

## MODEL 609 & 610 ANGULAR RATE SENSORS

### SPECIFICATIONS

- Silicon MEMS Gyro, DC Response
- $\pm 500$  to  $\pm 24,000^\circ/\text{sec}$  Range
- Insensitive to Shock Events
- SAE J211 & ISO 6487 Compliant
- NHTSA FMVSS 202a Compliant

The Model 609 and 610 Angular Rate Sensors are small analog MEMS gyroscope designed specifically for automotive safety testing and other system designs requiring accurate measurement of angular velocity. The Model 609 and 610 series utilizes silicon MEMS sensing elements with custom electronics and packaging to produce an angular rate sensor that is highly reliable even under excessive shock and vibration environments. A wide selection of ranges is available for your specific applications along with a triaxial mounting block designed for mounting of both the model 609/610 angular rate sensors and the model 64X accelerometers.

For a triaxial version, TE Connectivity also offers the model 603 angular rate sensor.

### FEATURES

- 5Vdc Fixed Excitation Voltage, Model 609
- 5 to 16Vdc Excitation Voltage, Model 610
- Small, Lightweight Package
- $-40^\circ\text{C}$  to  $+105^\circ\text{C}$  Temperature Range
- 10,000g Shock Resistant Design
- Low Cross-Axis Sensitivity

### APPLICATIONS

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



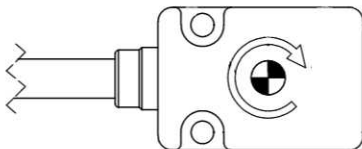
The Model 609 and 610 Angular Rate Sensors are identical in size, weight and form factor except for the location of the mounting holes.

The model 610 is designed with the two mounting holes located in opposite corners in order to best secure the sensor during testing. The opposite spacing of the mounting screws distributes the load evenly across the housing.

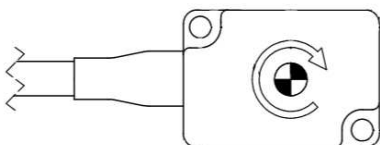
The model 609 has the traditional legacy mounting screw locations at the front of the sensor housing. This sensor is designed to be a drop-in for existing installations that utilize legacy sensors. We only recommend using model 609 if a change to mounting screw locations can not be accommodated.

The TE AC-A05700 mounting block is designed to accept both the model 609 and 610 screw hole locations.

#### Model 609 Footprint



#### Model 610 Footprint



# MODEL 609 & 610 ANGULAR RATE SENSORS

## PERFORMANCE SPECIFICATIONS

All values are typical at +24°C and 5Vdc excitation unless otherwise stated. TE Connectivity reserves the right to update and change these specifications without notice.

### Parameters

#### DYNAMIC

|                            | -0500  | -1500  | -6000  | -8000  | -12K   | -18K   | -24K   | Notes             |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|-------------------|
| Dash Number                | -0500  | -1500  | -6000  | -8000  | -12K   | -18K   | -24K   | See Ordering Info |
| Range (deg/sec)            | ±500   | ±1500  | ±6000  | ±8000  | ±12K   | ±18K   | ±24K   |                   |
| Sensitivity (mV/deg/sec)   | 4.00   | 1.33   | 0.333  | 0.250  | 0.167  | 0.111  | 0.083  | ±15%              |
| Frequency Response (Hz)    | 0-1000 | 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   | ±0.5   | BFSL              |
| Cross-Axis Sensitivity (%) | <1     | <1     | <1     | <1     | <1     | <1     | <1     |                   |
| Shock Limit (g)            | 10K    | 10K    | 10K    | 10K    | 10K    | 10K    | 10K    |                   |
| Residual Noise (mV RMS)    | 3.66   | 1.20   | 3.30   | 2.40   | 1.22   | 1.50   | 1.80   | Passband          |

#### ELECTRICAL

|  |                                |  |  |  |  |  |  |              |
|--|--------------------------------|--|--|--|--|--|--|--------------|
| Zero Acceleration Output (mV)              | ±100                           |  |  |  |  |  |  | Differential |
| Excitation Voltage (Vdc)                   | 5.0, Model 609                 |  |  |  |  |  |  |              |
| Excitation Voltage (Vdc)                   | 4.9 to 16.0, Model 610         |  |  |  |  |  |  |              |
| Excitation Current (mA)                    | <8                             |  |  |  |  |  |  |              |
| Influence of Linear Acceleration (°/sec/g) | 0.1                            |  |  |  |  |  |  |              |
| Common Mode Voltage (Vdc)                  | 2.5                            |  |  |  |  |  |  | ±5%          |
| Full Scale Output Voltage (Vpk)            | ±2                             |  |  |  |  |  |  | ±15%         |
| Output Resistance (Ω)                      | <100, Model 609                |  |  |  |  |  |  |              |
| Output Resistance (Ω)                      | <400, Model 610                |  |  |  |  |  |  |              |
| Insulation Resistance (MΩ)                 | >100                           |  |  |  |  |  |  | @100Vdc      |
| Turn On Time (msec)                        | <100                           |  |  |  |  |  |  |              |
| Ground Isolation                           | Isolated from Mounting Surface |  |  |  |  |  |  |              |

