

MODEL 633 SIX-DEGREE OF FREEDOM SENSOR

SPECIFICATIONS

- Silicon MEMS Gyro, DC Response
- $\pm 500^\circ/\text{sec}$ to $\pm 24,000^\circ/\text{sec}$ Rate Ranges
- Silicon PR MEMS Accels, DC Response
- $\pm 50\text{g}$ to $\pm 6000\text{g}$ Acceleration Ranges
- SAE J211 & ISO 6487 Compliant
- NHTSA FMVSS 202a Compliant

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 testing in harsh environments, the Model 633 maintains its precision under high shock conditions. The sensor utilizes silicon MEMS Gyro sensing elements with custom electronics and packaging to produce an angular rate sensor that is highly reliable even under excessive shock and vibration environments. The piezo-resistive MEMS acceleration sensors feature a full bridge output configuration with ideal gas damping tailored for outstanding shock survivability and a flat frequency response to $>6\text{kHz}$

For a similar sensor with lower acceleration and angular rate ranges, TE Connectivity also offers the model 634 6-DOF Sensor.

FEATURES

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

APPLICATIONS

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

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PERFORMANCE SPECIFICATIONS

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

Parameters

DYNAMIC (ACCELERATION SENSORS)

	-050	-100	-200	-500	-2K	-6K	Notes
Dash Number	-050	-100	-200	-500	-2K	-6K	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	0-2500	0-5000	0-6000	±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	BFSL
Transverse Sensitivity (%)	<3	<3	<3	<3	<3	<3	<1% Typical
Shock Limit (g)	5000	5000	5000	5000	10000	10000	
Damping Ratio	0.5	0.5	0.5	0.3	0.15	0.05	Typical

DYNAMIC (RATE SENSORS)

	-500	-1K5	-6K	-12K	-18K	-24K	Notes
Dash Number	-500	-1K5	-6K	-12K	-18K	-24K	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	±15%
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)	10,000	10,000	10,000	10,000	10,000	10,000	
Residual Noise (mV RMS)	3.66	1.20	3.30	1.22	1.50	1.20	Passband

ELECTRICAL

Zero Acceleration Output (mV), Rate Sensors	±100						Differential
Zero Acceleration Output (mV), Accel Sensors	±25						
Excitation Voltage (Vdc), Rate Sensors	4.9 to 16.0						Per channel
Excitation Voltage (Vdc), Accel Sensors	2 to 10						Per channel
Excitation Current (mA), Rate Sensors	<8						Per channel
Influence of Linear Acceleration (deg/sec/g)	0.1						For rate sensors
Common Mode Voltage (Vdc), Rate Sensors	2.5						±5%
Full Scale Output Voltage (Vpk), Rate Sensors	±2						
Output Resistance (Ω), Rate Sensors	400						
Input Resistance (Ω), Accel Sensors	3000 to 5000						
Output Resistance (Ω), Accel Sensors	3000 to 5000						
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

