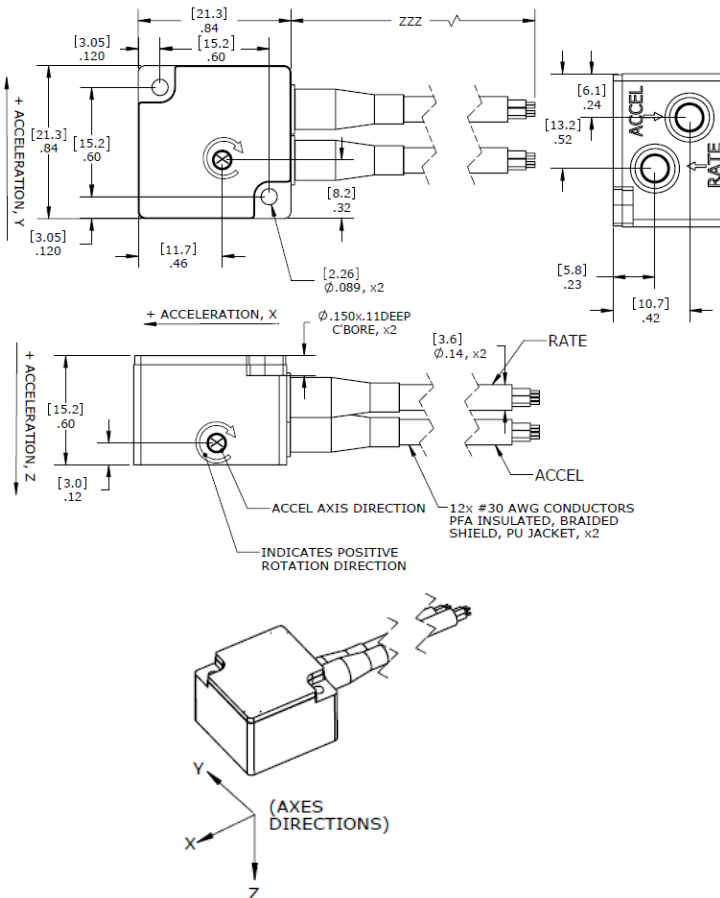


DIMENSIONS



MODEL 633

Six-Degree of Freedom Sensor

SPECIFICATIONS

- Silicon MEMS 6DOF Sensor
- ± 50 to $\pm 6000g$ Acceleration Range
- ± 500 to $\pm 24,000^\circ/\text{sec}$ Rate Range
- Miniature Compact Package
- Rugged Shock Resistant Housing

The Model 633 6-DOF Sensor is an analog sensor that includes outputs of three gyroscope/rate sensors and three DC accelerometers in one small package. The rate sensors and accelerometers are aligned orthogonally to each other which allow the user to measure motions in all 6 degrees of freedom (6-DOF). Designed specifically for product research and development in harsh environments, the Model 633 can maintain its precision under high shock condition.

FEATURES

- Low Noise Jacketed Cables
- Rugged Integral Strain Relief
- Reliable Silicon MEMS Sensors
- -40 to $+105^\circ\text{C}$ Temperature Range
- Shock Resistant Package
- Low Cross-Axis Sensitivity
- SAE J211 Compliant Performance

APPLICATIONS

- Auto Safety Crash Testing
- Dummy Instrumentation
- Pedestrian Impact
- Rollover Testing
- Motorsports
- Biomechanics Testing
- Shock & Impact Testing

MODEL 633

Six-Degree of Freedom Sensor

PERFORMANCE SPECIFICATIONS

All values are typical at +24°C and 10Vdc excitation unless otherwise stated. Measurement Specialties reserves the right to update and change these specifications without notice.

