

Commercial Inertial Measurement Unit (CIMU)

Offering proven technology to meet the needs of the unmanned aerial vehicle, survey, pipeline, and mining markets.



This system takes advantage of the experience and knowledge Honeywell has accumulated over the past 35 years in ring laser gyro development as the largest manufacturer of optical sensors and systems in the world.

- Delivery of more than 200,000 RLGs
- System MTBF exceeding 10,000 hours
- Flying worldwide on more than 2,000 air transports, 1,000 business jets, and 1,000 military platforms

System Description

The CIMU is the system solution for commercial survey, pipeline, and mining applications. This advanced IMU is designed to meet a need for lightweight inertial measuring installation in pipeline measurement systems and portable sensing devices.

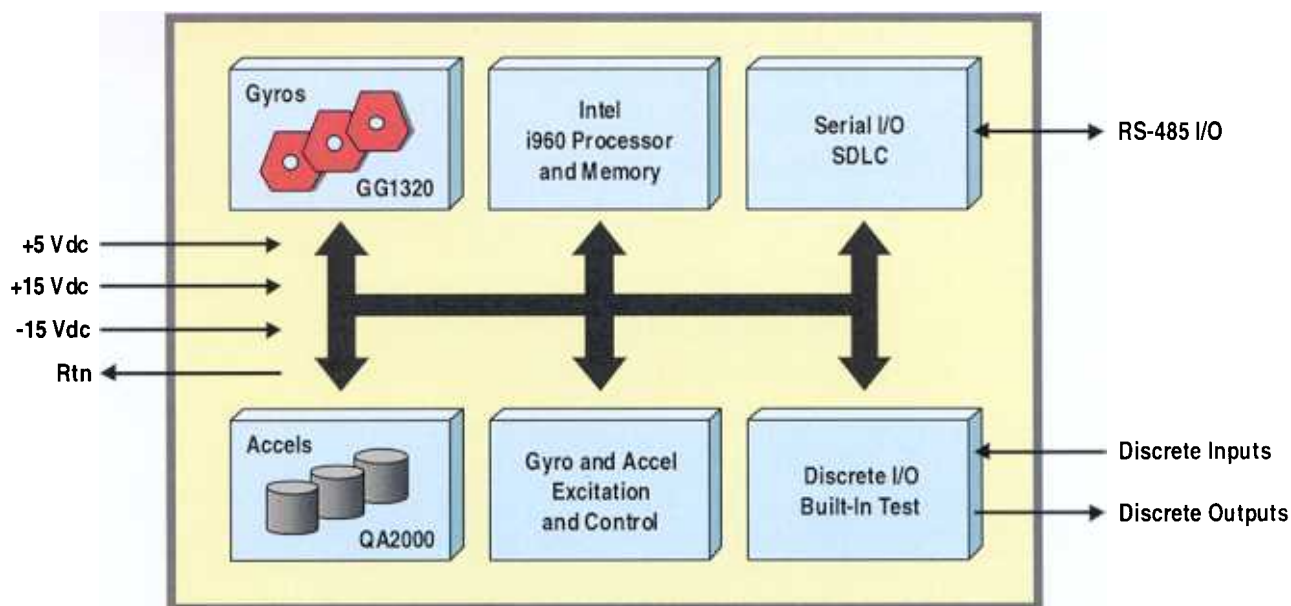
Honeywell's approach takes full advantage of product experience and ongoing development of inertial measurement systems throughout the world. The IMU integrates the sensors and electronics, through the use of a common dither approach, to minimize redundant physical and electrical interfaces.

Specifically, the CIMU is designed to measure angular and linear changes through the use of:

- GG1320 Digital Laser Gyro (DLG)
- Honeywell QA2000 Quartz-Flex accelerometers
- Standard modules/components across a wide range of applications
- Common dither approach

This fully digital unit provides inertial outputs ($\Delta v, \Delta \theta$) and high rate autopilot outputs (rates, accelerations). The digital I/O enhances the user's ability to quickly and easily integrate the unit into a variety of systems.