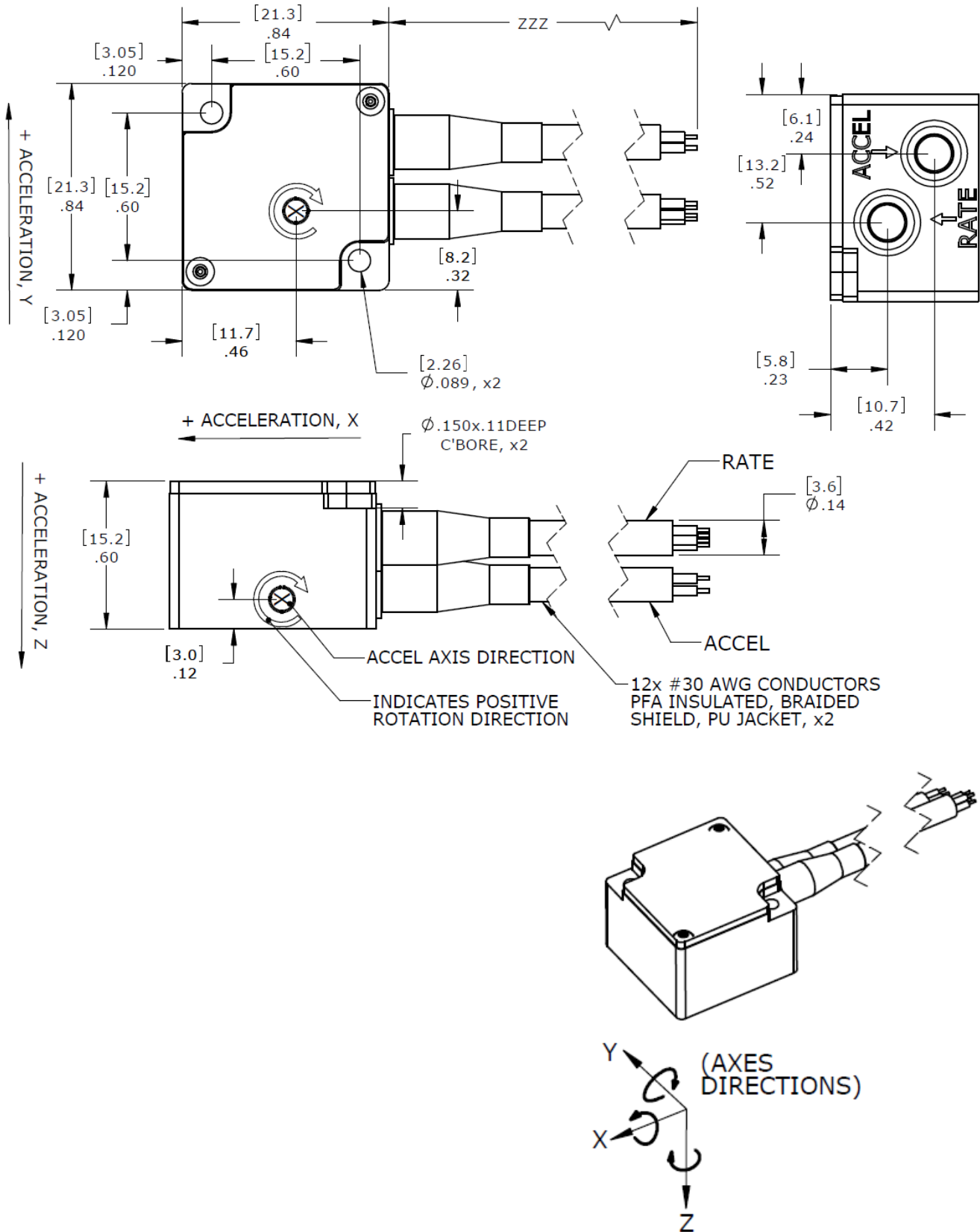
Calibration Supplied: CS-FREQ-0100 NIST Traceable Amplitude Calibration to FR Limit
CS-ARLIN NIST Traceable Linearity Calibration to FS Range

