Honeywell

HG1171 Series

6DF Inertial Measurement Unit

DESCRIPTION

The HG1171 Series is a six degrees of freedom (6DF) inertial measurement unit (IMU) that senses rotation rate about the roll, pitch and yaw axes (X, Y and Z axes) and acceleration along the longitudinal, lateral and vertical axes (X, Y and Z axes, see Figure 1 on page 2). This product is designed for enhanced accuracy of tracking and monitoring of vehicle/platform (up/down, left/right, forward/backward) in a hard mounted configuration.

It provides key data for automated steering and vehicle controls, freeing the operator to focus on machine functions, one of the main reasons customers use IMUs.

The HG1171 contains high performance MEMS (Micro Electromechanical Systems) rotation rate sensors (gyroscopes), whose function is based on the physical properties of the Coriolis effect, as well as enhanced precision integrated accelerometers for each axis.

High speed CAN bus (2.0 A or B) provides cost-effective, high-integrity serial data communications bus for real-time control applications operating at data rates up to 1 Mbit/s. This capability allows enhanced error detection and confinement.

KWP (Keyword Protocol) is used for self-test, health reporting, software loading and related tasks. KWP 2000 (or ISO14230) is a defined protocol for monitoring health and status of a unit on a CAN bus (primary use is for off-vehicle test equipment). It supports high speed IMU flashing for re-reprogramming.)

Customization of I/O timing, CAN labels, connectors, and other parameters allows the customer to specify changes in the IMU so it more readily fits into existing architecture on vehicle.

A temperature sensor in each rotation rate sensor provides a temperature value to the processing module where the samples are filtered and compensated. This information allows the customer's system to perform over a wide temperature range.

The tough metal housing is often ideal for demanding environments. The user may mount the product on the vehicle frame outside the cabin, anywhere an IMU is needed.

FEATURES

- 3-dimensional rotation rate and acceleration outputs (roll, pitch, yaw)
- High speed CAN bus
- Broad dynamic range
- Low noise
- High resolution
- Customizable
- Enhanced temperature performance
- Tough metal housing

POTENTIAL APPLICATIONS

Vehicle stability control systems on:

- Agricultural equipment such as tractors and harvesters to:
  - Provide motion control feedback (attitude/accleration) for leveling cutting blades, planters, tillers and other equipment when on slopes or hills
  - Improve automated steering capabilities by providing rotational rate change data to vehicle controls
  - Smooth GPS data (position and velocity) for use in high accuracy planting/tilling
- Construction equipment such as excavators, trucks, forestry equipment, loaders and graders to:
  - Improve operator awareness relative to equipment loading and extension envelopes on cranes and material/ telescopic handlers
  - Provide real time stability control in rugged and steep terrain
  - Provide active depth and angle control for graders
  - Provide motion compensation in GPS-guided automated vehicles

HG1171 Series

Table 1. General Specifications

Characteristic	Minimum	Typical	Maximum	Unit
Supply voltage (normal operation)	+7	+13.5	+17	V
Over voltage (output halted)	—	—	+26	V
Reverse voltage	—	—	-18	V
Supply current	—	—	+75	mA
Start up time	—	700	—	ms
Operating temperature	-40 [-40]	20 [68]	85 [185]	°C [°F]
Storage temperature	-40 [-40]	—	95 [203]]	°C [°F]
Vibration (10 Hz to 1000 Hz)	—	—	3.1	g (RMS)
Shock	—	100	—	g (half sine for 6 ms)
Humidity(1))	—	—	95%	—
Sealing	IP62K			
ESD (Electrostatic Discharge)(2)	Meets ISO 10605: – at ≤8 kV ESD protection for handling – at ≤15 kV protection for power			
Connector	AMP: 3-967-616-1, keying C mating cable harness			

Notes:

1. After exposure, including a condensing environment.
2. All exposed ports have low-pass filtering using trade-off methods which consider ESD protection, RF filtering and bandwidth. The ESD simulator waveform verification complies with ISO 10605 except for contact discharge rise time < 1 ns and air discharge rise time ≤ 20 ns.