CIMU Block Diagram



System Specifications

Dimension (in.)	6.61 x 7.54 x 5.27 in.
Volume	< 263 cu. in.
Weight	<10.7 lbs.
Power	< 18 watts
Bit Effectiveness	> 92%
Life: operating	> 2,000 hrs.
dormancy	> 10 years
Output Data Rate	200 Hz

Gyro Bias Continuous	0.0035 deg/√hr.
Angular Random Walk	0.0025 deg/√hr.
Accelerometer Range	
Accelerometer Scale Factor	100 ppm
Accelerometer Bias	

Performance Characteristics

INTERFACES

Voltages 5V and $\pm 15V$

RS-422

Restart Time 200 ms

Compensated $\Delta v, \Delta \theta$ 200 Hz

Filtered Angular Rate 200 Hz

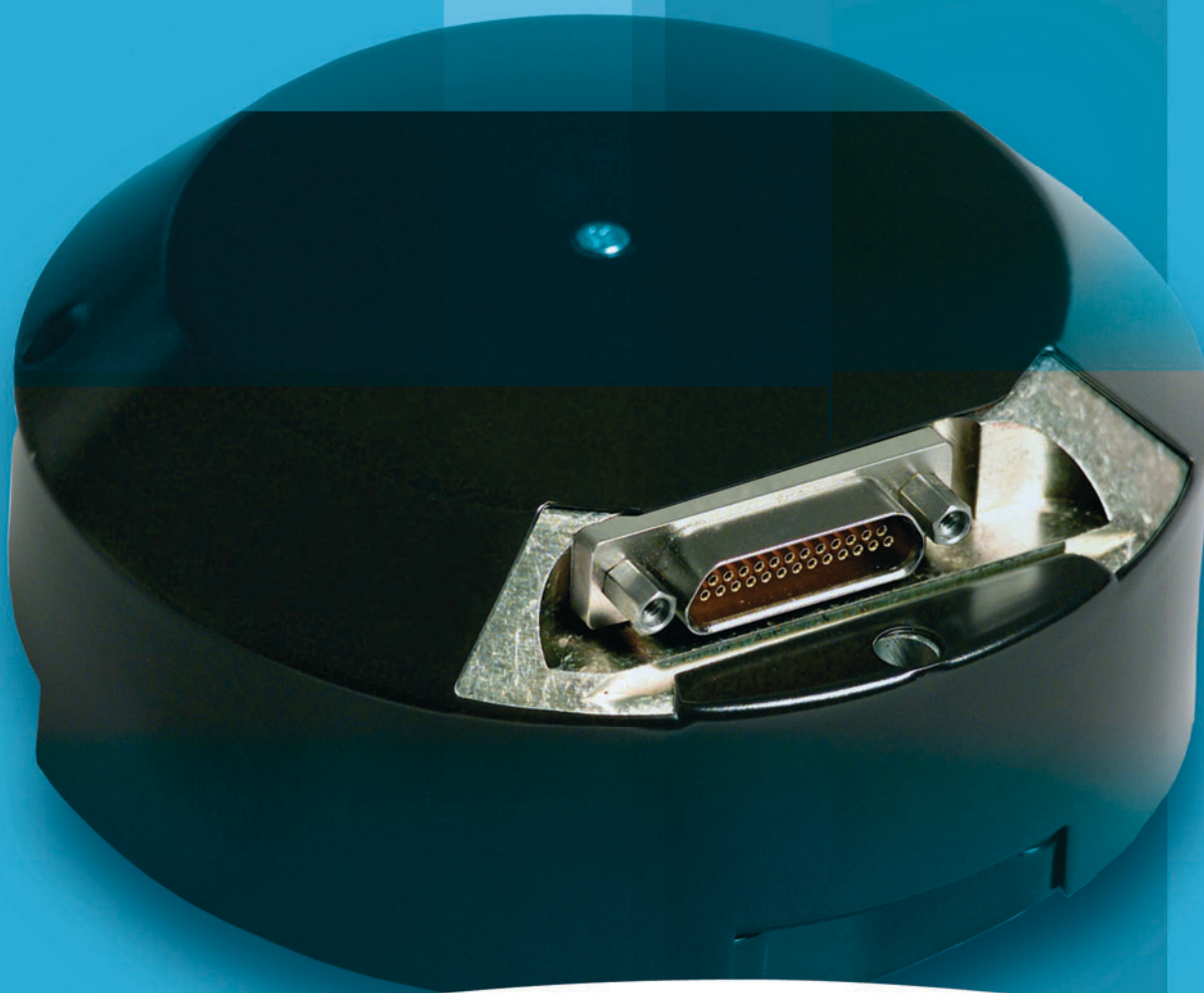
& Acceleration

Latency < 2.0 msec

Uncertainty < 10 μ sec

Honeywell

GG1320AN Digital Laser Gyro



**Affordable and advanced sensing technology
combined with unmatched production capabilities
to meet the needs of customers throughout the world**

