

AHRS

ATTITUDE & HEADING REFERENCE SYSTEM

- ▼ Roll, Pitch and Heading Angle in Dynamic Environments
- ▼ Enhanced Performance Kalman Filter Algorithm
- ▼ High Stability MEMS Sensors
- ▼ High Range Gyro and Accel Options
- ▼ EMI & Vibration Resistant

Applications

- ▼ UAV/RPV Control
- ▼ Platform Stabilization
- ▼ Avionics



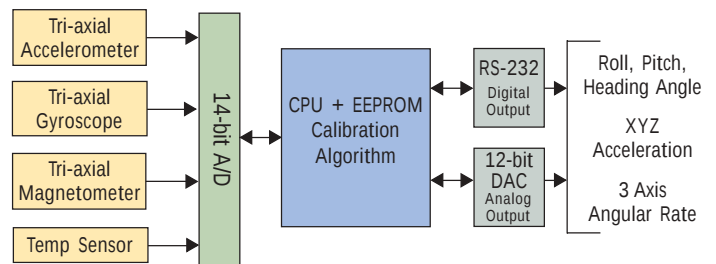
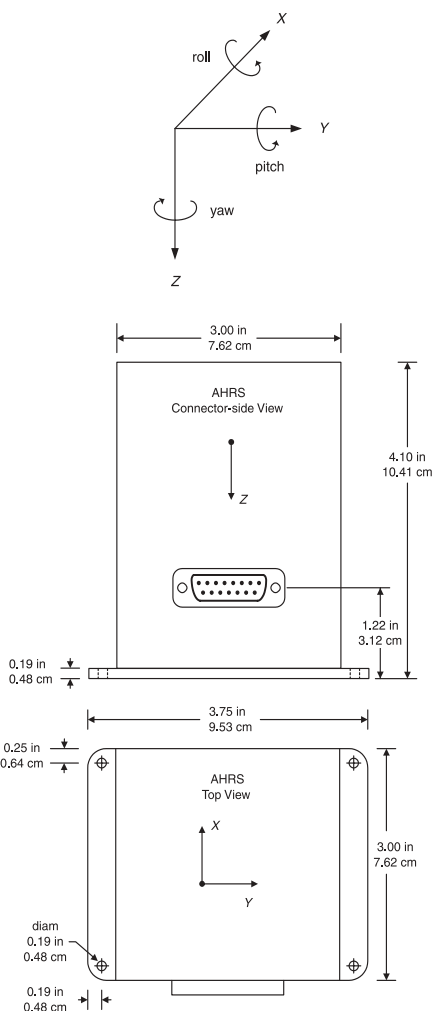
AHRS400CC

The Crossbow AHRS400CC is a high performance, solid-state attitude and heading reference system intended for airborne applications such as UAV control, Avionics, and Platform Stabilization. This high reliability, strap-down inertial subsystem provides attitude and heading measurements with static and dynamic accuracy that exceeds traditional spinning mass vertical and directional gyros.

This AHRS400CC series product builds on the performance of the AHRS400CB series. It features higher performance sensors, including new silicon MEMS gyroscopes with wider bandwidth and improved bias stability. New design features in the AHRS400CC Series reduce sensitivity to vibration and EMI.

The AHRS400CC achieves its excellent performance by employing proprietary Kalman Filter algorithms to determine stabilized roll, pitch, and heading angles in static and dynamic conditions. The Kalman Filter implementation results in a continuous on-line gyro bias calibration, and an adaptive attitude and heading measurement that is stabilized by the long term gravity and magnetic north references. Output data is provided in both analog and digital (RS-232) formats.

Each Inertial System comes with a User's Manual offering helpful hints on programming, installation, and product information. In addition, Crossbow's GYRO-VIEW software is included to assist you in system development and evaluation, and allows you to perform data acquisition.



