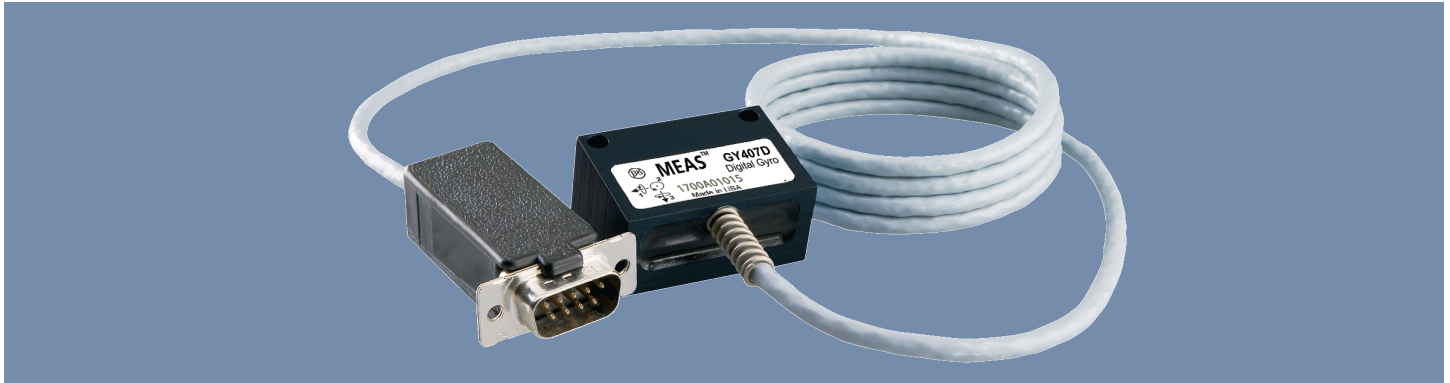


# Advanced Digital Rate Gyro

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  $-40^\circ$  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.

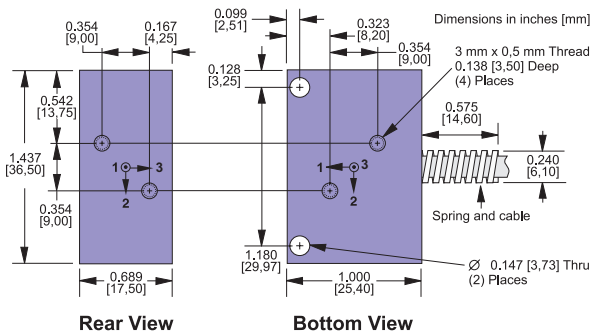
# Specifications for GY407D - improved specifications available upon request

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

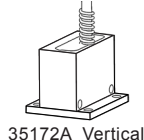
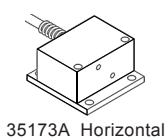
Parameter	Min	Typical	Max	Units	Conditions/Notes
Range & Sensivity at 25 °C ±1000 °/sec FSR ±300 °/sec FSR Drift $T_{MIN}$ to $T_{MAX}$	5.6 11.2	6.3 12.5 0.1	6.9 13.8	mV/°/sec mV/°/sec % FSR	Must specify via Option Rnnn, see Ordering Info Precise values on cal certificate Precise values on cal certificate 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	-80 V continuous, >38 V 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

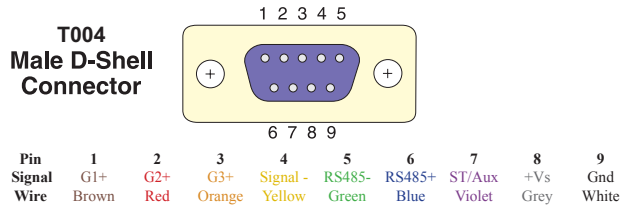
## Mechanical



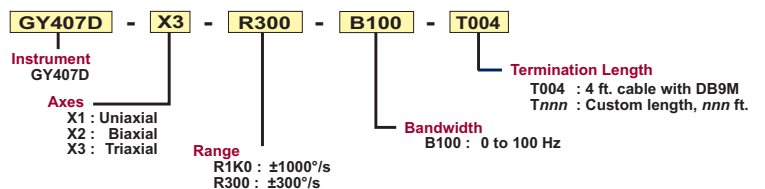
Mounting adapters (sold separately)



## Connections



## Ordering Information



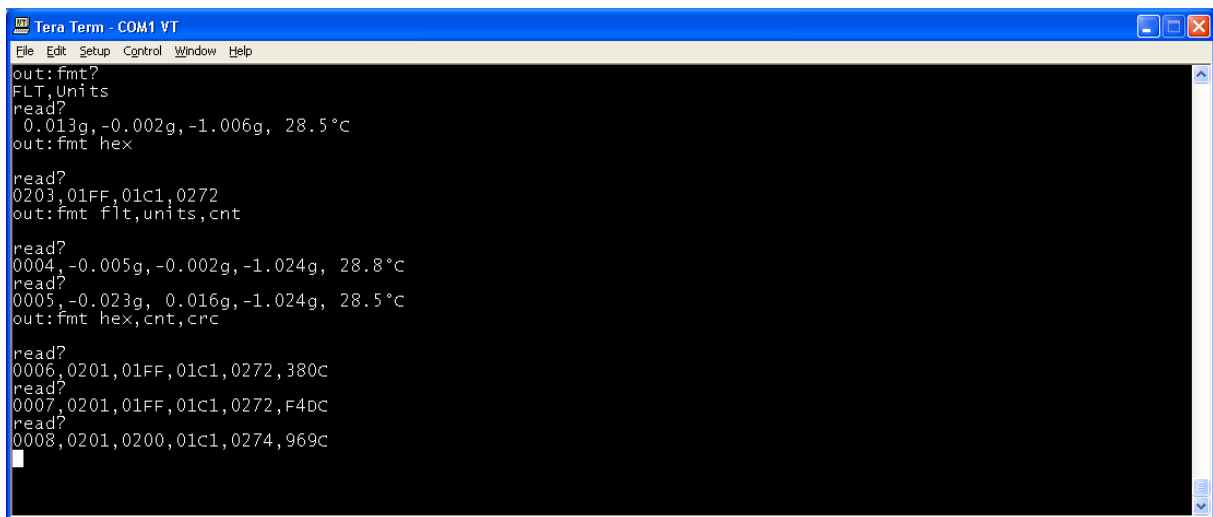
Please note: PC Interface Kit is required for digital sensor use (sold separately).

## 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
0203,01FF,01c1,0272
out:fmt flt,units,cnt
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
0006,0201,01FF,01c1,0272,380c
out:fmt hex,cnt,crc
0007,0201,01FF,01c1,0272,F4dc
out:fmt hex,cnt,crc
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.