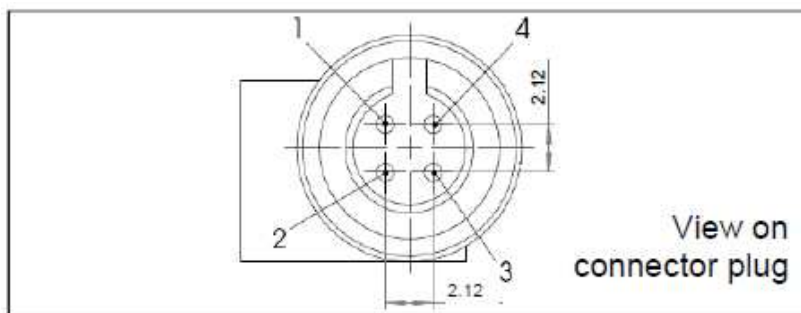


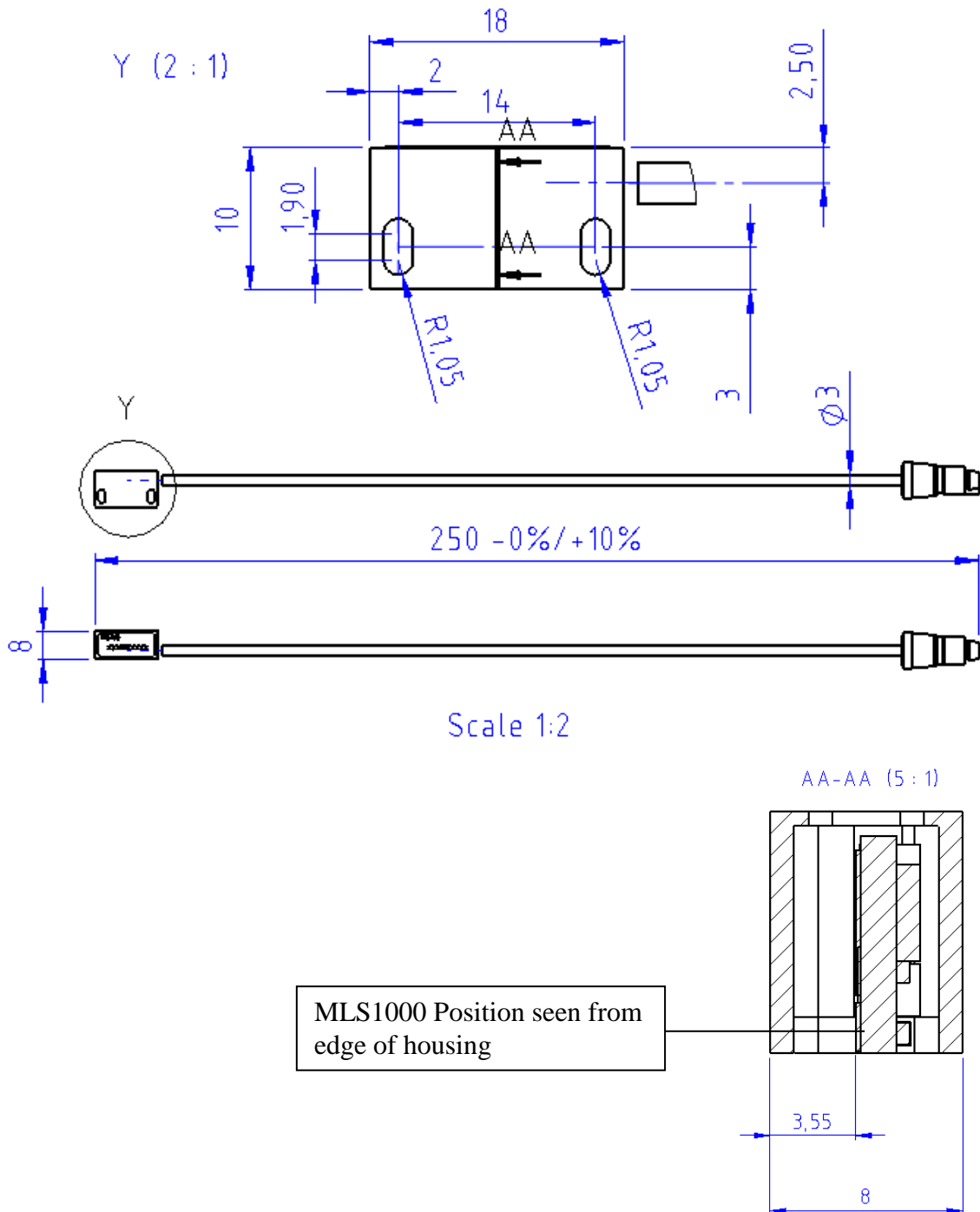
Figure 3 Connector Plug Pin description

### 3.3 Mechanical Data

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
	Weight			70		g
	Dimensions Encoder		18 x 8 x 10			mm
	Dimensions Encoder + Cable + Connector		250 -0% + 10%			mm

### 3.4 Mechanical Dimensions

The mechanical dimensions of the encoder are shown in Fig. 4.  
 Cross sectional and side view of the encoder with placement of the connector.



**Figure 4** Mechanical dimensions (MEAS Drawing number 320SM100\_0001ATK)

## 4 Electronic

### 4.1 Maximum Ratings

**Absolute maximum ratings are limiting values of permitted operation and should never be exceeded under the worst possible conditions either initially or consequently. If exceeded by even the smallest amount, instantaneous catastrophic failure can occur. And even if the device continues to operate satisfactorily, its life may be considerably shortened.**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	Vcc	Measured versus GND	<b>-0.3</b>		<b>+5.5</b>	V
Operating Temperature	Top		<b>-20</b>		<b>+70</b>	°C
Storage temperature	Tstor		<b>-40</b>		<b>+85</b>	°C