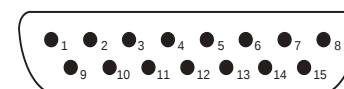
AHRS Block Diagram

Specifications	AHRS400CC-100	AHRS400CC-200	Remarks
Performance			
Update Rate (Hz)	> 60	> 60	Continuous update mode
Start-up Time Valid Data (sec)	< 1	< 1	
Fully Stabilized Data (sec)	< 60	< 60	Under static conditions
Attitude			
Range: Roll, Pitch (°)	± 180, ± 90	± 180, ± 90	
Static Accuracy (°)	<± 0.5	<± 1	Measured on level surface
Dynamic Accuracy (° rms)	± 2.0	± 2.5	
Resolution (°)	< 0.1	< 0.1	
Heading			
Range (°)	± 180	± 180	
Static Accuracy (°)	<± 1.5	<± 2	
Dynamic Accuracy (° rms)	± 3	± 4	
Resolution (° rms)	< 0.1	< 0.1	
Angular Rate			
Range: Roll, Pitch, Yaw (°/sec)	± 100	± 200	
Bias: Roll, Pitch, Yaw (°/sec)	<± 1.0	<± 1.0	Scaled sensor mode
Bias: Roll, Pitch, Yaw (°/sec)	<± 0.05	<± 0.05	Angle mode
Scale Factor Accuracy (%)	< 1	< 1	
Non-Linearity (% FS)	< 0.3	< 0.3	
Resolution (°/sec)	< 0.025	< 0.05	
Bandwidth (Hz)	>25	>25	-3 dB point
Random Walk (°/hr ^{1/2})	< 2.25	< 4.5	Typical
Acceleration			
Input Range: X/Y/Z (g)	± 2	± 10	
Bias: X/Y/Z (mg)	<± 8.5	<± 12	
Scale Factor Accuracy (%)	< 1	< 1	
Non-Linearity (% FS)	< 1	< 1	
Resolution (mg rms)	< 0.25	< 1.25	
Bandwidth (Hz)	>10	>10	-3 dB point
Random Walk (m/s/hr ^{1/2})	< 0.1	< 0.5	
Environment			
Operating Temperature (°C)	-40 to +71	-40 to +71	
Non-Operating Temperature (°C)	-55 to +85	-55 to +85	
Non-Operating Vibration (g rms)	6	6	20 Hz - 2 KHz random
Non-Operating Shock (g)	1000	1000	1 ms half sine wave
Electrical			
Input Voltage (VDC)	9 to 30	9 to 30	
Input Current (mA)	< 300	< 300	
Power Consumption (W)	< 4	< 4	at 12 VDC
Digital Output Format	RS-232	RS-232	"See Digital Data Format"
Analog ¹ Range (VDC)	± 4.096	± 4.096	Pins 8, 9, 10, 12, 13, 14
	0 to 5.0	0 to 5.0	Pins 5, 6, 7
Physical			
Size (in)	3.0 x 3.75 x 4.1	3.0 x 3.75 x 4.1	Includ. mounting flanges
(cm)	7.62 x 9.53 x 10.42	7.62 x 9.53 x 10.42	Includ. mounting flanges
Weight (lbs)	< 1.7	< 1.7	
(kg)	< 0.77	< 0.77	
Connector	15 pin sub-miniature "D" male		

Notes

¹All DAC analog outputs are fully buffered and are designed to interface directly to data acquisition equipment. Specifications subject to change without notice

15 Pin "D" Connector Male Pinout



Pin	Signal
1	RS-232 Transmit Data
2	RS-232 Receive Data
3	Input Power
4	Ground
5	X-axis accel voltage ¹
6	Y-axis accel voltage ¹
7	Z-axis accel voltage ¹
8	Roll-axis angular rate ²
9	Pitch-axis angular rate ²
10	Yaw-axis angular rate ²
11	NC – Factory use only
12	Roll angle/X-axis mag voltage ³
13	Pitch angle/Y-axis mag voltage ³
14	Heading angle/Z-axis mag voltage ³
15	NC – Factory use only

Notes

- The accelerometer voltage outputs are taken directly from the accelerometers without compensation or scaling.
- The angular rate analog outputs are scaled to represent degrees/second. Outputs are created by a D/A converter.
- Actual output depends on AHRS measurement mode.

Pin Diagram



inertial systems

Ordering Information

Model	Description	Gyro (°/sec)	Accel (g)
AHRS400CC-100	Attitude & Heading Reference System	± 100	± 2
AHRS400CC-200	Attitude & Heading Reference System	± 200	± 10

CALL FACTORY FOR OTHER CONFIGURATIONS

Document Part Number: 6020-0025-01

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