



## P503 Flat Rotary Sensor

High-resolution angle feedback for industrial and scientific applications

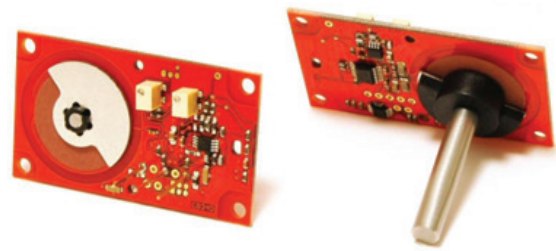
**ALTHEN**  
SENSORS & CONTROLS

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**P503**

### APPLICATION

- Non-contacting inductive technology to eliminate wear
- Angle set to customer's requirement
- Compact PCB design, durable and reliable
- High accuracy and stability



As a leading designer and manufacturer of linear, rotary, tilt and intrinsically safe position sensors, Althen has the expertise to supply a sensor to suit a wide variety of applications. The P503 is a low-cost assembly designed particularly for OEM users. Like all Althen sensors it provides a linear output proportional with input shaft rotation, which has full 360 degree rotational freedom. Each unit is supplied with the output calibrated to the angle required by the customer, between 15 and 160 degrees.

With suitable mounting and bearings, overall performance, repeatability and stability are outstanding over a wide temperature range. This very compact sensor, supplied as a printed circuit board sub-assembly, has a range of electrical options. The P503 is ready to mount directly in customer's equipment. Connections to the sensor are made via solder pins.

### SPECIFICATIONS

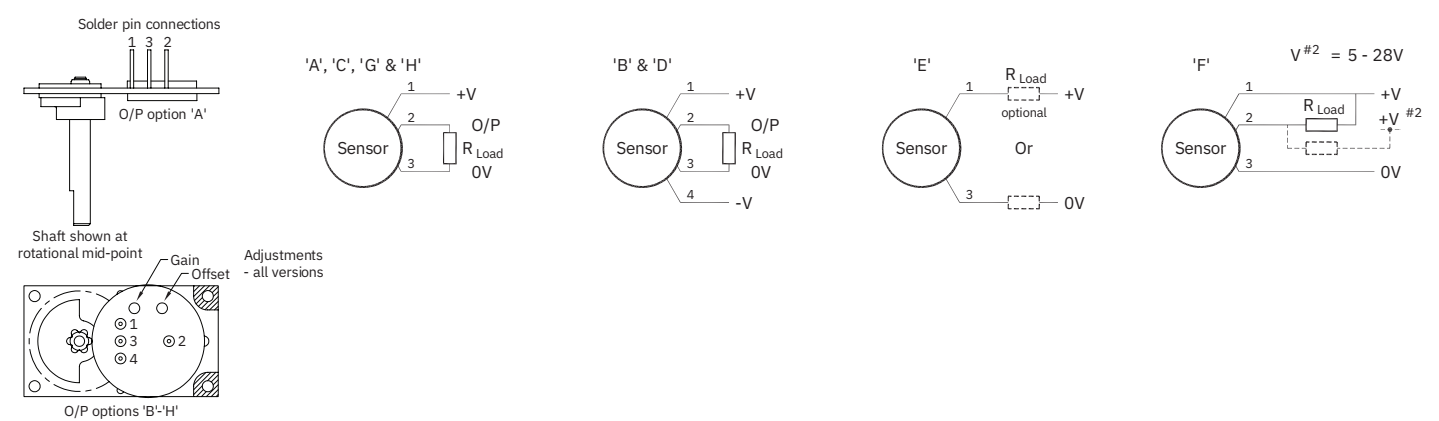
<b>Dimensions<sup>1</sup></b>	
Board Outline	56 x 32 x 6 mm standard
Board Outline	56 x 32 x 12.5 mm buffered
Shaft	31 mm Ø 6mm
<b>Independent Linearity</b>	≤ ± 0.5% FSO @ 20°C - up to 100°
<b>Temperature Coefficients</b>	< ± 0.01%/°C Gain & < ± 0.01%FS/°C Offset
<b>Frequency Response</b>	> 10 kHz (-3dB) > 300 Hz (-3dB) 2 wire 4 to 20 mA
<b>Resolution</b>	Infinite
<b>Noise</b>	< 0.02% FSO
<b>Torque</b>	< 20 mNm Static
<b>Environmental Temperature Limits</b>	
Operating	-40°C to +125°C standard -20°C to +85°C buffered
Storage	-40°C to +125°C
<b>Sealing</b>	IP00
<b>EMC Performance</b>	EN 61000-6-2, EN 61000-6-3
<b>Vibration</b>	IEC 68-2-6: 10 g
<b>Shock</b>	IEC 68-2-29: 40 g
<b>MTBF</b>	350,000 hrs 40°C Gf
<b>Drawing List<sup>2</sup></b>	
P503-11	Sensor Outline