Honeywell

GG1320AN Digital Laser Gyro

The Honeywell GG1320 Digital Laser Gyro is an affordable single axis inertial sensor with the electronics and ring laser gyro packaged into an easy to use compact unit. Its digital I/O enables

integration into almost any system, which is illustrated by its use in a variety of applications including inertial navigation and platform pointing and stabilization. This industry standard navigation grade

gyro benefits from Honeywell's four decades of ring laser gyro development. The result is a reliable and cost effective sensor for inertial sensing requiring accuracy and integrity.

System Specifications*

Size	Height 1.77" (4.5 cm) Diameter 3.45" (8.8 cm)	Bias Stability • 0.0035 deg/hr (typical)
Weight	1 lb. (454 grams)	Angular Random Walk (ARW) • 0.0035 deg/root-hour (typical)
Start-Up Time	1 second (typical)	Magnetic Environment, Operating 0.002°/hr/gauss
Shock (Op & Non-Op) (See below)	22 g, half sine, 11 millisecond	Altitude, Operating -20,000 ft. to +80,000 ft. (-610 m to +21,336 m)
Temperature Range • -65°F to +185°F (Operating) -54°C to 85°C • -65°F to +200°F (Non-Operating) -54°C to 93.3°C		Scale Factor – Corrected • Linearity • 30-day Stability 1,164,352 ±18 pulses/rev. 5.0 ppm of full scale 5.0 ppm rms
Power	15 Vdc, 1.6 Watts nominal 5 Vdc, 0.375 Watts nominal	Sample Frequency 2,000 Hz (typical use) 5,000 Hz (maximum) Latency 168 micro-seconds
Interface	RS-422, 25 pin micro "D" Asynchronous, 1 MHz, 8 Bit	Rate Input 900 deg/ sec (maximum)

* Please contact Honeywell for additional capabilities

Random Vibration, Operating

Freq Range (Hz)	Level (g2/Hz)
20	0.73
40	5.27
110	5.27
390	0.002
2000	0.002

Shock

100g, ½ sin, 8 millisecond

For additional information, please contact us at:

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Q-Flex® QA-2000 Accelerometer

The inertial navigation standard

As the inertial navigation standard by which others are measured, Honeywell produces the QA2000. It is the predominant sensor used in today's commercial and military aircraft strap-down inertial navigation systems. The long-term Repeatability and superior reliability characteristics of the QA2000 make it the best value inertial-grade accelerometer available on the market today.

As with the entire Q-Flex family of accelerometers, the QA2000 features a patented Q-Flex® etched-quartz-flexure seismic system. An amorphous quartz proof-mass structure provides excellent bias, scale factor, and axis alignment Repeatability.

The integral electronics develops an acceleration-proportional output current providing both static and dynamic acceleration measurement. By use of customer supplied output load resistor, appropriately scaled for the acceleration range of the application, the output current can be converted into a voltage.

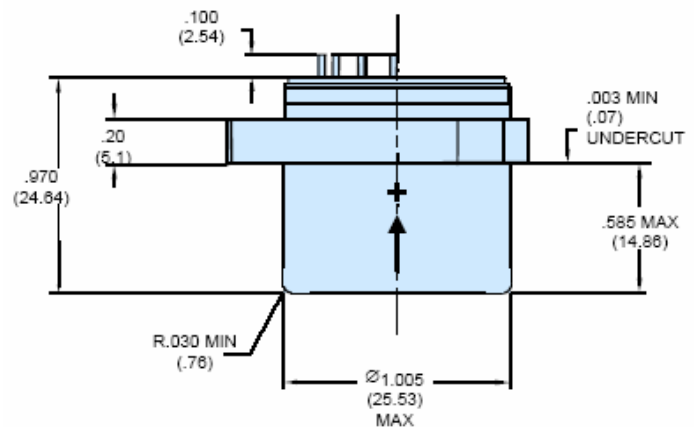
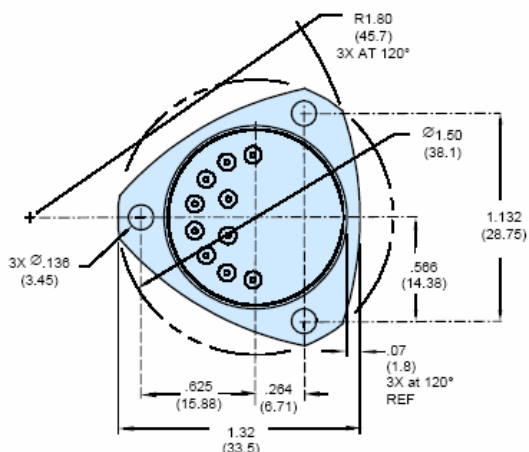


