

# QRS116

Quartz MEMS Angular Rate Sensor

emcore®



DATASHEET | DECEMBER 2023

A New Era in Navigation



## Applications

- Stabilization
- Flight Control
- Ground & Marine Vehicle Control
- Guidance
- Navigation
- Instrumentation

## Key Performance Features

- DC Input/High Level DC Output
- Extremely Low Noise
- Outstanding Bias Stability
- Internal Electronics
- High MTBF
- Fast Start-Up
- Unprecedented Low Angle Random Walk

## Ideal for High-Precision Military Applications

The QRS116 meets state-of-the-art systems requirements for very high accuracy, very low noise angular rate sensing. The QRS116 is a form, fit and function-enhanced alternative to the popular, highly-reliable QRS11. Using a next generation version of EMCORE's unique quartz micro-machined sensing element, the QRS116 delivers excellent bias stability, signal to noise ratio and vibration performance characteristics in a small, lightweight package.



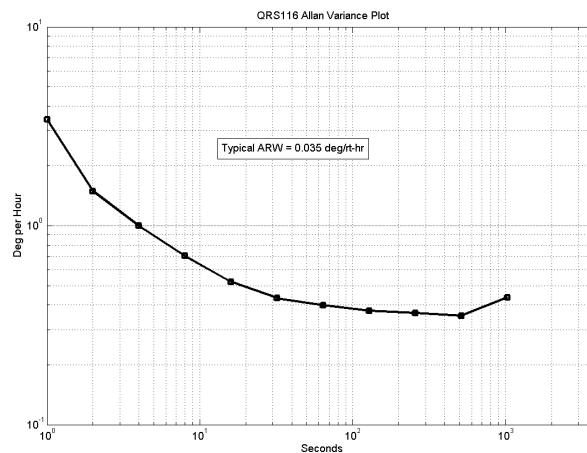
With no moving parts and no scheduled maintenance, the QRS116 provides reliable service and low total cost of ownership.

## Performance Highlights

Parameter	QRS116-0100-200
Standard Range Full Scale**	$\pm 100^\circ/\text{sec}$
Full Scale Output	$\pm 2.5 \text{ Vdc}$
Scale Factor Calibration (at 22°C)	$\leq 1\%$ of value
Scale Factor over Temperature (Dev. from 22°C)	$\leq 0.03\%/^\circ\text{C}$
Bias Variation with Temperature (Modeled with 3rd order polynomial $1\sigma$ )	36 deg/hr
Short Term Bias Stability - Note 6 (1 sigma)	3 deg/hr
Bandwidth (-90° Phase Shift)	> 60 Hz

\*\* Other rate ranges available, consult factory

## QRS116 Allan Variance Plot



# QRS116

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## Performance Specifications

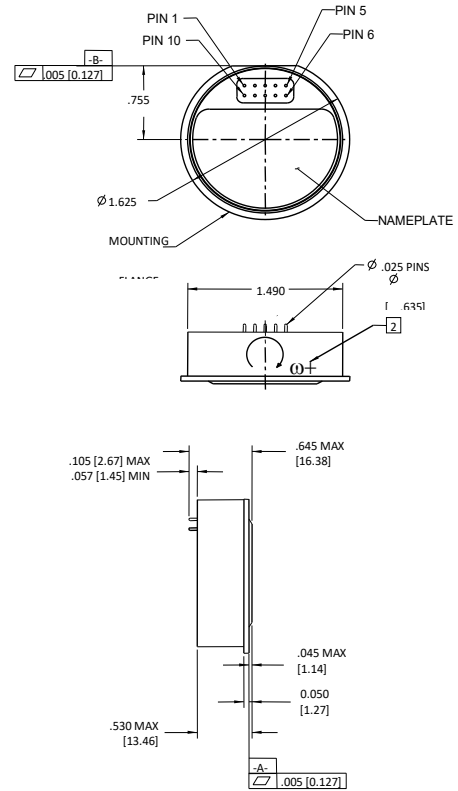
Parameter	QRS116-0100-200
<b>Power Requirements</b>	
Input Voltage	+ and - 5 Vdc $\pm$ 5 % regulation
Input Current	< 20 mA (each supply)
<b>Performance</b>	
Standard Range Full Scale**	$\pm$ 100°/sec
Full Scale Output	$\pm$ 2.5 Vdc
Scale Factor Calibration (at 22°C)	$\leq$ 1% of value
Scale Factor over Temperature (Dev. from 22°C)	$\leq$ 0.03%/°C
Bias Variation with Temperature (Modeled with 3rd order polynomial 1 $\sigma$ )	36 deg/hr
Short Term Bias Stability - Note 6 (1 sigma)	3 deg/hr
G Sensitivity	< 0.02°/sec/g
Start-Up Time	< 1.5 sec.
Bandwidth (-90° Phase Shift)	> 60 Hz
Non-Linearity (% Full Range)	< 0.05%
Threshold/Resolution	< 0.004°/sec
Output Noise (DC to 100Hz)	$\leq$ 0.002 °/sec./ $\sqrt{\text{Hz}}$
<b>Environments</b>	
Operating Temperature	-55°C to +85°C
Storage Temperature	-55°C to +100°C
Vibration Operating***	10 grms 20 Hz to 2 kHz Random - flat spectrum
Vibration Survival	20 grms 20 Hz to 2 kHz random
Shock	1,000g, any axis
Weight	$\leq$ 60 grams
<b>Temperature Sensor</b>	
Temp. Sensor (Offset @ +22°C)	0 $\pm$ 0.5 Vdc @ 22°C
Scale Factor	0.007 to 0.012 V/°C

\* Performance levels indicated are "Typical" unless otherwise noted

\*\* Other rate ranges available, consult factory

\*\*\* Consult factory for other vibration level requirements, and see user's guide for more information regarding vibration tolerance and sensitivity

## Dimensions/Scale



## QRS116 INPUTS/OUTPUTS

Self Test Input (see Note 4)

+Vdc Input

Power Ground

BIT Output (see Note 5)

Internal Temperature Sensor

Rate Output

Signal Ground

-Vdc Input

## Notes

- QRS116 is supplied with two mounting rings, mounting screws & mating test connector.
- Angular rate applied as shown will produce a more positive output (not marked on unit)
- Unit of measure is inches/[mm]
- Initiated BIT - Grounding Self Test Input produces a step change of +1.0 to +1.5 VDC @ Rate Output
- BIT Output > +2.4 Vdc when "ready"
- Allan Variance 100 second correlation time

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## For More Information

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## EMCORE Corporation

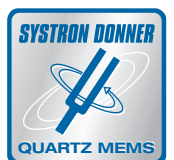
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