Parameters

DYNAMIC (RATE SENSORS)

| | -500 | -1K5 | -6K | -12K | -18K | -24K | Notes |
|----------------------------|--------|--------|--------|--------|--------|--------|-------------------|
| Dash Number | | | | | | | See Ordering Info |
| Range (deg/sec) | ±500 | ±1500 | ±6000 | ±12K | ±18K | ±24K | |
| Sensitivity (mV/deg/sec) | 4.00 | 1.33 | 0.333 | 0.167 | 0.111 | 0.083 | Not ratiometric |
| Frequency Response (Hz) | 0-1000 | 0-1000 | 0-1000 | 0-2000 | 0-2000 | 0-2000 | +1dB/-3dB |
| Non-Linearity (%FSO) | ±0.5 | ±0.5 | ±0.5 | ±0.5 | ±0.5 | ±0.5 | BFSL |
| Cross-Axis Sensitivity (%) | <1 | <1 | <1 | <1 | <1 | <1 | |
| Shock Limit (g) | 3000 | 3000 | 3000 | 5000 | 5000 | 5000 | |
| Residual Noise (mV RMS) | 3.66 | 1.20 | 3.30 | 1.22 | 1.50 | 1.20 | Passband |

DYNAMIC (ACCELERATION SENSORS)

| | -050 | -100 | -200 | -500 | -2K | -6K | Notes |
|----------------------------|--------|--------|--------|--------|--------|--------|--------------------------|
| Dash Number | | | | | | | See Ordering Info |
| Range (g) | ±50 | ±100 | ±200 | ±500 | ±2000 | ±6000 | |
| Sensitivity (mV/g) | 2.0 | 1.1 | 0.8 | 0.4 | 0.15 | 0.10 | Ratiometric ¹ |
| Frequency Response (Hz) | 0-1000 | 0-1200 | 0-1500 | 0-2000 | 0-3500 | 0-3500 | ±1/2dB |
| Natural Frequency (Hz) | 4000 | 6000 | 8000 | 10000 | 23000 | 26000 | |
| Non-Linearity (%FSO) | ±1.0 | ±1.0 | ±1.0 | ±1.0 | ±1.0 | ±1.0 | |
| Transverse Sensitivity (%) | <3 | <3 | <3 | <3 | <3 | <3 | |
| Shock Limit (g) | 5000 | 5000 | 5000 | 5000 | 10000 | 10000 | Typical |
| Damping Ratio | 0.5 | 0.5 | 0.5 | 0.3 | 0.05 | 0.05 | |

ELECTRICAL

| | | | | | | | |
|---|--------------------------------|--|--|--|--|--|--------------|
| Zero Acceleration Output (mV), Rate Sensors | ±100 | | | | | | Differential |
| Zero Acceleration Output (mV), Accel Sensors | ±25 | | | | | | |
| Excitation Voltage (Vdc), Rate Sensors | 5 to 16 | | | | | | |
| Excitation Voltage (Vdc), Accel Sensors | 2 to 10 | | | | | | |
| Excitation Current (mA), Rate Sensors | <8 | | | | | | |
| Influence of Linear Acceleration (deg/sec/g) | 0.1 | | | | | | |
| Common Mode Voltage (Vdc), Rate Sensors | 2.5 | | | | | | ±5% |
| Full Scale Output Voltage (Vpk), Rate Sensors | ±2 | | | | | | ±15% |
| Output Resistance (Ω), Rate Sensors | 400 | | | | | | |
| Input Resistance (Ω), Accel Sensors | 2400 to 6000 | | | | | | |
| Output Resistance (Ω), Accel Sensors | 2400 to 6000 | | | | | | |
| Insulation Resistance (MΩ) | >100 | | | | | | @100Vdc |
| Turn On Time (msec), Rate Sensors | <100 | | | | | | |
| Ground Isolation | Isolated from Mounting Surface | | | | | | |

ENVIRONMENTAL

| | | | | | | | |
|---|--------------------------|--|--|--|--|--|---------------|
| Thermal Zero Shift, Rate Sensors (%FSO) | ±2.5 | | | | | | -40 to +105°C |
| Thermal Sensitivity Shift, Rate Sensors (%) | ±2.0 | | | | | | -40 to +105°C |
| Thermal Zero Shift, Accel Sensors (mV/°C) | -0.11 ±0.11 | | | | | | -40 to +105°C |
| Thermal Sensitivity Shift, Accel Sensors (%/°C) | -0.25 ±0.25 | | | | | | -40 to +105°C |
| Operating Temperature (°C) | -40 to +105 | | | | | | |
| Humidity (Active Element & Electronics) | Hermetically Solder Seal | | | | | | |
| Humidity (Housing) | Epoxy Sealed, IP65 | | | | | | |