#### ENVIRONMENTAL

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

#### PHYSICAL

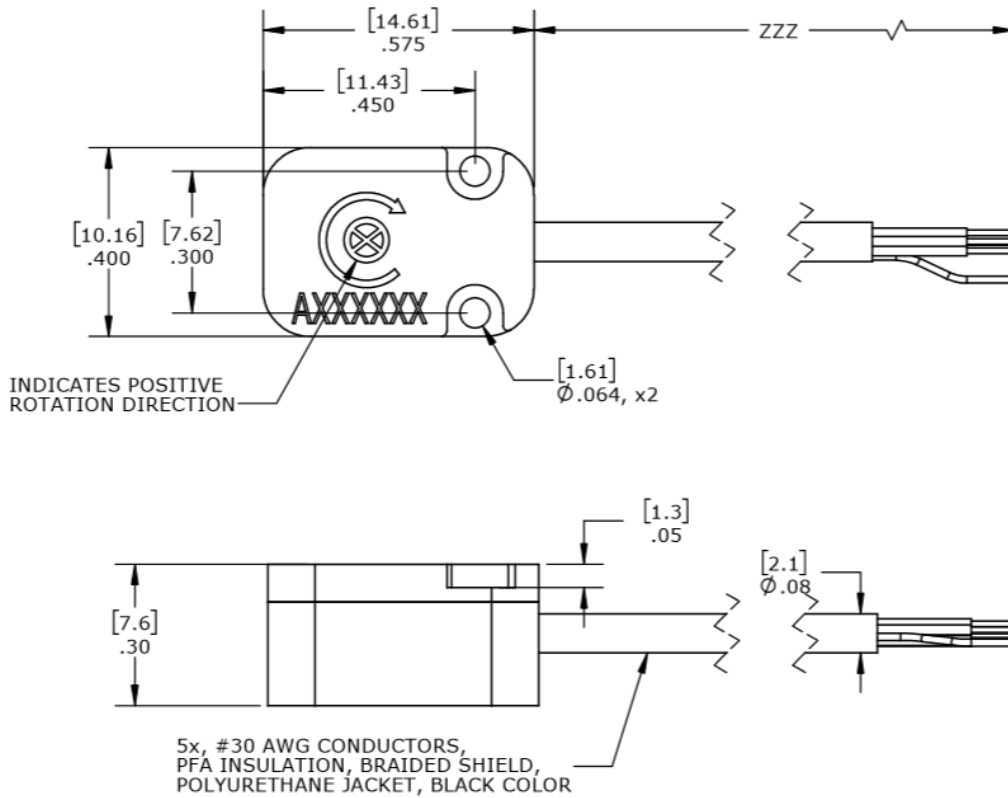
|                             |  |
|-----------------------------|--|
| Case Material               | Anodized Aluminum  |
| Cable                       | 5x, #30 AWG Conductors, PFA Insulated, Braided Shield, PU Jacket |
| Weight (cable not included) | 3 grams  |
| Mounting                    | 2x #0-80 or M1.4 Socket Head Cap Screws                          |
| Mounting Torque             | 4 lb-in (0.45 N-m)   |

|                              |                  |  |
|------------------------------|------------------|--|
| <b>Calibration supplied:</b> | CS-ARLIN         | NIST Traceable Linearity Calibration to FS Range   |
| <b>Supplied accessories:</b> | AC-A04531        | 2x #0-80 (3/8 length) Socket Head Cap Screw and Washer   |
| <b>Optional accessories:</b> | AC-A05700<br>121 | Mounting Block (3x 610 Rate Sensors & 3x 64X Accelerometers)<br>3-Channel Precision Low Noise DC Amplifier |

