

Advanced Digital Rate Gyro

Built-in Analyses, Dynamic Interface, $\pm 300^\circ/\text{sec}$, $\pm 1000^\circ/\text{sec}$



- **Built-in Analyses** reduce the need for post-processing time and equipment, plus shrink data file sizes. Simply request minimum values, maximum values, peak-to-peak, magnitude, or threshold.
- **Dynamic Customer Interface** - Set and query the GY407D with SCPI-like commands such as CONFigure or MEASure. Users may select the scan rates needed and set threshold detection and actions as required. Employ start-up scripts and run multiple sensors with data synchronization.
- **Flexible Output** - Readouts at specified intervals can include one, two or three axes plus temperature. Choose engineering units ($^\circ/\text{sec}$, $^\circ\text{C}$), or raw ADC counts at RS232 or RS485 baud rates.
- **High Accuracy and Linearity over Wide Temperature Range** - Each sensor output is fully temperature compensated, improving accuracy by minimizing variations due to temperature and aging effects. Each axial sensor has been tested over the -40° to $+85^\circ\text{C}$ temperature range.
- **Built-in Calibration** - Calibration data for each sensor is maintained in the accelerometer. All data output is fully calibrated in accordance with NIST standards.
- **Self-Test** - Self-test signal and commands help verify channel integrity and wiring connections.
- **Rugged for Harsh Environments** - The GY407D is robust and suitable for harsh environments. The aluminum-encased, fully-potted unit will survive 3000g powered or unpowered.
- **Built-In Power Supply Regulation** - Unregulated DC power from +8.5 to +36 Volts is all that is required to measure rotation and temperature. Reverse power voltages of up to -80V can be withstood indefinitely. Transients of +80V for 550 ms compatible with MIL-STD-704A can be withstood with full operation.
- **Small Size** - Completely conditioned uniaxial, biaxial or triaxial rate gyro in less than one cubic inch.
- **Earth Friendly Design** - Lead-free design makes the GY407D environmentally safe while Measurement Specialties' assembly process ensures reliable functionality. Fully-potted electronics eliminates the possibility of tin whiskers-related failures.
- **Three-Year Warranty** - Measurement Specialties' digital rate gyros come with a three-year factory warranty.

*Technical Data subject to change without notice

The GY407D is the first rate gyro to support SCPI-like commands, return data in engineering units, and work with an ASCII terminal emulator. It also performs basic functions such as evaluating minimum, maximum, magnitude, and peak-to-peak. The output is configurable by the customer - choose number of axes, units returned, bandwidth, sample rates, function specifics, and analysis results.

The sensor also contains a temperature sensor, microcontroller, and analog outputs in a small, easy-to-install package. The microcontroller takes 10-bit samples and performs temperature compensation and additional functions as programmed for output via the RS-485 interface.

Order the range option best suited for your application to measure $\pm 300^\circ/\text{sec}$ or $\pm 1000^\circ/\text{sec}$. Bandwidth is standard at 100 Hz.

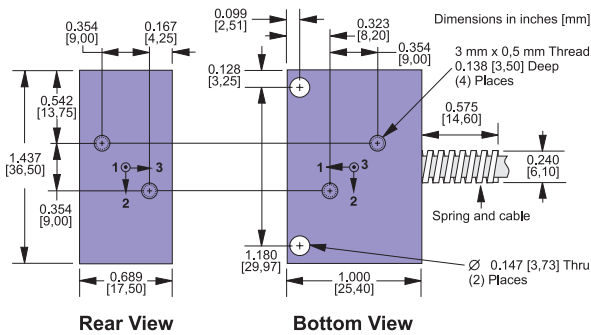
Specifications for GY407D - improved specifications available upon request

$T_A = T_{MIN}$ to T_{MAX} ; Acceleration = ± 1 g, Angular Rate = 0 °/sec unless otherwise noted; within one year of calibration.