<sup>1</sup> For full mechanical details see drawings P503-11  
<sup>2</sup> 3D models, step or .igs format, available on request

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INSTALLATION INFORMATION

Table with 4 columns: Output Option, Output Description, Supply Voltage: Vs (tolerance), and Load resistance: (include leads for 4 to 20mA O/Ps). Rows A through H detail various output configurations and their corresponding voltage and load requirements.



GAIN AND OFFSET ADJUSTMENT

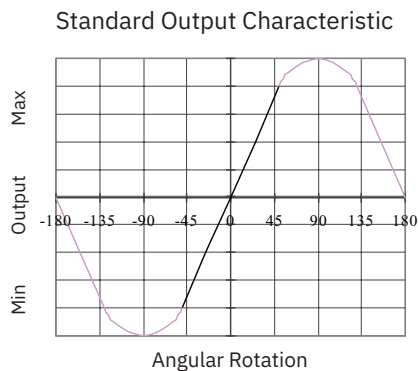
(Typically ± 10% Min available)
To adjust the gain or offset use a small potentiometer adjuster or screwdriver 2mm across. Do not apply too much force on the potentiometers.

MECHANICAL MOUNTING

By four 3.2 mm diameter holes in the printed circuit board. The sensor should be mounted with minimal axial and radial loading on the shaft for optimum life. It is recommended that the shaft is coupled to the drive using a flexible coupling. Tests indicate that, with a suitable bearing system, a life in excess of 16 million cycles can be achieved with 1kg side and end load. The radial position of the shaft must be controlled by the customer; the end float is set by the sensor and should not be controlled by the customer.

OUTPUT CHARACTERISTIC

The sensor has full rotational freedom and two sectors, 180° apart, over which linear response can be achieved. At the mid point of the calibrated range the output signal will be half full scale deflection, and the flat on the shaft is as shown. In the calibrated range the output increases as the shaft is rotated in an anti- clockwise direction viewed from the shaft. The calibrated output is factory set to be between 15 and 160°.

