

QRS14

Quartz MEMS Angular Rate Sensor

emcore®



DATASHEET | DECEMBER 2023

A New Era in Navigation



Ideal for Precision Industrial Applications

The QRS14 is a compact, rugged, solid-state inertial sensor used to measure angular rotation rates. It features a monolithic quartz sensing element, internal power regulation and DC input/high-level DC output operation. Two versions are available. The +12 Vdc version features a high-level +1.0 to +4.0 Vdc output, and operation from standard battery power. The plus and minus 15 Vdc version provides a high-level bipolar output of ± 5 Vdc, and is designed for use with conventional double-sided power supplies.



Applications

- Platform Stabilization
- Short Term Navigation
- GPS Augmentation
- Camera Stabilization
- Instrumentation
- Ride Control Stabilization
- Wind Turbine Control

Key Performance Features

- Solid State
- Compact, Lightweight Design
- Wide Temperature Range
- DC Input/High-Level DC Output
- Internal Power Regulation
- High Reliability
- Shock Resistant

Performance Highlights

Parameter	QRS14-0XXXX-102**	QRS14-0XXXX-103**
Standard Ranges	$\pm 50, 100, 200, 500^\circ/\text{sec.}$	
Full Scale Output (Nominal)	+1.0 Vdc (-FS) to +4.0 Vdc (+FS)	± 5 Vdc
Scale Factor Calibration (at 22°C Typical)	$\pm 2\%$ of value	
Scale Factor Over Temperature (Dev. from 22°C Typical)	$\leq 0.06\%/^\circ\text{C}$	
Bias Calibration (at 22°C Typical)	$+2.5 \pm 0.045$ Vdc	0.0 ± 0.075 Vdc
Bias Variation over Temperature (Dev. from 22°C)	$< 3.0^\circ/\text{sec}$	
Short Term Bias Stability (100 sec at const. temp)	$< 0.05^\circ/\text{sec}$, typical	
Long Term Bias Stability (1 year)	$\leq 1.0^\circ/\text{sec.}$	
Bandwidth (-90° Phase Shift)	> 50 Hz	
Output Noise (DC to 100 Hz)	$\leq 0.05^\circ/\text{sec.}/\sqrt{\text{Hz}}^*$	$\leq 0.02^\circ/\text{sec.}/\sqrt{\text{Hz}}^*$

* Values indicated are for $\pm 100^\circ/\text{sec.}$ range

**"XXXX" designates \pm range



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Performance Specifications

Parameter	QRS14-0XXXX-102**	QRS14-0XXXX-103**
Power Requirements		
Input Voltage	+9 to +18 Vdc	+ and - 9 to 18 Vdc
Input Current	<20 mA	<25 mA (each supply)
Performance		
Standard Ranges	±50, 100, 200, 500°/sec.	
Full Scale Output (Nominal)	+1.0 Vdc (-FS) to +4.0 Vdc (+FS)	±5 Vdc
Scale Factor Calibration (at 22°C Typical)	±2% of value	
Scale Factor Over Temperature (Dev. from 22°C Typical)	≤0.06%/°C	
Bias Calibration (at 22°C Typical)	+2.5 ±0.045 Vdc	0.0±0.075 Vdc
Bias Variation over Temperature (Dev. from 22°C)	<3.0°/sec	
Short Term Bias Stability (100 sec at const. temp)	<0.05°/sec, typical	
Long Term Bias Stability (1 year)	≤1.0°/sec.	
G Sensitivity (Typical)	≤0.06°/sec/g	
Start-Up Time (Typical)	<2.0 sec	
Bandwidth (-90° Phase Shift)	>50 Hz	
Non-Linearity (Typical) % Full Range	≤0.05% of F.R.	
Threshold/Resolution	≤0.004°/sec.*	
Output Noise (DC to 100 Hz)	≤0.05°/sec./√Hz*	≤0.02°/sec./√Hz*
Environments		
Operating Temperature	-40°C to +85°C	
Storage Temperature	-55°C to +100°C	
Vibration Operating***	5 grms 20 Hz to 2 kHz random	
Vibration Survival***	10 grms 20 Hz to 2 kHz random 5 minutes/axis	
Shock	200g, any axis	
Weight	≤50 grams	

* Values indicated are for ±100°/sec. range

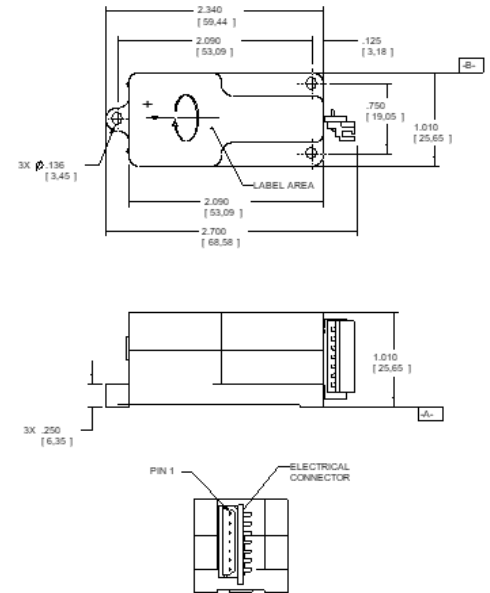
***XXXX designates ± range

*** Please see user's guide for more information regarding vibration tolerance and sensitivity.

Notes

- QRS14 is supplied with a mating connector (Molex P/N 5264-7 or Equiv.).
- Angular rate applied as shown will produce a positive output.
- Unit of measure is in inches/[mm].
- Built-in-test activated by grounding Pin 7 causes an increase in rate output (Pin 5) of 0.5 Vdc nominal.
- Built-in-test activated by grounding Pin 7 causes an increase in rate output (Pin 5) of 1.0 Vdc nominal.

Dimensions/Scale



QRS14 -00XXX-102 PIN ASSIGNMENT

1. Power and Signal Ground
2. +Vdc Input
3. No connection, Leave Open
4. No connection, Leave Open
5. Rate Output
6. No Connection, Leave Open
7. Built-in-test (Note 4)

QRS14 -00XXX-103 PIN ASSIGNMENT

1. -Vdc Input
2. +Vdc Input
3. Power Ground
4. Signal Ground
5. Rate Output
6. No Connection, Leave Open
7. Built-in-test (Note 5)

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For More Information

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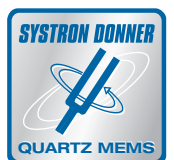
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