Rate Gyroscopes
475 Series

Form, Fit and Function replacements for Honeywell GG445,
BAE GI-G5 and GR-G5 Series

The 475 gyro is an all-welded, hermetic construction, capable of meeting performance requirements in extreme operating environments of vibration, shock, altitude, humidity and temperature. The heart of the gyro consists of a synchronous hysteresis motor whose high reliability is enhanced by preloaded inertial grade ball bearings and advanced lubricants. The spin motor assembly is dynamically balanced using state-of-the-art high precision balancing equipment and then run-in for a minimum of 96 hours to fully channel the lubricants. The gimbal is supported by a specially designed torsion wire that yields very low hysteresis with excellent repeatability and a miniature high precision ball bearing enabling high g forces without distortion. The angular position of the gimbal is detected by 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. A stable and inert silicone-based fluid is used for gimbal neutral buoyancy and damping. It's characteristics allow gyro start-up at low temperatures of –54 deg C. 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. An external null trimming device enables mechanical trimming of the pickoff without electrical components that would effect pickoff phase shift. All gyros are temperature cycled from -65 deg F to +240 deg F for 48 hours to stress relieve all components and assure maximum drift stability.

475 Series Applications

Program	Application	Comments
Phalanx	Weapon System	Radar Stabilization
F-15	Aircraft	Radar Rate Stabilization
F-16	Aircraft	Heads Up Display Rate Sensor
Standard Missile	Missile	Autopilot
AN/APQ-150A	Aircraft	Tracking Radar
SATCOM	Shipboard	Antenna Stabilization
AN/APQ-150	Aircraft	Radar System
AN/ASQ-173	Aircraft	Laser Tracker
F-16	Aircraft	Flight Control
LANTIRN	Aircraft	Target Pod
F-4	Aircraft	

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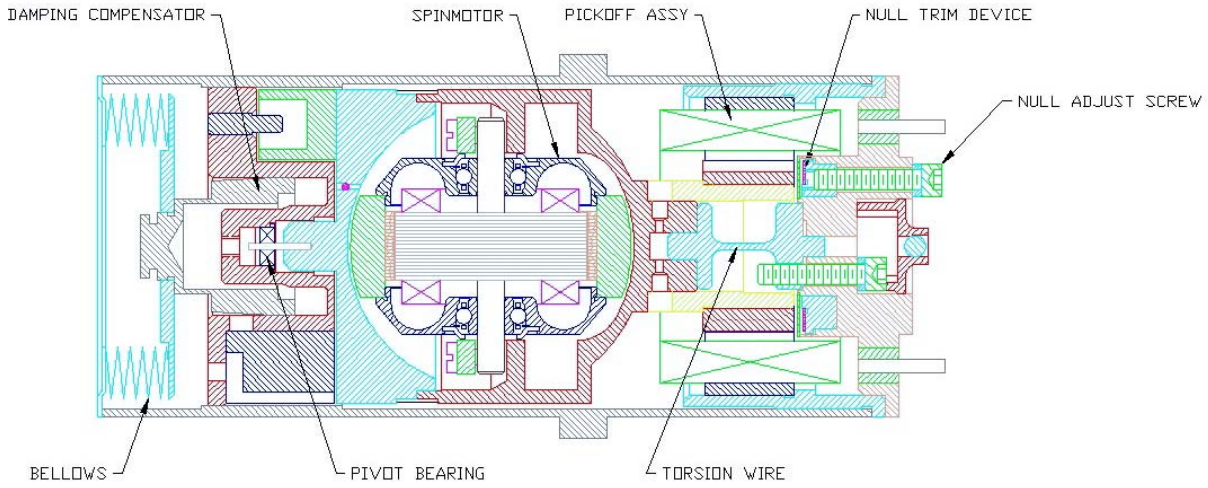
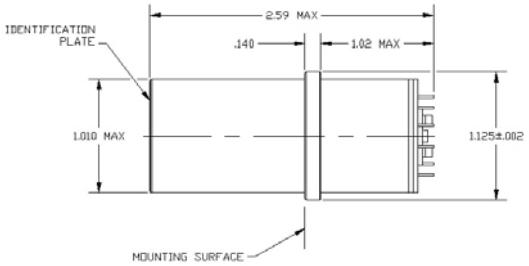
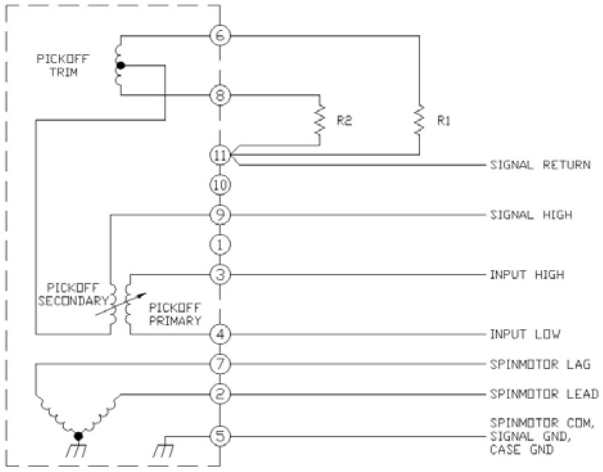


