

DIGITAL INERTIAL MEASUREMENT UNIT HIGH PERFORMANCE: SX43040 SERIES



MAIN FEATURES

- Measurement of acceleration and angular speed (XYZ)
- Temperature compensated
- Digital and analogue output.
- Built In Self Test (BIST) and monitoring
- Reconfiguration possible by user
- Compact and robust, designed for severe environments

APPLICATIONS

Flight testing
Backup for guidance and navigation
Road and rail vehicle behaviour studies
Control and stabilisation

GENERAL DESCRIPTION

The 43040 IMU from Sensorex allows high performance dynamic measurement in all three axes using MEMS technology. Use of MEMS ensures high reliability and robustness.

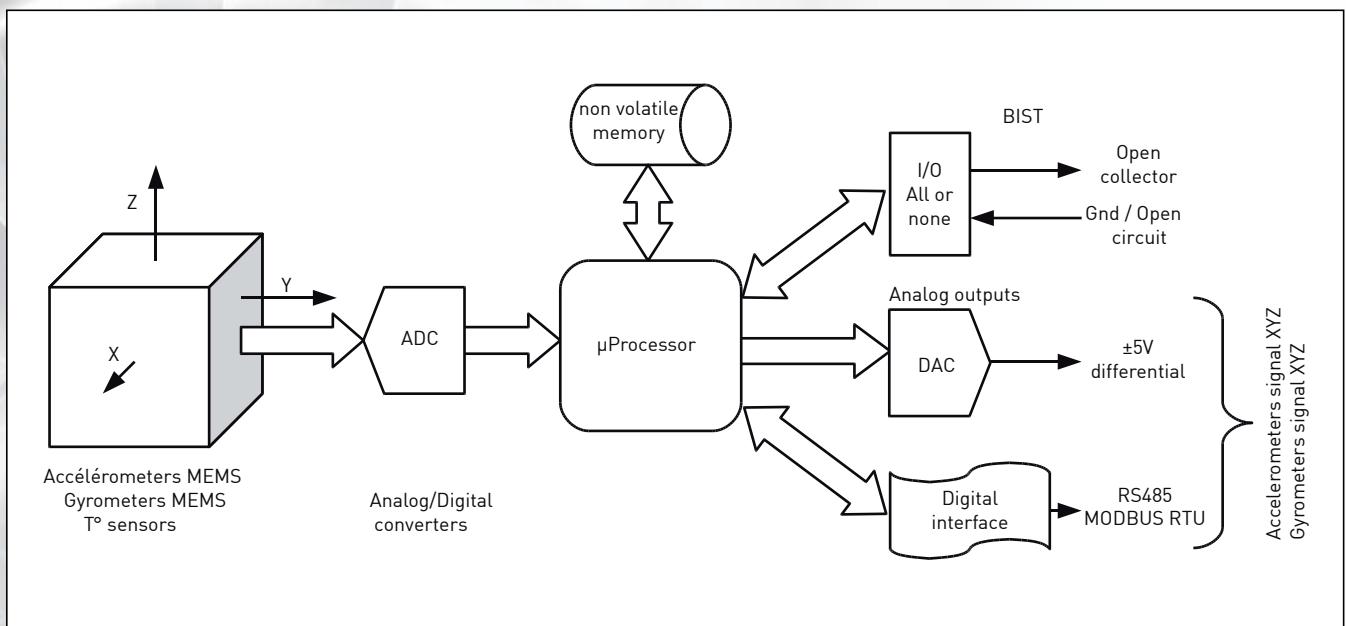
Combining this with our own digital electronics gives an accuracy normally only found with more expensive technologies.

Three silicon accelerometers and three vibrating structure gyro-meters are positioned on each x-y-z axis. The output from each sensor is corrected for errors due to non-linearity, temperature drift and miss-alignment.

Bias drift can also be reset using the digital interface.

Acceleration, angular speed and temperature outputs are available as differential analogue output and RS 485 Modbus RTU. Bandwidth can be modified through the Modbus, which also has a monitoring and self-test function.