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

Optional Accessories: 121 3-Channel Precision Low Noise DC Amplifier

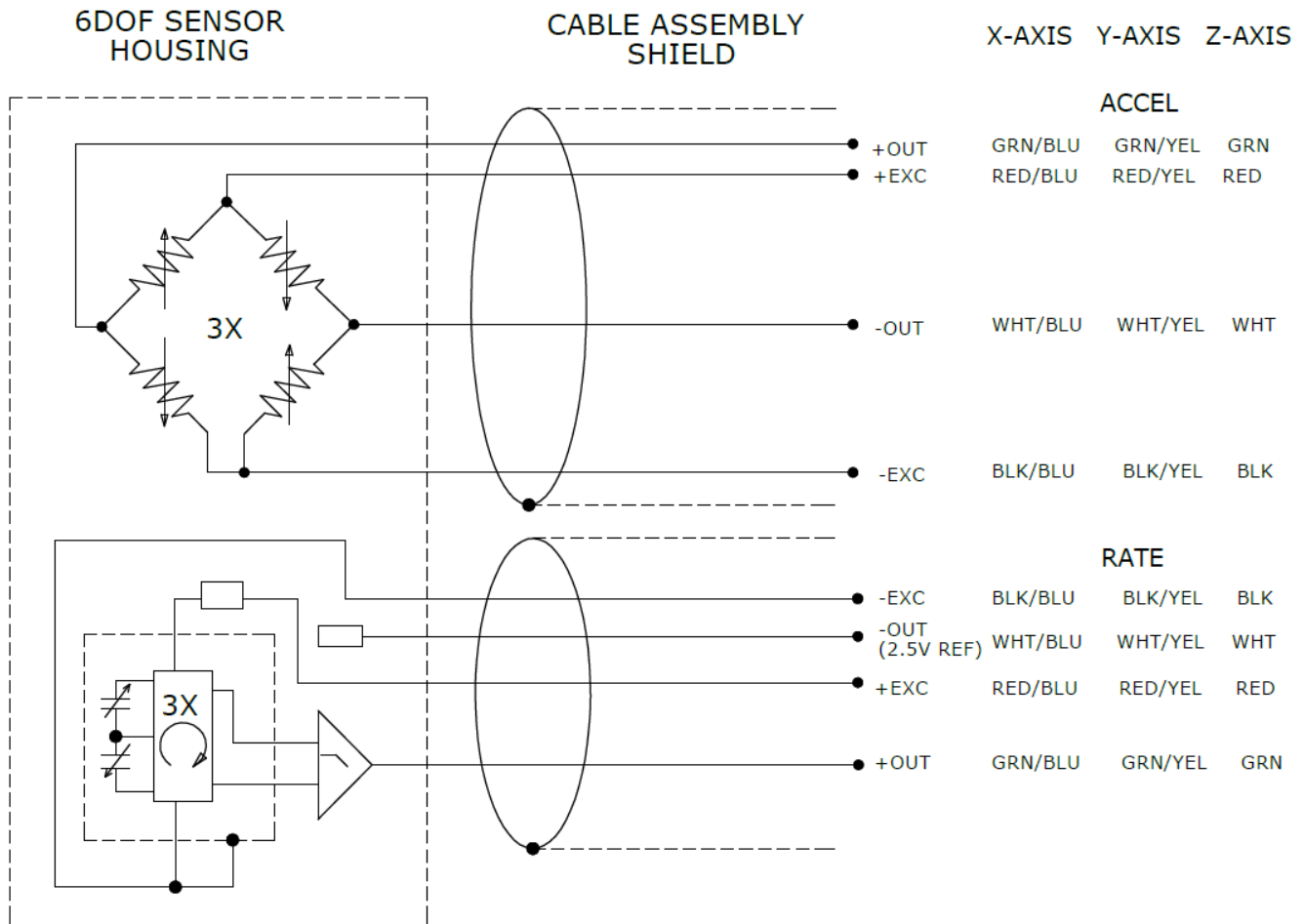
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DIMENSIONS



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SCHEMATIC



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ORDERING INFORMATION

633	G G G	R R R	Z Z Z	X X
Range (Accelerometer)				
050 = 50g				
100 = 100g				
200 = 200g				
500 = 500g				
2K = 2000g				
6K = 6000g				
Range (Rate Sensor)				
500 = 500deg/sec				
1K5 = 1500deg/sec				
6K = 6000deg/sec				
12K = 12,000deg/sec				
18K = 18,000deg/sec				
24K = 24,000deg/sec				
Cable Length				
120 = 120 inches, 10 feet				
240 = 240 inches, 20 feet				
360 = 360 inches, 30 feet				
600 = 600 inches, 50 feet				
197 = 197 inches, 5 meters				
276 = 276 inches, 7 meters				
Reserved for custom designs. Leave blank for standard options listed above.				

Example; 633-500-6K-120
Model 633, 500g accel range, 6000deg/sec rate range, 120inch (10ft) cable length

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