Stress above one or more of the limiting values may cause permanent damage to the device. Exposure to limiting values for extended periods may affect device reliability.

### 4.2 Operating Conditions (typical @ 25°C)

If not otherwise noted, 25°C ambient temperature, 5V supply voltage applied.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply voltage	Vcc	Measured versus GND	<b>4.5</b>	<b>5</b>	<b>5.5</b>	V
Supply Current	I		<b>14</b>	<b>16</b>	<b>18</b>	mA
Output Frequency	f <sub>out</sub>	Motion speed v=1 m/s		<b>50</b>		kHz
Resolution (flank to flank)	A			<b>5</b>		µm
Flanks per mm				<b>200</b>		
Ambient Temperature	T <sub>amb</sub>		<b>-20</b>		<b>+70</b>	°C
Absolute accuracy	Δx		<b>-10</b>		<b>+10</b>	µm
Repeatability	R		<b>-10</b>		<b>+10</b>	µm
Deviation of pulse width	Δn		-	<b>±10</b>	<b>±45</b>	deg
Deviation of phase shift	Δφ		-	<b>±10</b>	<b>±40</b>	deg
Motions Speed	v		-	-	<b>6</b>	m/s
used magnetic pole width	p			<b>1</b>		mm
air gap sensor - scale	d		<b>0.1</b>		<b>0.4</b>	mm

### 4.3 Startup Time

During startup the internal ASIC gets the parameter set out of the EEPROM and switched into AB-Quadrature output mode. This will take in maximum 10ms after powering up to 5V.

## 5 Functional description

The sensor system will perform a position feedback over an AB-Quadrature Output.