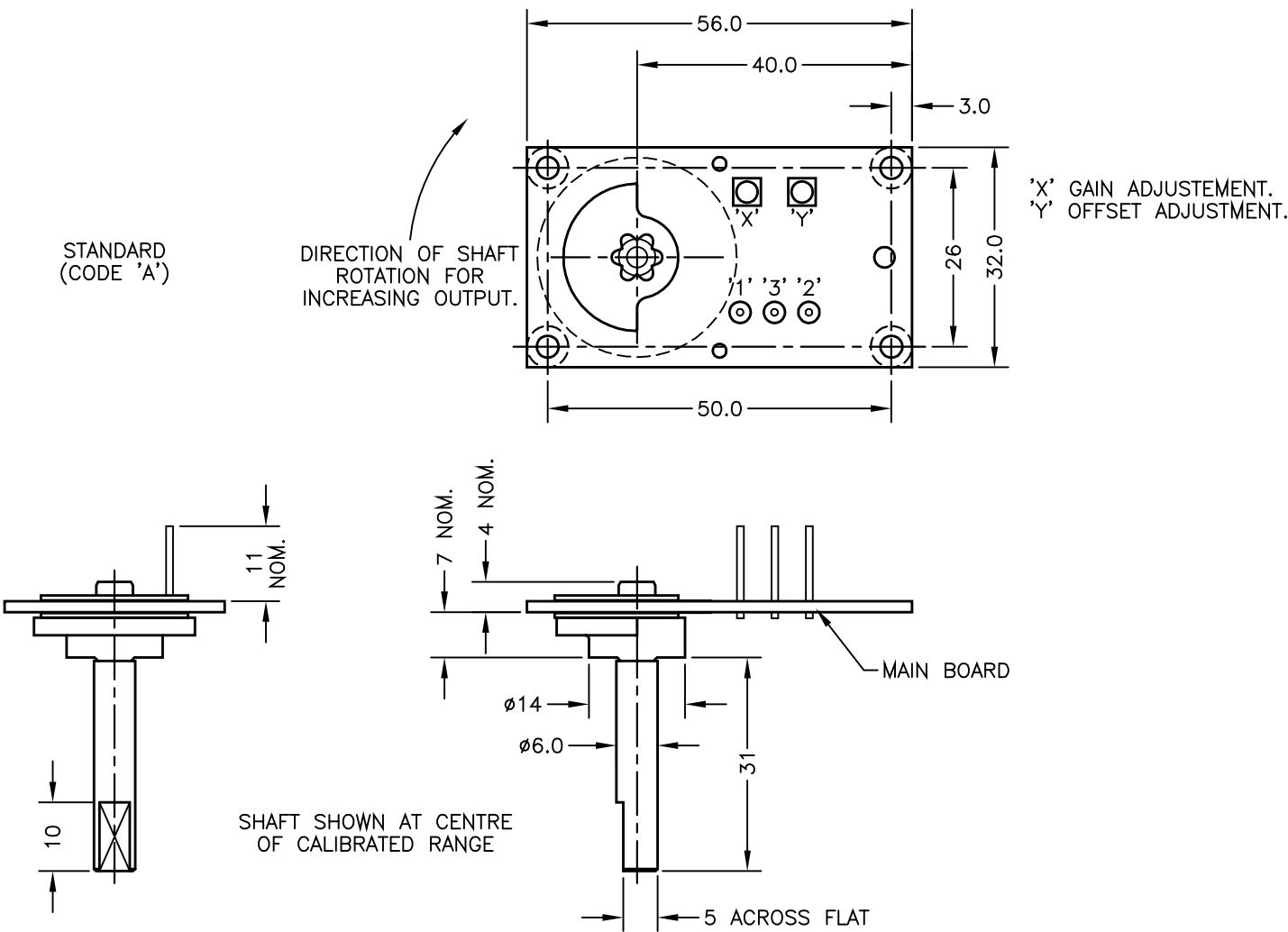


INCORRECT CONNECTION PROTECTION LEVELS

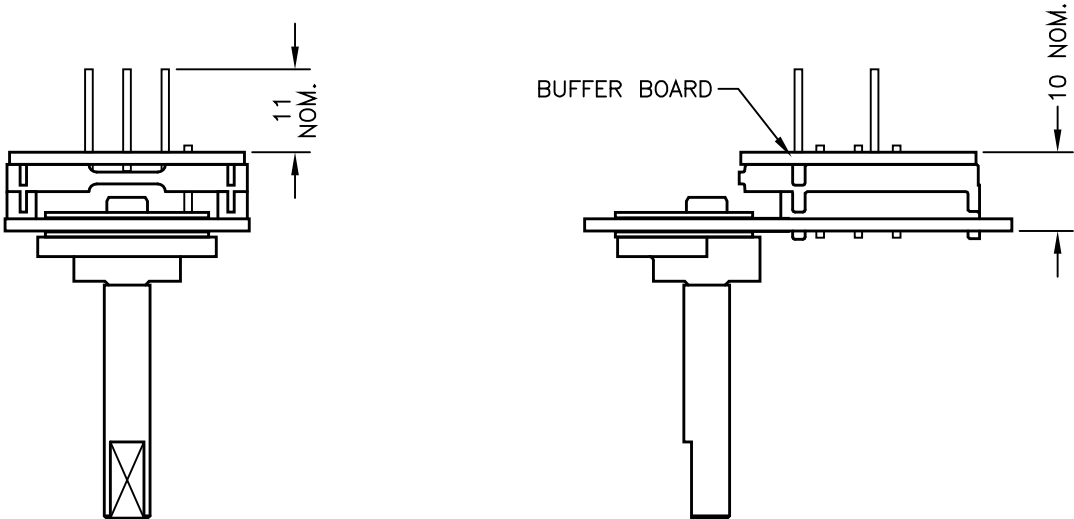
A	<b>Not protected</b> – the sensor is <b>not</b> protected against either reverse polarity or over-voltage. The risk of damage should be minimal where the supply current is limited to less than 50mA.
B & D	Supply leads diode protected. Output must not be taken outside $\pm 12V$ .
C & G	Supply leads diode protected. Output must not be taken outside 0 to 12V.
E, F & H	Protected against any misconnection within the rated voltage.

