

# PAM7943D

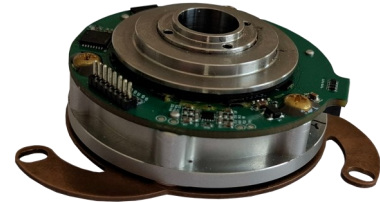
## Axial 360 degree absolute Encoder

The axial encoder system PAM7943 consists of a 360 degree absolute encoder and a two-track axial magnetic disc which are assembled in a packaged, which can be mounted directly.

This system offers a true-power-on position measurement system with an resolution up to 24 bit for single turn.

Due to it's axial magnetic disc and the compact, very flat sensor module the system is ideally suited for use in robot joints or flat motors.

With the proven MR-sensor technology and integrated correction algorithms the PAM is a very robust and reliable solution with a high accuracy and repeatability.



### Product Overview

Article Name	Description
PAM7943-DSA-EG	Axial 360 degree absolute encoder, SPI

### Quick Overview

Symbol	Parameter	min.	typ.	max.	Unit
V <sub>CC</sub>	Supply voltage	4.75	5.0	5.25	V
I <sub>C</sub>	Current consumption	100	125	150	mA
Res	Resolution Singleturn	-	24	-	bit
Acc	Accuracy	-	±15	-	arcsec
T <sub>amb</sub>	Operating temperature	-40	-	+85	°C

### Features

- Singleturn absolute
- Up to 24 bit resolution
- Calibration algorithms
- True-power-on
- Wide temperature range from -40°C up to +85°C
- SPI protocol interfaces

### Advantages

- Compact design (axial)
- High accuracy
- Robust and reliable

### Applications

- Off-axis applications
- Robotic joints
- Automated Guided Vehicles
- Flat electro motors



### Electrical Data

T<sub>amb</sub> = 25°C, V<sub>CC</sub> = 5.0 V; unless otherwise specified

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
V <sub>CC</sub>	Supply voltage		4.75	5.0	5.25	V
F <sub>Pos</sub>	Position Refresh Rate		-	18.0	-	kHz
I <sub>A</sub>	Current	V <sub>CC</sub> = 5.0 V	100.0	125.0	150.0	mA
t <sub>Start</sub>	Start time		-	100.0	-	ms
T <sub>op</sub>	Operating temperature		-40	-	+85	°C
T <sub>storage</sub>	Storage temperature		-40	-	+105	°C

### Mechanical Data <sup>1)</sup>

T<sub>amb</sub> = 25°C; unless otherwise specified

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
D <sub>out</sub>	Outer diameter of the module		-	49.0	-	mm
D <sub>in</sub>	Inner diameter of the module		-	11.0	-	mm
H	Height of the module		-	20.05	-	mm

<sup>1)</sup> more details in Fig. 2

### Performance Data

T<sub>amb</sub> = +25°C, V<sub>CC</sub> = 5.0 V, unless otherwise specified

Symbol	Parameter	Comment	Min.	Typ.	Max.	Unit
Acc	Accuracy		-	±15.0	-	arcsec
Rep	Repeatability		-	±7.0	-	arcsec
Res	Resolution		-	24	-	bit
Speed	Maximum speed <sup>4)</sup>		-	10000	-	RPM
N	Noise		-	±0.0005	-	°

### Environmental Data

Symbol	Conditions	min.	typ.	max.	Unit
Vibration resistance		-	-	785	m/s <sup>2</sup>
Shock resistance		-	-	980	m/s <sup>2</sup>
External magnetic field		-	-	±100	mT
Humidity		-	-	70	%

**Pinout of the sensor module**

Pad	Symbol	Parameter
1	GND	Ground
2	SS	Slave select
3	SCLK	Serial clock
4	MOSI	Master output
5	MISO	Master input
6	V <sub>cc</sub>	Supply Voltage

