



Watson Industries Application Notes

Remotely Piloted Vehicles: Control & Display

Piloting an aerial vehicle remotely is a challenging task. There is no pilot in the craft to monitor its position with respect to the ground. Controlling the cost of the vehicle is important, but the cost of a losing a RPV due to inadequate sensors is much higher.

A sensor package that can quickly and accurately deliver data on vehicle attitude and heading is crucial. A system built using solid-state gyros is favorable when considering cost and reliability.



Watson Industries has several sensor packages that can provide attitude data to the remote pilot. We manufacture several types of Attitude and Heading Reference Systems (AHRS) and Dynamic Measurement Systems (DMS) that can meet your requirements.

Technical Challenges:

Adequate space and a difficult magnetic environment are two challenges in the installation of an inertial sensor package for remotely piloting an aerial vehicle. The most compact solution is the Watson AHRS. This inertial sensor includes a magnetometer as its heading reference. These vehicles also have motors, relays, batteries and high current carrying conductors that create highly variable magnetic fields that can induce heading errors. Finding a mounting location that is magnetically clean is key to solving this issue.

We strongly encourage you to read our magnetometer mounting location paper located on our website for more information on finding the best place to install your AHRS. We also provide free software for calibrating the AHRS internal compass after it has been installed to remove any remaining heading errors that may result from its mounting environment.

For applications in a poor magnetic environment, Watson Industries has a line of GPS-heading enabled DMS inertial gyro sensors. All that is needed is a place in the vehicle where the GPS antennas can have a clear line of sight to satellites.



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Watson Experience:

We have produced sensors used for RPV control and display since 1988. Since that time, we have sold several configurations of products to meet our customer's needs.

Requirements:

- Roll, Pitch and Yaw Rate: $\pm 100^\circ/\text{sec}$
- X, Y, and Z Acceleration: $\pm 10\text{G}$
- Airspeed Input – The possibility of sustained dynamic maneuvers requires airspeed be read into the sensor to allow calculation of and correction for those dynamics. The standard input format is an analog voltage. A digital airspeed signal from GPS or another source is available as a custom option.
- Magnetically Clean Installation Location
- Installation digital compass calibration

Applicable Products:

- AHRS-E304
- AHRS-S305
- DMS-EGP02
- DMS-SGP02

Typical Options:

We are able to accommodate your custom needs. Shown below is a listing of our most common custom modifications.

- Digital velocity input – Watson can support digital velocity inputs in many formats such as GPS and air data sensors.
- Custom specifications – For certain applications, customers require specifications that are different from our standard units. Watson Industries engineering is willing and able to accommodate these needs.
- Input Voltage – Many different input voltages can be accommodated.
- Output Format – Communications Protocols RS-232, RS-485, RS-422, USB, Syncro.
- Data Format – We have made many products with custom formatted data outputs.
- Sensor Ranges – The ranges for most of our sensors can be expanded or reduced to meet your requirements.

Options specific to this application:

- Digital airspeed input from GPS or other source.

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