### Typical performance graphs

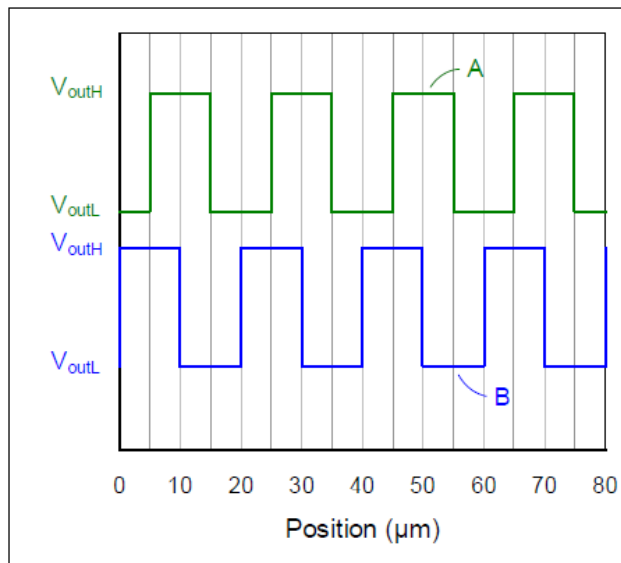


Fig. 1: Typical output signals depend on direction of movement.

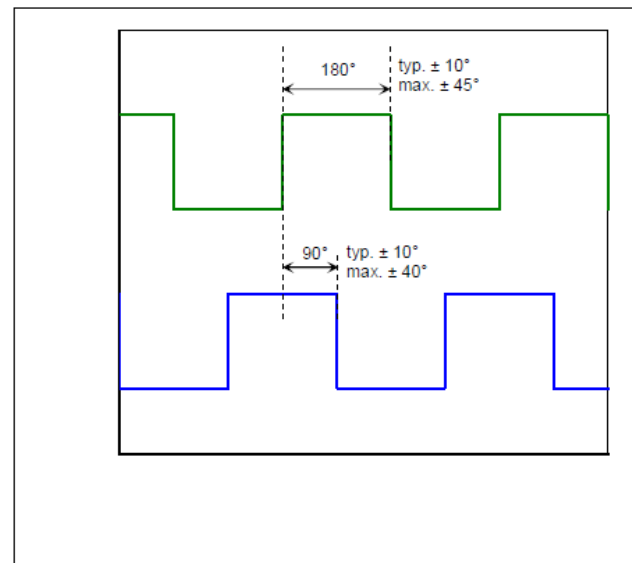


Fig. 2: Pulse width deviation and phase shift.

### 5.1 Lost Magnet

If the specified air gap between scale and sensor is over its maximum the incremental AB output is frozen at the last valid state. If the sensor turns back into the specified air gap the incremental AB output is corrected when the driven way is smaller than one pole pitch (<1mm), otherwise the output gives back a miscount of flanks.