Typical 475 Gyro Assembly



475 Gyro Outline - 1.00 Diameter



Typical 475 Gyro Wiring Diagram

See Notes on next page

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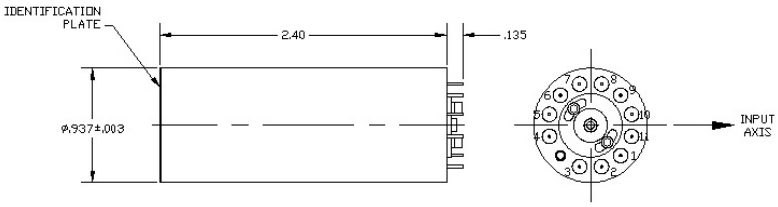
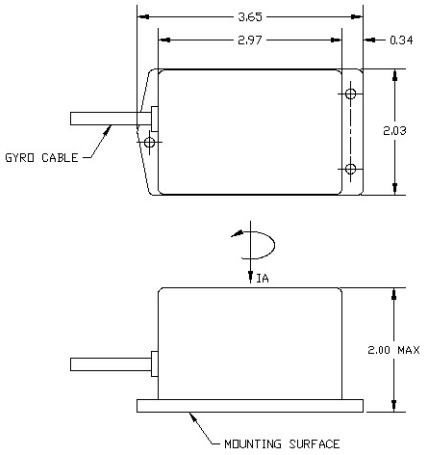


475 Gyro Assembly - 0.94 Diameter



475 Gyro Outline with Electronics

(Shown is a typical Humphrey / Goodrich RG78 Outline)

The Outline and Wiring Diagrams should be only used as a guide. The 475 series of rate gyroscopes can be configured to customer specifications. Some of the options are listed below:

- Spin motor available with common leg of 2 phase motor grounded or as a separate return.
- Self test torquer.
- Cables, connectors, mounting flanges and brackets, magnetic shielding and long life spin bearings.
- Various combinations of gyro inputs and outputs:
  - AC input - AC output
  - AC input - DC output
  - DC input - DC output
- Spin motor and Pickoff drive electronics.
- Operational bit output.

USD can also package multiple gyros with all the necessary electronics for multi-axis sensing. For more information, please call Sales at (631) 842-5600 or send an email to sales@usdynamicscorp.com.

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Rate Gyroscopes
475 Series

USD Part Number		475134	475150	475163	475194	475195
NSN		6615010714292	6615012205377	6615014326690	6615013102233	6615013399457
Honeywell Part Number		10059849			10134100-101	
BAE Part Number			304545	64667-302		67619-306
PARAMETER	**UNIT**					
Rate	± deg/sec	90	150	300	20	60
SPINMOTOR:						
Voltage (2 phase)	volts rms	26	14.5	7	26	26
Frequency	Hz	800	800	900	400	400
Current - Start/phase	amps rms max			0.6		
- Run/phase	amps rms max	0.192	0.36	0.4		
Power (Total) - Start	watts max				5	6
- Run	watts max				4	5
Run-Up Time	sec max	45	5	60	30	25
PICKOFF:						
Voltage	volts rms	26	15	20	26	26
Frequency	Hz	800	800	4000	400	400
Load	ohms, Pf max				10 K	
Scale Factor	mv/deg/sec	75	35	20	85	100
GYRO PERFORMANCE:						
Threshold	deg/sec	0.01	0.01		0.01	0.015
Linearity	% max		2	1		1
Natural Frequency	Hz min	22	42	60	25	28
Damping Ratio	------	0.7 to 2.0	0.4 to 0.8	0.35 to 1.3	0.7 ± 0.3	0.4 to 1.0
Acceleration Sensitivity	deg/sec/g max	0.05	0.06	0.1	0.1	0.1
Hysteresis	deg/sec max	0.1	0.15	0.1% of input	0.03	0.1
Zero Offset	deg/sec max	0.4 max	0.11	0.3	0.1	0.1
ENVIRONMENTS:						
Operating Temp.	°F	-40 to +185	140 ± 5 Htd	-65 to +203	-65 to +150	-40 to +160
Shock, Duration	g-peak,msec	15, 11	40, 11	80, 11	20, 9	
Vibration 20-2000 Hz	g-peak	10g's sine	10g's random	15g's sine	20g's sine	
Acceleration	g	10	40	18		

