

U.S. Dynamics (USD) 475 series of subminiature Rate Gyroscopes are a high performance series of gyros that performs reliably and accurately in severe environments. USD has designed and developed this series of rate gyros from the ground up with all of the latest technologies.

The 475 gyro is a single degree of freedom unit built into a 1 inch diameter x 2.5 inch length stainless steel housing. Utilizing the same construction techniques that have been developed and improved for over 20 years in our 446 Rate Integrating Gyro Series, the 475 rate gyro can offer an excellent solution for many current and legacy military programs. Typical applications include attitude control, radar stabilization, sight stabilization and guidance.



## Features

Some of the outstanding features in the USD 475 series include the following:

- Rugged, all welded construction capable of meeting performance requirements in extreme environments of vibration, shock, altitude, humidity and temperature.
- A synchronous hysteresis motor whose high reliability is enhanced by preloaded inertial grade ball bearings and advanced lubricants. The rotor assembly is dynamically balanced using state of the art high precision balancing equipment. Every spin motor assembly is "run-in" for a minimum of 96 hours.
- A variable reluctance pickoff which contains quadrature and null trimming capabilities. Utilizing state of the art materials for the stator and rotor stacks, it provides high sensitivity, excellent linearity and low noise.
- High precision radial ball bearings that maintain gimbal alignment and support for the torsion wire enabling high g forces without distortion. Radial play can be limited to 20 millionths of an inch in high performance applications.
- A stainless steel welded bellows allows a wide temperature range without pressurizing and damaging the internal components.
- Dynamic characteristics of the gyro are maintained throughout the temperature range by means of a bellows-operated, variable-orifice, damping compensator. The compensator is a mechanical device and requires no power source. It provides a constant damping ratio from -65 deg F to 250 deg F without heaters.
- Stable and inert silicone-based fluid for gimbal floatation and damping. This enables gyro start-up at low temperatures of -65 deg F.
- An external null trimming device which enables mechanical trimming of the pickoff without any electrical components which would effect pickoff phase shift.



**OPTIONS:**

USD's 475 series of gyros are available in a wide range of performance characteristics as shown in the accompanying table. Various options and configurations are available for easy integration of 475 gyroscopes into a customer's system. A variety of clamping and mounting systems, cable/connector assemblies, terminal configurations, heater and sensor assemblies, magnetic shielding, long life spin bearings are all available.

**475F1 GYRO PERFORMANCE PARAMETERS**

**SPINMOTOR:**

|                        |                     |
|------------------------|---------------------|
| Voltage (2 phase)      | 7.0 volts rms, sine |
| Frequency              | 900 Hz, sine        |
| Sync Time at Room Temp | 60 seconds maximum  |

**PICKOFF:**

|                |                           |
|----------------|---------------------------|
| Voltage        | 20 volts rms, sine        |
| Frequency      | 4000 Hz                   |
| Output Voltage | 7.0 volts maximum         |
| Null           | 35 millivolts rms maximum |
| Phase Shift    | +/- 5 degrees max.        |

**MECHANICAL:**

|                            |              |
|----------------------------|--------------|
| Input Rate                 | 300 deg/sec  |
| Gimbal Displacement        | +/- 3.0 deg  |
| Undamped Natural Frequency | 60 Hz min.   |
| Damping Ratio              | 0.35 to 0.88 |

**GYRO PERFORMANCE:**

|                                 |   |
|---------------------------------|---|
| Linear Acceleration Sensitivity | 0.1 deg/sec/g maximum                               |
| Hysteresis                      | 0.1% of the input rate                              |
| Resolution and Threshold        | +/- 0.01 deg/sec maximum                            |
| Zero Offset                     | 0.3 deg/sec maximum                                 |
| Scale Factor                    | 20 +/- 4% mv/deg/sec                                |
| Linearity                       | +/- 0.5% of full scale plus +/-0.5% of applied rate |

**ENVIRONMENTS:**

|                        |                   |
|------------------------|-------------------|
| Operating Temperature  | -65 to +220 deg F |
| Linear Acceleration    | 18 g peak         |
| Shock                  | 80 g peak         |
| Vibration (10-2000 Hz) | 15 g peak         |
| Weight                 | 5 oz max.         |
| Mounting               | Flange            |