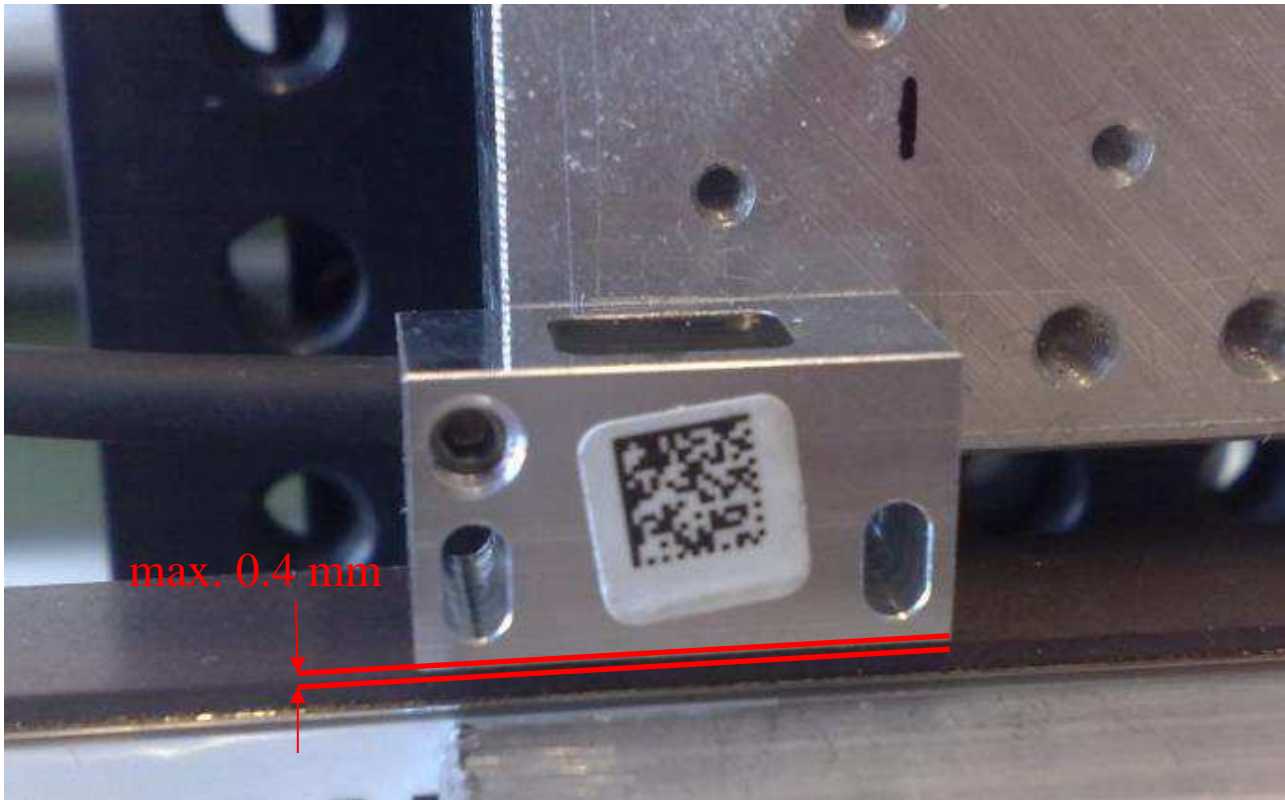
### 5.2 Exceeding speed range

If the specified speed range of  $v_{max} = 6m/s$  is exceeded the incremental AB output is frozen at the last valid state. If the sensor turns back into the specified velocity the incremental AB output works in correct order. The meanwhile travelled distance (with  $v > v_{max}$ ) is not covered in AB output flanks.



## 6 Mounting of ED33

The encoder works with a pole scale of 1mm pole pitch. The maximum air gap between scale and encoder lower side is 0.4 mm.



## 7 Test Requirements

### 7.1 100% Series Test

100% of delivered sensor systems will be measured in order to determine corresponding values (according the following table) within a temperature range of 18°C to 30°C by a combined In-circuit and Functional Test Equipment (ICT/FUT)

No.	Test value	No. of measurements	Condition / Annotation
1	MR sensor resistance	1	3kOm (+/-500 Ohm)
2	Current Consumption	1	16mA (+/-4 mA)
3	EEPROM	1	programming and read back comparison
4	Accuracy	1	+/- 10 µm, air gap between sensor and scale = 0,45 mm

## 8 EMC / CE declaration

Due to the use of these sensors for OEM application no CE declaration can be given. The sensor will be designed using capacitors and ESD protection diodes for blocking and ground plane areas in order to prevent wireless coupled disturbances as good as possible. The cable is shielded.

### 8.1 ROHS and REACH declaration

The module is in agreement with ROHS and REACH regulations.

## 9 Qualification / requalification

### 9.1 Qualification

A qualification run is not scheduled.

### 9.2 Re-Qualification and material testing

A re-qualification is not scheduled.

### 9.3 Material tests

All materials used in the process are released by checking the corresponding supplier certificates.

A regular material analysis from an independent laboratory is not scheduled.

## 10 Packaging

The modules are protected against ESD with a special bag which is not sealed.

The modules are packed in a way that damage during transport is impossible.

## 11 Ordering information

This product can be ordered using:

#### ARTICLE NUMBER

**G-MRED-110**

#### DESCRIPTION

ED33 linear magnetic sensor, pole pitch 1mm, resolution 5  $\mu$ m



## CONTACT INFORMATION

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