SYNOPTIC



SPECIFICATIONS AT 25 °C

Electric	
Power supply	10 / 36V
Consumption	< 5 W
Output	Digital : 2 wires RS485 MODBUS RTU Analogue: $\pm 5V$ differential
Impedance (analogue output)	50 Ω
Accelerometer	
	$\pm 2 g$ $\pm 10 g$
Sensitivity	
Nominal	2,5 V/g ($\pm 0,8 \%$) 0,5 V/g ($\pm 2 \%$)
Bias thermal drift ⁽¹⁾	typ 40 ppm / °C max 100 ppm / °C typ 40 ppm / °C max 100 ppm / °C
Non linearity	< $\pm 0,8 \%$ FS < $\pm 0,9 \%$ FS
Bias	
Nominal bias	5 mg 25 mg
Bias thermal drift ⁽¹⁾	< 10 mg < 100 mg
Resolution	< 0,25 mg < 1,3 mg
Noise	< 50 $\mu V/\sqrt{Hz}$
Bias stability	< 2 mg typ, < 5 mg < 25 mg
Bandwidth	[0-1] to [0-100] Hz ajustable
Transverse sensibility	< 5 mg/g < 25 mg/g
Gyrometer	
	$\pm 50^\circ/s$ $\pm 110^\circ/s$ $\pm 300^\circ/s$ $\pm 1500^\circ/s$
Sensitivity	
Nominal sensitivity	100 mV/°/s 45,45 mV/°/s $\pm 0,2 \%$ 16,66 mV/°/s $\pm 0,2 \%$ 3,33 mV/°/s $\pm 0,2 \%$
Sensitivity thermal drift ⁽¹⁾	< $\pm 0,3 \%$ < $\pm 0,3 \%$ $\pm 0,3 \%$ $\pm 0,5 \%$
Bias	
Nominal bias (includes long term drift and repeatability)	< $\pm 0,3 \%$ < $\pm 0,3 \%$ $\pm 0,3 \%$ $\pm 1,5 \%$
Bias instability (Typ.) ⁽²⁾	3°/h 3°/h 10°/h 30°/h
Thermal drift ⁽¹⁾	< $\pm 0,4 \%$ < $\pm 0,4 \%$ $\pm 0,4 \%$ $\pm 1 \%$
Non linearity	< $\pm 0,1 \%$ FS < $\pm 0,1 \%$ FS $\pm 0,1 \%$ FS $\pm 2 \%$ FS
Angular Random Walk	< 0,2 °/√Hz < 0,2 °/√Hz $\pm 0,2 \%$ /√Hz $\pm 1,3 \%$ /√Hz
Noise	< 0,3 °/s rms < 0,35 °/s rms $\pm 0,55 \%$ /s rms $\pm 3 \%$ /s rms
Bandwidth	[0-1] to [0-50] Hz ajustable
Acceleration sensitivity	< 7°/h/g
Cross coupling	< $\pm 0,2 \%$
Environnement	
Working temperature	- 40 to + 75 °C
Storage temperature	- 40 to + 85 °C
Random vibrations	0,05 g ² / Hz (20 - 2000 Hz)
Shocks	200 g / 6 ms
EMC	EN 61326 (industrial)
Protection	IP65
Mechanical	
Size	Height : 92 mm Length : 93 mm Width : 93 mm
Weight	< 800 g
Other	
Temperature output	$\pm 4,5 V$ (imp. 25 Ω), Sensitivity 60 mV / °C, Vout 0 V to 25 °C
Start up	< 1 sec