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Rate Gyroscopes
475 Series

USD Part Number		475196	475197	475198	475199	475200
NSN			6615013533294	6615004070166		
Honeywell Part Number			S101280			
BAE Part Number		103162	79199-333	79148-302	67696-301	64625-302
PARAMETER	**UNIT**					
Rate	± deg/sec	50	100	30	30	40
SPINMOTOR:						
Voltage (2 phase)	volts rms	26	26	26	26	26
Frequency	Hz	800	400	400	800	400
Current - Start/phase	amps rms max		125			
- Run/phase	amps rms max		100			
Power (Total) - Start	watts max	5.5		4.5	3.5	4
- Run	watts max	4.5		4.5	2.5	2.5
Run-Up Time	sec max	25	30	30	30	25
PICKOFF:						
Voltage	volts rms	26	26	26	26	26
Frequency	Hz	800	400	400	800	400
Load	ohms, Pf max			10K	10K	100K
Scale Factor	mv/deg/sec	93	110	140	100	134
GYRO PERFORMANCE:						
Threshold	deg/sec	0.01	0.01	0.01	0.01	0.01
Linearity	% max	1	2	1	1	2
Natural Frequency	Hz min	28	35	25	25	19
Damping Ratio	------	0.4 to 0.8	0.5 to 0.9	0.5 to 2.4	0.7 to 1.3	0.3 to 0.7
Acceleration Sensitivity	deg/sec/g max	0.05	0.05	0.08	0.05	0.1
Hysteresis	deg/sec max	0.05	0.1	0.3	0.03	0.04
Zero Offset	deg/sec max	0.1	0.1	0.15	0.1	0.3
ENVIRONMENTS:						
Operating Temp.	°F	-25 to +120	-20 to +160	-65 to +212	+14 to +160	+60 to +90
Shock, Duration	g-peak,msec	20	300, 7	25, 11	50, 11	50, 11
Vibration 20-2000 Hz	g-peak		2	5	12	5
Acceleration	g			6	15	10

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Rate Gyroscopes
475 Series

USD Part Number		475201	475202	475203	475204	475205
NSN		6615010477463	6615010683593			
Honeywell Part Number						
BAE Part Number		67561-302	64654-301	64670-301	67652-301	67547-301
PARAMETER	**UNIT**					
Rate	± deg/sec	40	50	50	50	60
SPINMOTOR:						
Voltage (2 phase)	volts rms	26	27 Square	28	28	26
Frequency	Hz	400	800	400	400	400
Current - Start/phase	amps rms max					
- Run/phase	amps rms max					
Power (Total) - Start	watts max	4	3.5	4.5	3.5	5
- Run	watts max	2.5	2.5	3	3	4.5
Run-Up Time	sec max	25	25	25	25	60
PICKOFF:						
Voltage	volts rms	26	27	8	26	26
Frequency	Hz	400	800	1970	400	400
Load	ohms, Pf max	100K	10K	10K	10K	10K
Scale Factor	mv/deg/sec	140	100	150	100	100
GYRO PERFORMANCE:						
Threshold	deg/sec	0.01	0.015	0.01	0.01	0.03
Linearity	% max	2	1	2	2	2
Natural Frequency	Hz min	19	28	25	25	31
Damping Ratio	------	0.4 to 0.6	0.4 to 1.3	0.3 to 1.0	0.5 to 1.2	0.4 to 2.0
Acceleration Sensitivity	deg/sec/g max	0.075	0.05	0.05	0.05	0.1
Hysteresis	deg/sec max	0.04	0.03	0.03	0.05	0.06
Zero Offset	deg/sec max	0.07	0.1	0.05	0.1	0.3
ENVIRONMENTS:						
Operating Temp.	°F	+60 to +90	-55 to +160	-65 to +160	0 to +180	-25 to +125
Shock, Duration	g-peak,msec	50, 11	40, 11	50, 11	50, 11	400, 0.5
Vibration 20-2000 Hz	g-peak	5	10	5	9	2.5
Acceleration	g	10	20	10	10	20