PHYSICAL

| | | | | | | | |
|-----------------------------|---|--|--|--|--|--|--|
| Case Material | Stainless Steel | | | | | | |
| Cable | 2x Cables; 12x #30AWG Cond PFA Insulated, Braided Shield, PU Jacket | | | | | | |
| Weight (cable not included) | 35 grams | | | | | | |
| Mounting | 2x #2.56 or M2 Mounting Screw | | | | | | |
| Mounting Torque | 4 lb-in (0.45 N-m) | | | | | | |

¹ Output is ratiometric to excitation voltage

Calibration supplied: CS-ARLIN NIST Traceable Linearity Calibration to FS Range
CS-FREQ-0100 NIST Traceable Amplitude Calibration to FR Limit

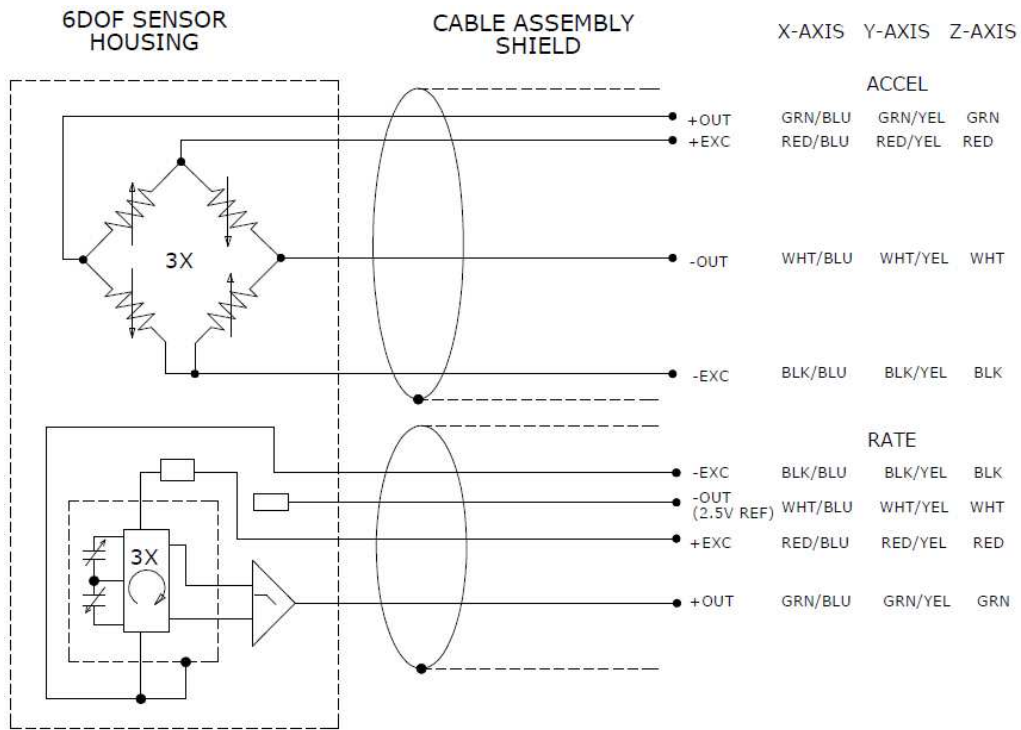
Supplied accessories: AC-D03548 2x #2-56 (3/4" length) Socket Head Cap Screw

Optional accessories: 121 3-Channel Precision Low Noise DC Amplifier
140 Auto-zero Inline Amplifier

MODEL 633

Six-Degree of Freedom Sensor

SCHEMATIC



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MODEL 633

Six-Degree of Freedom Sensor

ORDERING INFORMATION

PART NUMBERING Model Number+Accel Range+Rate Range+Cable Length

633-GGG-RRR-ZZZ-XX

| | | | _____ Special requirements, otherwise leave blank
| | | _____ Cable (120 is 120 inches)
| | _____ Rate Range (-500 for 500deg/sec, -12K for 12000deg/sec)
| _____ Accel Range (-050 for 50g, -2K for 2000g)

Example: 633-500-6K-120

Model 633, 500g, 6000deg/sec, 120" Cable

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