⁽¹⁾ Calculated over - 40 °C to + 75 °C

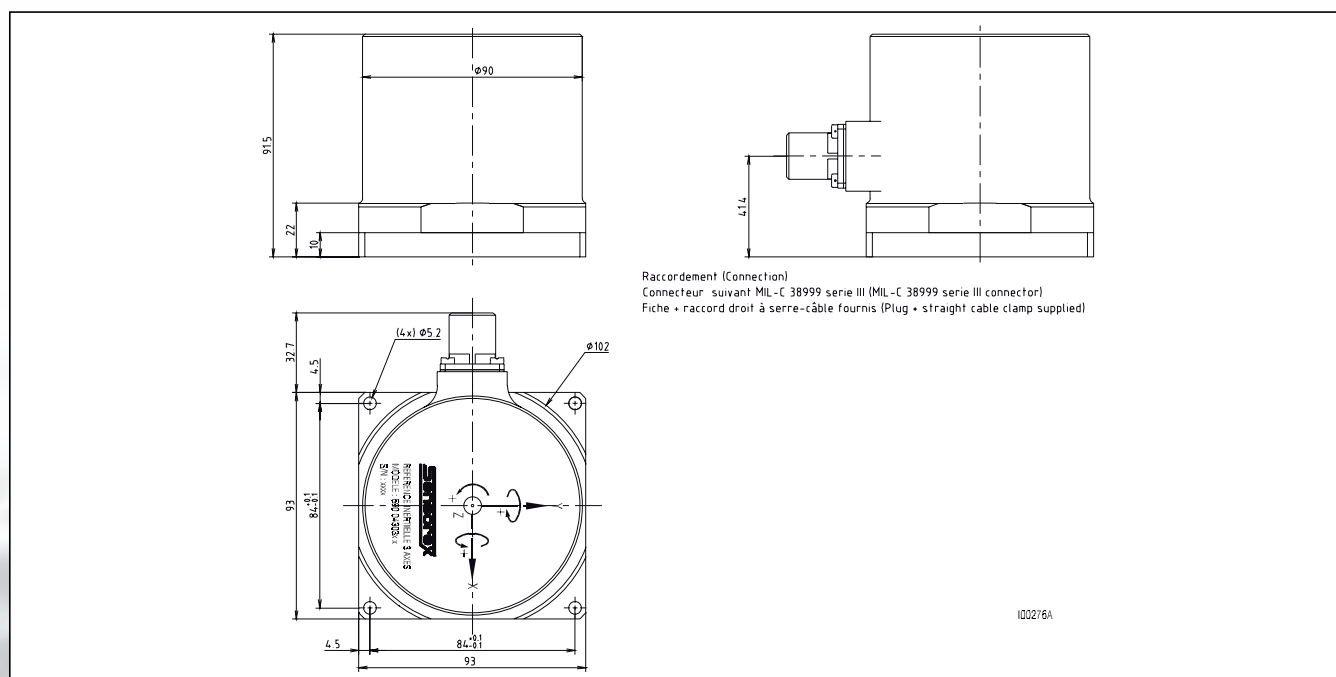
⁽²⁾ Using Allan variance plot

RS 485 MODBUS RTU PROTOCOL

Data is transmitted on a two wire RS485 bus. Software uses MODBUS RTU protocol.

Parameters	Value
Transmission speed	9600, 19200 (by default), 38400 bauds
Number of bits	8
Parity	even, odd, none
Stop bit	1

DRAWING



CONNECTIONS

Pin N°	Signal	Pin N°	Signal
1	+ V Supply	12	- V Gyro Y
2	NC	13	- V Gyro Z
3	0 V Supply	14	Housing
4	V Temperature	15	Self Test command
5	+ V Gyro X	16	Self Test result
6	+ V Gyro Y	17	- V accelero X
7	+ V Gyro Z	18	- V accelero Y
8	+ V accelero X	19	- V accelero Z
9	+ V accelero Y	20	Gnd
10	+ V accelero Z	21	A (RS485)
11	- V Gyro X	22	B (RS485)

SELECTION GUIDE

Range	± 50°/sec	± 110°/sec	± 300°/sec	± 1500°/sec
± 2 g	43040	43041	Consult us	
± 10 g	43042	43043		
± 30 g	Consult us			
± 100 g				

For applications with range above +/- 15 G and/or +/- 500 °/sec, an export licence may be necessary.