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Rate Gyroscopes
475 Series

USD Part Number		475206	475207	475208	475209	475210
NSN						
Honeywell Part Number						
BAE Part Number		67597-301	67513-303	64543-301	67513-301	67708
PARAMETER	**UNIT**					
Rate	± deg/sec	90	100	100	100	100
SPINMOTOR:						
Voltage (2 phase)	volts rms	26	30 Square	20.5 Square	30 Square	28
Frequency	Hz	400	400	480	400	800
Current - Start/phase	amps rms max					
- Run/phase	amps rms max					
Power (Total) - Start	watts max	5	8	3	8	4
- Run	watts max	4	5	2.25	5	3.5
Run-Up Time	sec max	20	5	30	5	20
PICKOFF:						
Voltage	volts rms	26	10	8	10	28
Frequency	Hz	2600	4800	2404	4800	800
Load	ohms, Pf max	10K	90K	62K	90K	30K
Scale Factor	mv/deg/sec	41	50	100	50	160
GYRO PERFORMANCE:						
Threshold	deg/sec	0.01	0.04	0.02	0.04	0.01
Linearity	% max	2	1	1	1	2
Natural Frequency	Hz min	33	60	60	60	38
Damping Ratio	------	0.7 to 1.3	0.3 to 1.0	0.4 to 0.7	0.3 to 1.0	0.4 to 1.0
Acceleration Sensitivity	deg/sec/g max	0.1	0.3	0.04	0.3	0.06
Hysteresis	deg/sec max	0.1	0.02	0.15	0.2	0.15
Zero Offset	deg/sec max	0.25	1	0.4	1	0.15
ENVIRONMENTS:						
Operating Temp.	°F	0 to +140	0 to +225	+30 to +190	-65 to +225	+60 to +160
Shock, Duration	g-peak,msec	50, 11	45, 10	20, 30	45, 10	50, 11
Vibration 20-2000 Hz	g-peak	4	12	8	12	12
Acceleration	g	15	30	20	30	17

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Rate Gyroscopes
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USD Part Number		475211	475212	475213	475214	475215
NSN				6615010682149		
Honeywell Part Number						
BAE Part Number		67510-301	64640-302	64654-302	67597-302	64669-301
PARAMETER	**UNIT**					
Rate	± deg/sec	150	100	250	270	300
SPINMOTOR:						
Voltage (2 phase)	volts rms	30/15 run sq	27 Square	27 Square	26	7 Square
Frequency	Hz	1200	400	800	400	900
Current - Start/phase	amps rms max					
- Run/phase	amps rms max					
Power (Total) - Start	watts max	56 VA	6.5	3.5	5	4.7
- Run	watts max	7.5 VA	4.5	2.5	4	2
Run-Up Time	sec max	2	20	25	20	60
PICKOFF:						
Voltage	volts rms	9	10	27	26	20
Frequency	Hz	3125	4800	800	2600	4000
Load	ohms, Pf max	51K	10K, 500	10K	10K	15K, 2200
Scale Factor	mv/deg/sec	10	100	20	14	20
GYRO PERFORMANCE:						
Threshold	deg/sec	0.015	0.01	0.05	0.01	0.01
Linearity	% max	1.6	1	1	2	1
Natural Frequency	Hz min	58	56	60	43	60
Damping Ratio	------	0.5 to 0.8	0.4 to 1.0	0.3 to 1.0	0.7 to 1.3	0.4 to 1.5
Acceleration Sensitivity	deg/sec/g max	0.05	0.05	0.05	0.1	0.1
Hysteresis	deg/sec max	0.2	0.2	0.15	0.2	0.3
Zero Offset	deg/sec max	0.5	0.25	0.5	0.5	0.3
ENVIRONMENTS:						
Operating Temp.	°F	+150 to +185	-30 to +225	-55 to +160	0 to +120	-65 to +220
Shock, Duration	g-peak,msec	86, 1	150, 1	40, 11	50, 11	80, 11
Vibration 20-2000 Hz	g-peak	19	15	10	4	10
Acceleration	g	50	18	20	15	18