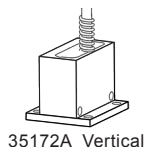
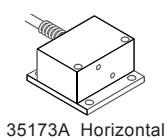
Parameter	Min	Typical	Max	Units	Conditions/Notes
Range & Sensivity at 25 °C ±1000 °/sec FSR ±300 °/sec FSR Drift T_{MIN} to T_{MAX}	5.6 11.2	6.3 12.5 0.1	6.9 13.8	mV/°/sec mV/°/sec % FSR	Must specify via Option Rnnn, see Ordering Info Precise values on cal certificate Precise values on cal certificate Percent of sensitivity at 25°C
Stationary Bias Level At 25°C Drift T_{MIN} to T_{MAX}		400* -3.25 / +3.00		mV °/sec	Precise values on calibration certificate
g Sensivity		0.2		°/sec/g	Affects offset
Nonlinearity		±1		% FSR	Best fit straight line
Frequency Response	0		140	Hz	Upper cutoff per Option Bnnn, -3 dB pt ±10% 5-pole Butterworth filter
Noise Density		0.018		°/sec/√Hz	10 Hz to 400 HZ
Self Test Pull-up Resistor	5			kΩ	Logic "1" ≥ 3.5 V, Logic "0" ≤ 1.5 V, "0" causes self test
Temperature Sensor			±0.2	°C	Accuracy ±1 °C
Scan Rate	0.0007		2500	scans/sec	Default scan list (G1,G2,G3,T1)
ADC Resolution Absolute accuracy		10 ±2		bits LSB	
Outputs Output Voltage Swing Capacitive Drive Capability	0.5		4.5	V pF	$I_{OUT} = \pm 0.5$ mA
Power Supply (V_S) Input Voltage Limits Input Voltage - Operating Input Current Rejection Ratio	-80 +8.5		+80 +36	V V mA dB	-80V continuous, >38V if ≤550 ms, duty <1% Continuous DC
Temperature Range (T_A)	-40		+85	°C	
Mass		38		grams	Precise values on calibration certificate
Shock Survival	-3000		+3000	g	Any axis for 0.5 ms, powered or unpowered

*Scale linearly with Range option Rnnn - see Ordering Information

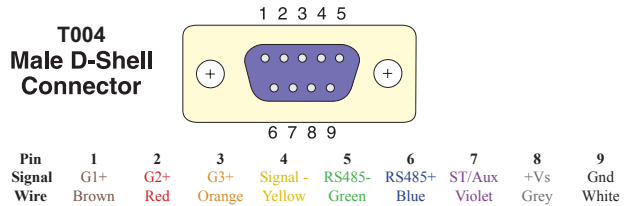
Mechanical



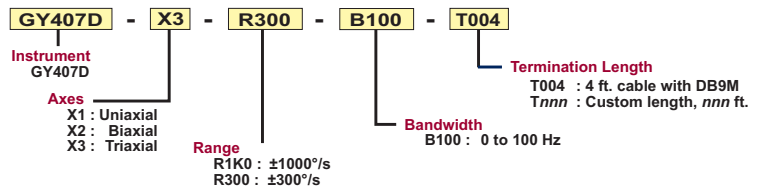
Mounting adapters (sold separately)



Connections



Ordering Information



Please note: PC Interface Kit is required for digital sensor use (sold separately).

GY407D Set up

Use the 35250AK0/AK1 interface kit (sold separately) to connect the GY407D to a computer with a serial port and supply power (USB adapters available if needed). Use an ASCII terminal emulator of your choice to interface with the sensor (Tera Term Pro is recommended).

GY407D Sample Commands

<i>Set commands</i>		<i>Query Commands</i>	
		*IDN?	device identification
ROUT:SCAN	set channels to be scanned	ROUT:SCAN?	channels being scanned
		READ?	show single scan
INP:FILT:FREQ	set cutoff frequency	INP:FILT:FREQ?	current cutoff filter setting
TRIG:SOUR:TIM	set time-based scan	TRIG:SOUR?	current trigger source
TRIG:COUNT	set maximum number of triggers	TRIG:COUNT?	current max number of triggers
INIT	begin scanning as configured	SYST:ERR?	current error status
OUT:FMT	format output	OUT:FMT?	current formatting
CONF:FNC <name>	configure function	CONF:FNC?	current function definitions

```

Tera Term - COM1 VT
File Edit Setup Control Window Help
out:fmt?
FLT,Units
read?
0.013g,-0.002g,-1.006g, 28.5°C
out:fmt hex
read?
0203,01FF,01c1,0272
out:fmt flt,units,cnt
read?
0004,-0.005g,-0.002g,-1.024g, 28.8°C
read?
0005,-0.023g, 0.016g,-1.024g, 28.5°C
out:fmt hex,cnt,crc
read?
0006,0201,01FF,01c1,0272,380c
read?
0007,0201,01FF,01c1,0272,F4dc
read?
0008,0201,0200,01c1,0274,969c
  
```

Display engineering units (FLT), HEX values; add a scan count or CRC to each scan

GY407D Functions

Configure GY407D's built-in functions to execute as needed. Each unique function is performed on the scan measurements, with results maintained internally within the sensor.

MIN – tracks the minimum reading on each channel since the function was configured

MAX – tracks the maximum reading on each channel since the function was configured

MAG – calculates the magnitude of the vector sum of axes G1, G2 and G3

PTP – tracks the peak-to-peak value for each channel since the function was configured. This is equal to MAX – MIN for each channel

TH1 – tracks channels readings against individual channel threshold values

TH2 – tracks MAG or TLT values against a threshold

OU1/OU2/OU3 – output functions that print the values of functions on a configurable periodic basis

When the GY407D threshold function is set, external controls can be triggered when the threshold is reached. Receive a warning, flip a switch, apply a brake - take action immediately when limits are exceeded.