Table 2. Rotation Rate Sensor Specifications

Characteristic	Minimum	Maximum	Unit
Measurement range	-75	75	°/s
Overload range(<60 ms recovery)	-1000	1000	°/s
Sensitivity error	-4	4	%
Linearity	-1	1	%
Offset (total)	-2.5	2.5	°/s
Offset drift (over temperature range)	-1	1	°/s
Offset drift speed (t > 3 min)	-0.2	0.2	°/s/min
Noise	—	0.2	°/s
Cross axis sensitivity	—	2	%
Turn on time	—	750	ms

Table 3. Acceleration Sensor Specifications

Characteristic	Minimum	Maximum	Unit
Measurement range	-17	17	m/s^2
Overload range(<60 ms recovery)	-100	100	m/s^2
Sensitivity error	-5	5	%
Linearity	-4	4	%
Offset (total)	-1	1	m/s^2
Offset drift (over temperature range)	-0.35	0.35	m/s^2
Offset drift speed (over 60 °K interval)	-0.2	0.2	m/s^2/min
Noise	—	0.1	m/s^2 (RMS)
Cross axis sensitivity	5	5	%
Turn on time	—	250	ms

Table 4. Software Resolution for Rotation Rates and Accelerations

Bit Position	Number of Bits
Vehicle Dynamic Rates	
34-47	14
—	—
—	—
Vehicle Dynamic Lateral and Longitudinal Acceleration	
22-31	10
—	—
—	—
Vehicle Dynamic Vertical Acceleration	
22-31	10
—	—
—	—