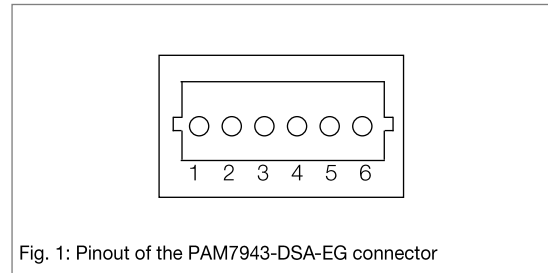


Fig. 1: Pinout of the PAM7943-DSA-EG connector

**Dimensions**

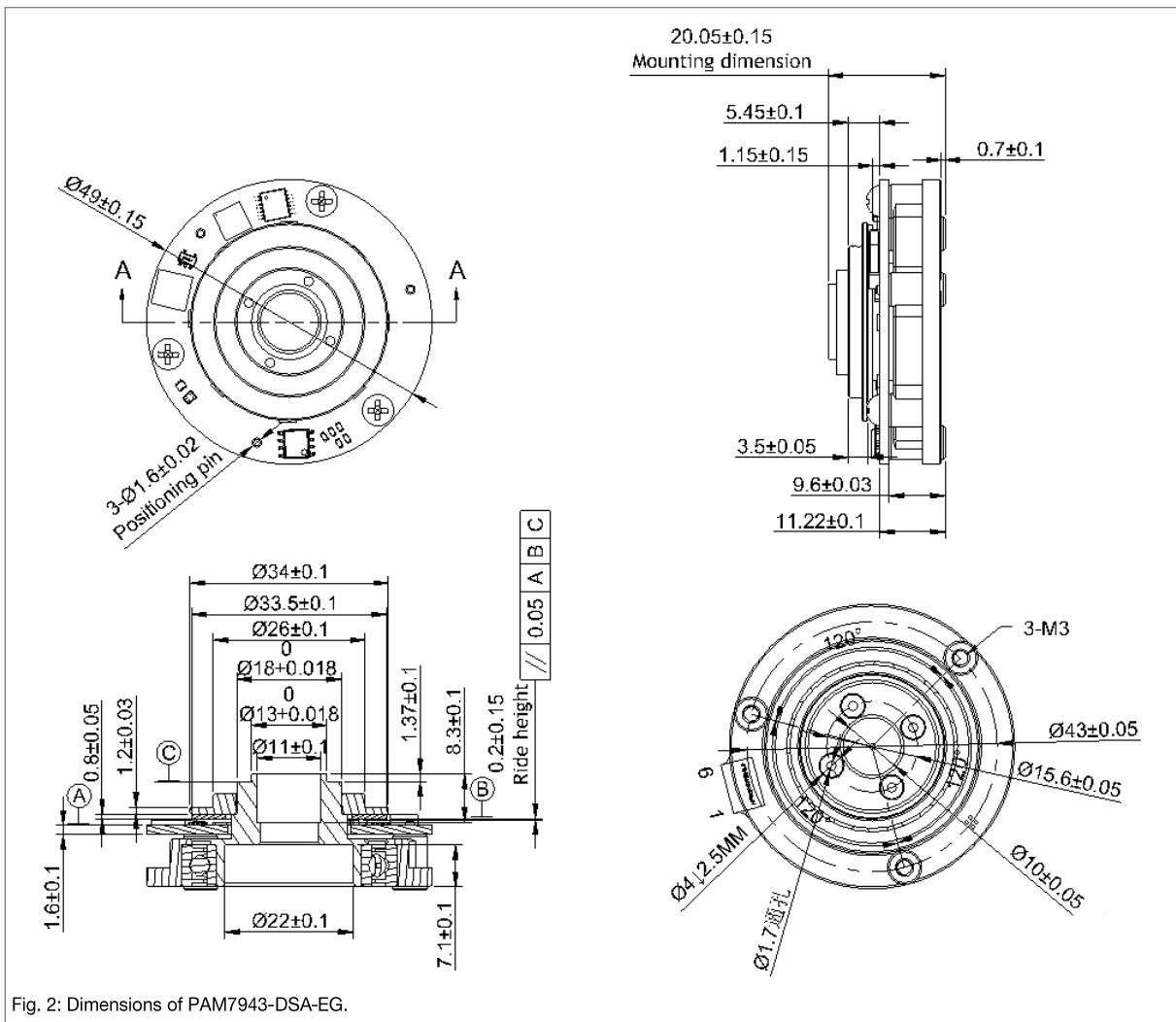


Fig. 2: Dimensions of PAM7943-DSA-EG.

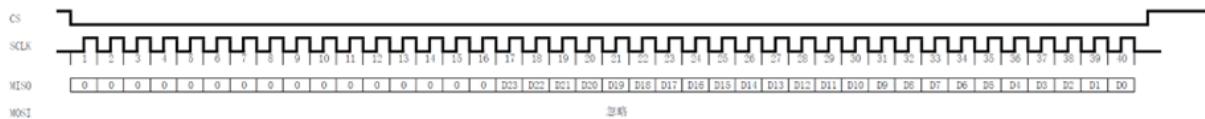
### SPI interface

The following chapter describes how the SPI interface is working and how it is possible to receive the position information of the sensor.