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Rate Gyroscopes
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USD Part Number		475193	475216	475217	475218	475219
NSN						6615011611460
Honeywell Part Number						
BAE Part Number		67701-301	67705-301	79199-301	67696-303	79172-302
PARAMETER	**UNIT**					
Rate	± deg/sec	300	400	20	30	40
SPINMOTOR:						
Voltage (2 phase)	volts rms	26	26	26	26	26
Frequency	Hz	800	400	400	800	400
Current - Start/phase	amps rms max					
- Run/phase	amps rms max					
Power (Total) - Start	watts max	4	5	5	5	5
- Run	watts max	3.5	4	4	4	4
Run-Up Time	sec max	60	20	30	20	25
PICKOFF:						
Voltage	volts rms	26	20	26	26	26
Frequency	Hz	800	4000	400	800	400
Load	ohms, Pf max	20K	30K	10K	10K	15K
Scale Factor	mv/deg/sec	20	7.5	250	100	150
GYRO PERFORMANCE:						
Threshold	deg/sec	0.01	0.05	0.01	0.01	0.01
Linearity	% max	1	1	2	1	3
Natural Frequency	Hz min	47	80	14	25	17
Damping Ratio	------	0.3 to 1.5	0.3 to 1.5	0.5 to 0.9	0.3 to 1.5	0.4 to 0.6
Acceleration Sensitivity	deg/sec/g max	0.1	0.2	0.05	0.05	0.05
Hysteresis	deg/sec max	0.25	0.4	0.02	0.1	0.08
Zero Offset	deg/sec max	0.75	1	0.04	0.3	0.08
ENVIRONMENTS:						
Operating Temp.	°F	-65 to +160	-40 to +180	0 to +160	0 to +160	+30 to +140
Shock, Duration	g-peak,msec	25, 11	25, 20		50, 11	
Vibration 20-2000 Hz	g-peak	6	9		12	
Acceleration	g	18	45		15	

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Rate Gyroscopes
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USD Part Number		475220	475221	475222	475223	475224
NSN						
Honeywell Part Number						
BAE Part Number		67538-301	103013-301	67618-301	67640-303	67640-301
PARAMETER	**UNIT**					
Rate	± deg/sec	40	40	60	60	60
SPINMOTOR:						
Voltage (2 phase)	volts rms	26	26	26	26	26
Frequency	Hz	400	400	400	400	400
Current - Start/phase	amps rms max					
- Run/phase	amps rms max					
Power (Total) - Start	watts max	5	5	6	6	5
- Run	watts max	4	4	5	5	4
Run-Up Time	sec max	20	30	15	20	30
PICKOFF:						
Voltage	volts rms	7	26	26	26	26
Frequency	Hz	1800	400	400	400	400
Load	ohms, Pf max	20K	10K	10K	10K	
Scale Factor	mv/deg/sec	33	80	100	30	83
GYRO PERFORMANCE:						
Threshold	deg/sec	0.01	0.01	0.01	0.01	0.01
Linearity	% max	1	1	1	1	1
Natural Frequency	Hz min	50	25	31	50	35
Damping Ratio	------	0.3 to 1.0	0.4 to 1.2	0.4 to 1.0	0.4 to 1.0	0.3 to 1.5
Acceleration Sensitivity	deg/sec/g max	0.1	0.1	0.2	0.15	0.03
Hysteresis	deg/sec max	0.3	0.16	0.1	0.06	0.1
Zero Offset	deg/sec max	0.3	0.16	0.1	0.33	0.1
ENVIRONMENTS:						
Operating Temp.	°F	-65 to +212	-65 to +160	-25 to +160	-31 to +150	-10 to +212
Shock, Duration	g-peak,msec	20, 11	15, 11	500, 0.25	500, 1.5	
Vibration 20-2000 Hz	g-peak	20	10	5	15	
Acceleration	g	15	6	10	10	10