H	REDRAWN, OPTIONS B & G ADDED.	PDM
I	HUB ROTATED 180 - RAN200	PDM
J	HUB ORINTATION AS REV H - RAN257	PDM
K	PINS ADDED- RAN281	RDS
L	ADDITIONAL DIMS/VIEWS ADDED.	PDM
M	DISP. 15 TO 160° WAS 20 TO 160° RAN442.	PDM
N	RANGE NOTE AMENDED ~ RAN1200	PDM

DRAWINGS NOT TO BE CHANGED WITHOUT REFERENCE TO THE CHANGE PROCEDURE.  
CHANGES TO PARTS USED IN INTRINSICALLY SAFE PRODUCT MUST BE APPROVED  
BY THE AUTHORISED PERSON  
THIS IS AN UNCONTROLLED PRINT AND WILL NOT BE UPDATED.



STANDARD  
(CODE 'A')



BUFFERED  
(CODES 'B' - 'H')

ELECTRICAL OPTIONS/ SPECIFICATIONS			
OUTPUT		SUPPLY	
OUTPUT OPTION A B C D G E F H	0.5 TO 4.5V RATIOMETRIC	5V	STANDARD
	±5V	±15V	
	0.5 TO 9.5V	24V	
	±10V	±15V	BUFFERED
	0.5 TO 4.5V	24V	
	SUPPLY CURRENT 12mA TYP. 20mA MAX.	24V	
	4 TO 20mA 2-WIRE	24V	
	4 TO 20mA 3-WIRE SINK	24V	
	4 TO 20mA 3-WIRE SOURCE	24V	
SINK VERSION OUTPUT COMPLIANCE 5-28V			
SOURCE VERSION DRIVE 300Ω MAX TO 0V			

SOLDER PINS

- :1 +Ve
- :2 OUTPUT
- :3 0V
- :4 -Ve - OPTIONS: B OR D

RANGE OF DISPLACEMENT FROM 0-15° TO 0-160° e.g. 76°, IN INCREMENTS OF 1°.



SHAFT MATERIAL:- STAINLESS STEEL.

PCB MATERIAL:- FR-4, 1.6mm THICK.

MOUNTING NOTES:

MAIN AND BUFFER CIRCUIT BOARDS ARE DOUBLE SIDED, ALLOW 3.5mm FROM BOARD SURFACES FOR COMPONENTS. 4 ø3.2 MOUNTING HOLES WITH ø6 CLEARANCE - BOTH SIDES. THE RADIAL POSITION OF THE SHAFT MUST BE CONTROLLED BY THE CUSTOMER.

THE END FLOAT OF THE SHAFT IS SET BY THE SENSOR AND SHOULD NOT BE CONTROLLED BY NOT BE CONTROLLED BY THE CUSTOMER.

H	06/10/06		CHECKED BY  RDS	X	±0.4
I	18/02/08			X.X	±0.2
J	24/11/09			X.XX	±0.1
				DIMS	mm
K	21/07/10	DESCRIPTION			
L	06/07/11	P503 RIPS FLAT ROTARY			
M	20/11/13	SENSOR ASSEMBLY			
N	12/09/17				
SCALE		DRAWING NUMBER		REV	
10mm		P503-11		N	
				SHEET 1 OF 1	