Figure 1. Axes of Motion

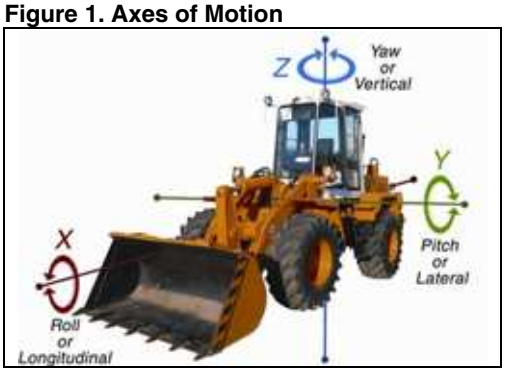


Figure 2. Block Diagram

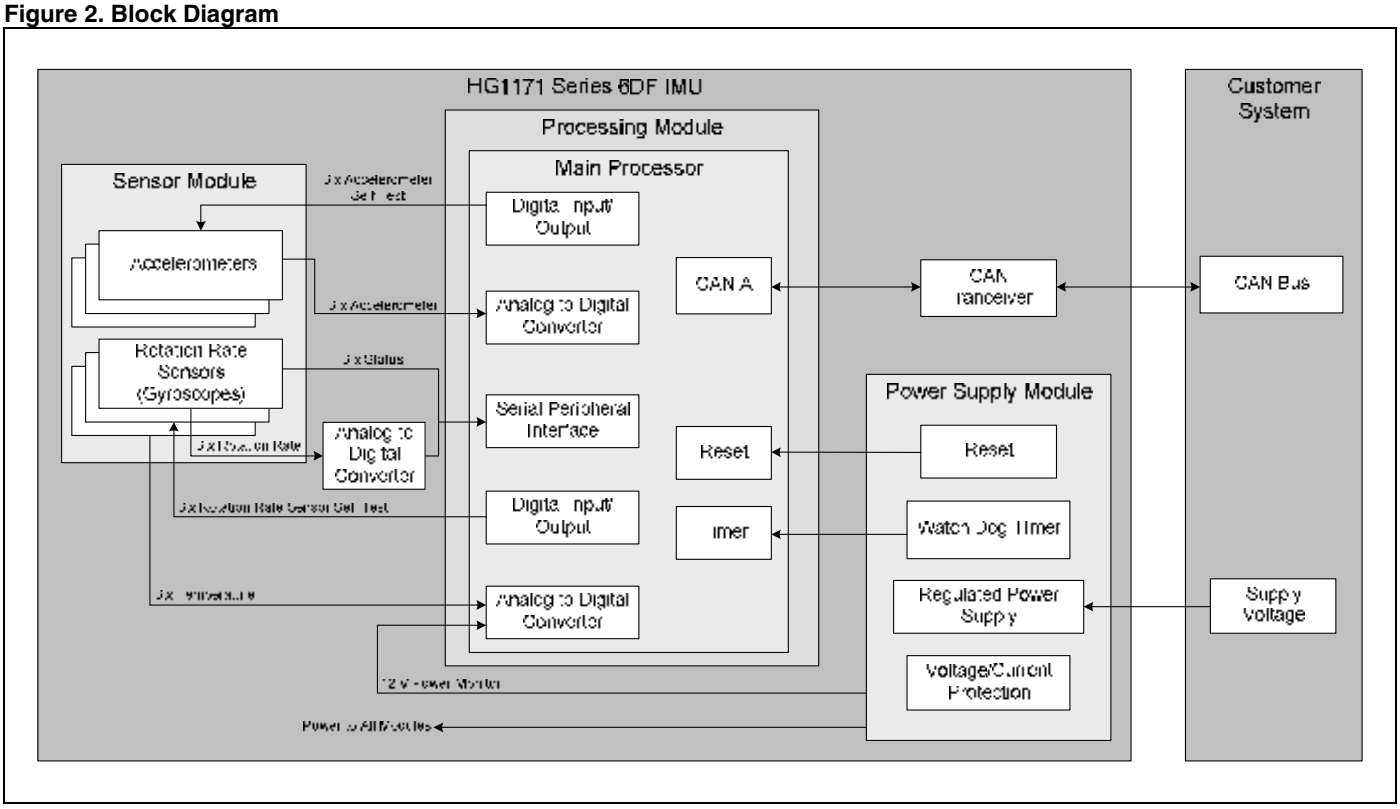
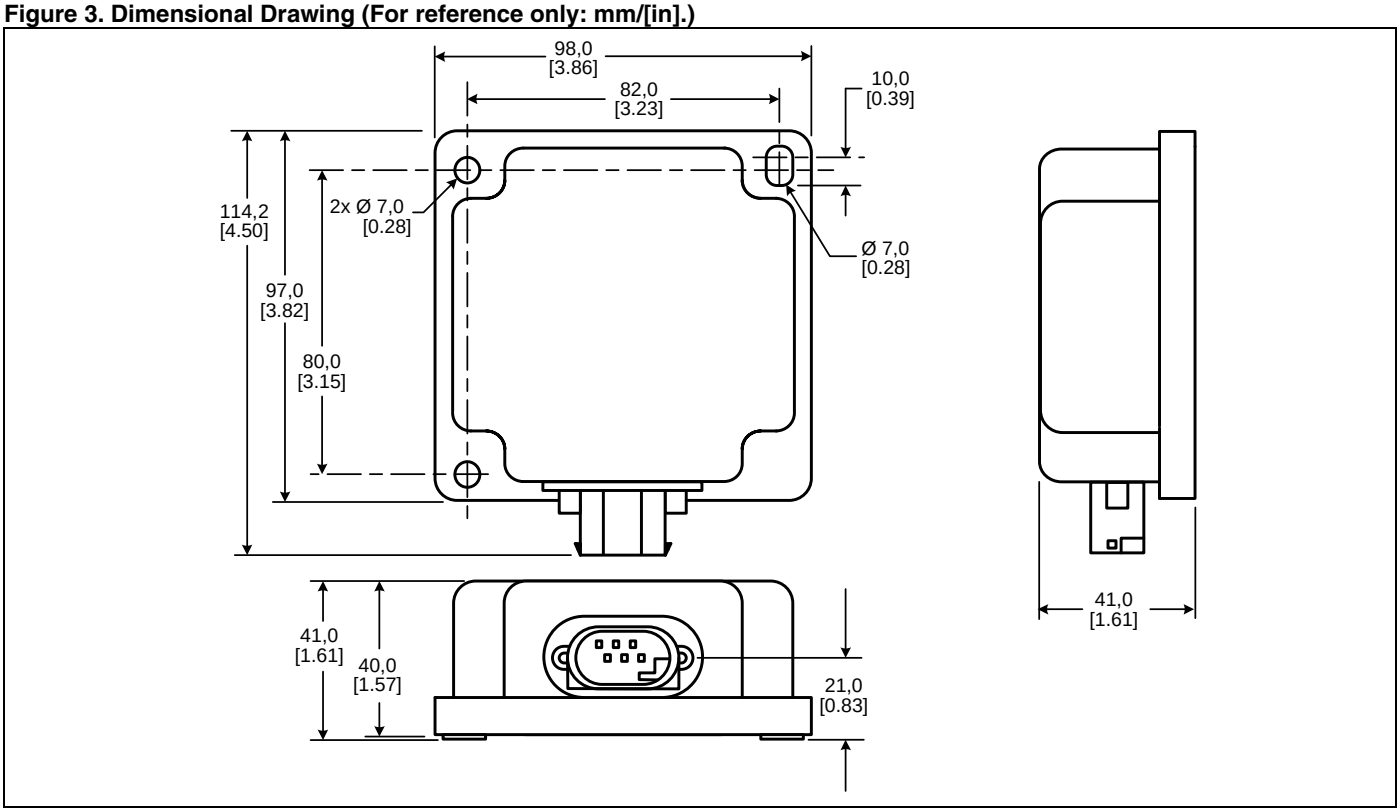


Figure 3. Dimensional Drawing (For reference only: mm/[in].)



Order Guide

Catalog LIsting	Description
HG1171BA01	HG1171 Series 6DF inertial measurement unit

⚠ WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

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