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Rate Gyroscopes
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USD Part Number		475225	475226	475227	475228	475229
NSN						
Honeywell Part Number						
BAE Part Number		67680-301	67736-302	79022-303	67595-301	67603-301
PARAMETER	**UNIT**					
Rate	± deg/sec	75	100	150	150	400
SPINMOTOR:						
Voltage (2 phase)	volts rms	26	26	13.5 Square	14.7 Square	26
Frequency	Hz	400	400	800	1200	400
Current - Start/phase	amps rms max					
- Run/phase	amps rms max					
Power (Total) - Start	watts max	6	6	9	9	5
- Run	watts max	5	5	6	6	4
Run-Up Time	sec max	20	20	2.5	2	30
PICKOFF:						
Voltage	volts rms	26	26	13.5 Square	14.7 Square	10
Frequency	Hz	400	400	800	1200	4500
Load	ohms, Pf max	200K	16.5K	10K	50K	10K
Scale Factor	mv/deg/sec	70	70	35	10	10
GYRO PERFORMANCE:						
Threshold	deg/sec	0.01	0.01	0.01	0.01	0.05
Linearity	% max	2	2	2	3	2
Natural Frequency	Hz min	30	40	38	54	100
Damping Ratio	------	0.4 to 1.0	0.4 to 0.8	0.4 to 0.8	0.4 to 1.2	0.3 to 1.5
Acceleration Sensitivity	deg/sec/g max	0.05	0.05	0.05	0.02	0.1
Hysteresis	deg/sec max	0.05	0.1	0.15	0.06	0.4
Zero Offset	deg/sec max	0.3	0.14	0.3	0.15	1
ENVIRONMENTS:						
Operating Temp.	°F	+32 to +100	-4 to +160	+32 to +160	+32 to +190	-65 to +212
Shock, Duration	g-peak,msec	20, 11	30, 11	40		20, 11
Vibration 20-2000 Hz	g-peak	10	5	5	16	15
Acceleration	g			6	40	10

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Rate Gyroscopes
475 Series

USD Part Number		475230	475231	475232	475234	475235
NSN		1015010766742	6615010714513	6615013223408	6615011435934	6615010546075
Honeywell Part Number						
BAE Part Number		13196	67699-302		103003-005	12000
PARAMETER	**UNIT**					
Rate	± deg/sec	60	300	100	100	50
SPINMOTOR:						
Voltage (2 phase)	volts rms	26	26	28	26	15
Frequency	Hz	400	800	400	400	400
Current - Start/phase	amps rms max					
- Run/phase	amps rms max				0.2	
Power (Total) - Start	watts max	6		8		7
- Run	watts max	5		7.5	5	6
Run-Up Time	sec max	25	60	45	30	60
PICKOFF:						
Voltage	volts rms	26	26	28	7	15
Frequency	Hz	400	800	400	1800	400
Load	ohms, Pf max	10K	20K		20K	
Scale Factor	mv/deg/sec	100	20	60 mvdc	33	280
GYRO PERFORMANCE:						
Threshold	deg/sec	0.03	0.01	0.01	0.05	0.01
Linearity	% max	2		1	1	1
Natural Frequency	Hz min	31	47	40	50	
Damping Ratio	------	0.4 to 1.0	0.3 to 2.5	0.5 to 1.0	0.4 to 1.5	0.4 to 1.2
Acceleration Sensitivity	deg/sec/g max		0.1	0.15	0.1	0.15
Hysteresis	deg/sec max	0.25	0.25	0.15	0.10	0.15
Zero Offset	deg/sec max		0.25	0.35	0.30	0.15
ENVIRONMENTS:						
Operating Temp.	°F	-25 to +140	-65 to +203	-65 to +167	-65 to +203	-65 to +167
Shock, Duration	g-peak,msec	30, 11		50, 11	25, 11	
Vibration 20-2000 Hz	g-peak	5	9	8 rms	15	
Acceleration	g				15	

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Rate Gyroscopes
475 Series

USD Part Number		475243	475244			
NSN						
Honeywell Part Number		7003315-901				
BAE Part Number						
PARAMETER	**UNIT**					
Rate	± deg/sec	100	200			
SPINMOTOR:						
Voltage (2 phase)	volts rms	26	26/52			
Frequency	Hz	400	400			
Current - Start/phase	amps rms max	200				
- Run/phase	amps rms max	200				
Power (Total) - Start	watts max	5	7			
- Run	watts max	3	5.7			
Run-Up Time	sec max	7	3			
PICKOFF:						
Voltage	volts rms	10	26			
Frequency	Hz	4800	400			
Load	ohms, Pf max	90K				
Scale Factor	mv/deg/sec	72	19			
GYRO PERFORMANCE:						
Threshold	deg/sec	0.01	0.01			
Linearity	% max		2			
Natural Frequency	Hz min	60	60			
Damping Ratio	------	0.1 to 3.0	0.4 to 1.0			
Acceleration Sensitivity	deg/sec/g max	0.15	0.15			
Hysteresis	deg/sec max	0.12	0.3			
Zero Offset	deg/sec max	3	4			
ENVIRONMENTS:						
Operating Temp.	°F	-65 to 212	-65 to 185			
Shock, Duration	g-peak,msec	350, 0.5	300, 6			
Vibration 20-2000 Hz	g-peak	1 rms	30 rms			
Acceleration	g	40	30			

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