### Communication parameters

Parameter	Symbol	Min	Max
Clock cycles	$t_{cl}$	400 ns	-
Clock frequency	$F_{cl}$	-	2.5 MHz

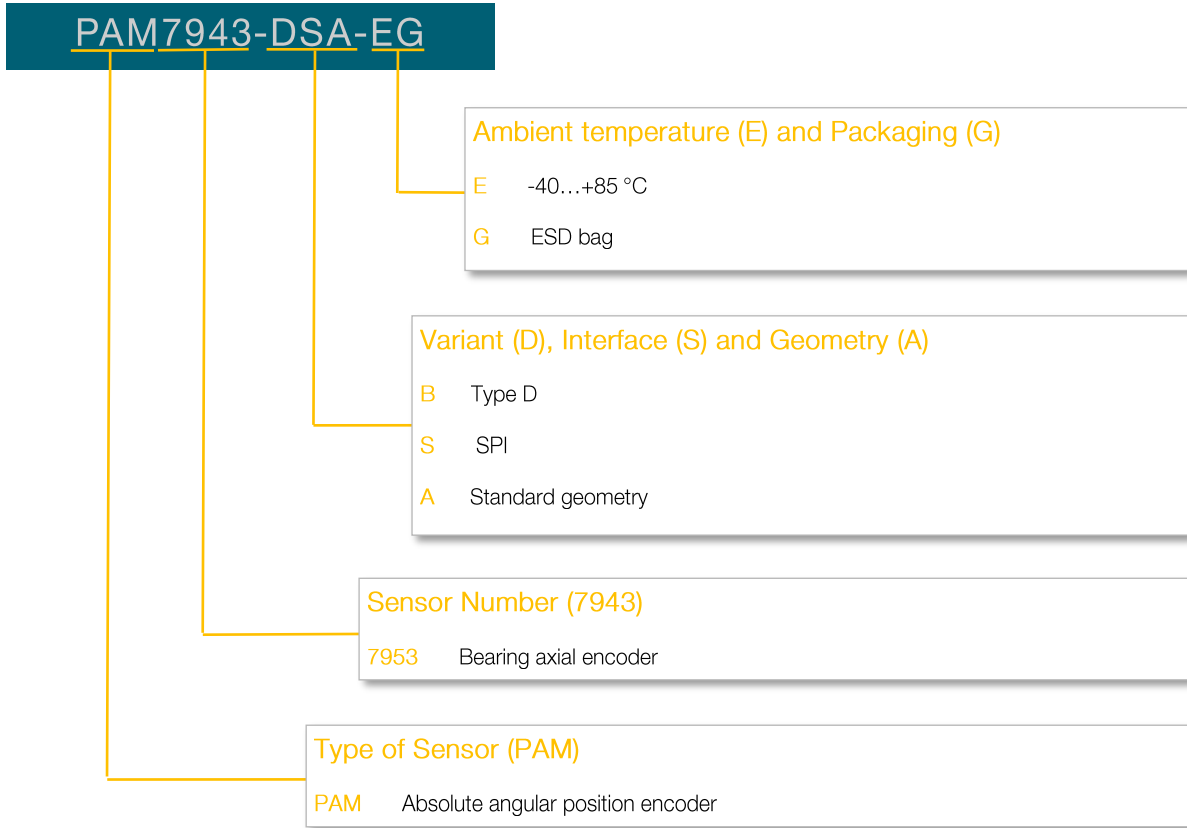
### SPI timing diagramm



Using SPI MODE0 communication mode, the upper computer sends 48 SCLK

- BIT1~BIT8: Obligate
- BIT9~BIT16: Encoder status bits
  - BIT9: Obligate
  - BIT10: Obligate
  - BIT11: Obligate
  - BIT12:flash\_crc\_error
  - BIT13:magic\_error
  - BIT14:temp\_alarm
  - BIT15:chip\_fflt
  - BIT16: prbs\_error
- BIT17~BIT40: Encoder data bits
- BIT41~BIT48: CRC check bit, XOR value for the first 5 bytes

**Additional Information on Ordering Code**



**General Information**
**Product Status**

Article	Status
PAM7943-DSA-EG	The product is under development.
<b>Note</b>	The status of the product may have changed since this data sheet was published. The latest information is available on the internet at <a href="http://www.sensitec.com">www.sensitec.com</a> .

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### Life Critical Applications

These products are not qualified for use in life support appliances, aeronautical applications or devices or systems where malfunction of these products can reasonably be expected to result in personal injury.

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### Changelist

Version	Description of the Change	Date
PAM7943D.DSE.00	Original (pp. 1-7)	04/2025

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