The QA2000 also includes a current-output, internal temperature sensor. By applying temperature-compensating algorithms, bias, scale factor, and axis misalignment performance are dramatically improved.

Features

- Excellent turn-on repeatability performance
- Environmentally rugged
- Analog output
- Field-adjustable range
- Three fastener precision mounting flange
- Internal temperature sensor for thermal compensation
- Dual built-in self-test

Configuration Drawings



Performance Characteristics

Additional product specifications, outline drawings and block diagrams, and test data are available on request.

Performance	QA2000-030	QA2000-020	QA2000-010
Input Range [g]	±60	±60	±60
Bias [mg]	<4	<4	<4
One-year Composite Repeatability [μg]	<160	<220	<550
Temperature Sensitivity [μg/°C]	<30	<30	<30
Scale Factor [mA/g]	1.20 to 1.46	1.20 to 1.46	1.20 to 1.46
One-year Composite Repeatability [ppm]	<310	<500	<600
Temperature Sensitivity [ppm/°C]	<180	<180	<180
Axis Misalignment [μrad]	<2000	<2000	<2000
One-year Composite Repeatability [μrad]	<100	<100	<100
Vibration Rectification [μg/g ² rms]	<20 (50-500 Hz)	<40 (50-500 Hz)	<40 (50-500 Hz)
	<60 (500-2000 Hz)	<60 (500-2000 Hz)	<150 (500-2000 Hz)
Intrinsic Noise [μg-rms]	<7 (0-10 Hz)	<7 (0-10 Hz)	<7 (0-10 Hz)
	<70 (10-500 Hz)	<70 (10-500 Hz)	<70 (10-500 Hz)
	<1500 (500-10,000 Hz)	<1500 (500-10,000 Hz)	<1500 (500-10,000 Hz)
Environment	QA2000-030	QA2000-020	QA2000-010
Operating Temperature Range [°C]	-55 to +95	-55 to +95	-55 to +95
Shock [g]	250	250	250
Vibration Peak Sine [g]	15 @ 20-2000 Hz	15 @ 20-2000 Hz	15 @ 20-2000 Hz
Resolution/Threshold [μg]	<1	<1	<1
Bandwidth [Hz]	>300	>300	>300
Thermal Modeling	QA2000-030	QA2000-020	QA2000-010
	YES	YES	YES
Electrical	QA2000-030	QA2000-020	QA2000-010
Quiescent Current per Supply [mA]	<16	<16	<16
Quiescent Power [mW] @ ±15 VDC	<480	<480	<480
Electrical Interface	Temp Sensor	Temp Sensor	Temp Sensor
	Voltage Self Test	Voltage Self Test	Voltage Self Test
	Current Self Test	Current Self Test	Current Self Test
	Power / Signal Ground	Power / Signal Ground	Power / Signal Ground
	-10 VDC Output +10 VDC Output	-10 VDC Output +10 VDC Output	-10 VDC Output +10 VDC Output
Input Voltage [VDC]	±13 to ±28	±13 to ±28	±13 to ±28
Physical	QA2000-030	QA2000-020	QA2000-010
Weight [grams]	71± 4	71± 4	71± 4
Diameter below mounting surface [inches]	Ø1.005 Max	Ø1.005 Max	Ø1.005 Max
Height - bottom to mounting surface [inches]	.585 Max	.585 Max	.585 Max
Case Material	300 Series Stainless Steel	300 Series Stainless Steel	300 Series Stainless Steel

Find out more:

www.inertialsensor.com

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