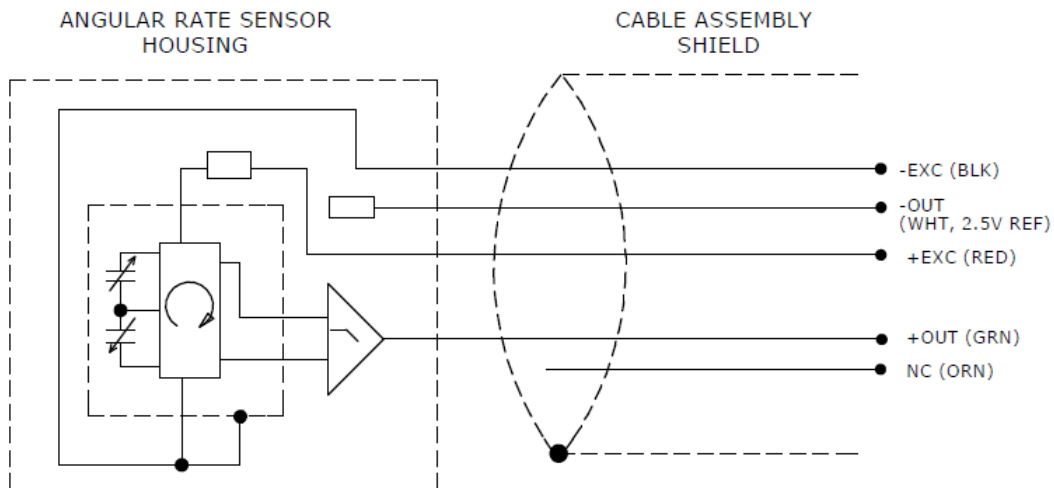
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# MODEL 609 & 610 ANGULAR RATE SENSORS

## DIMENSIONS, MODEL 609



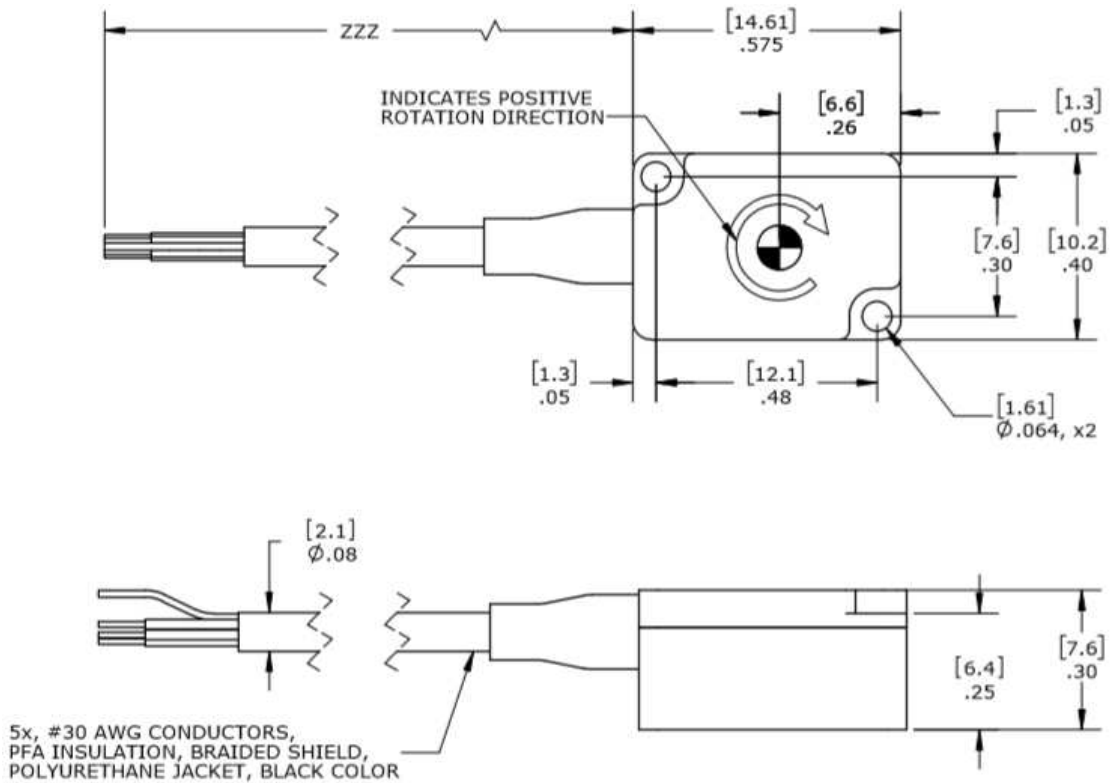
## SCHEMATIC, MODEL 609



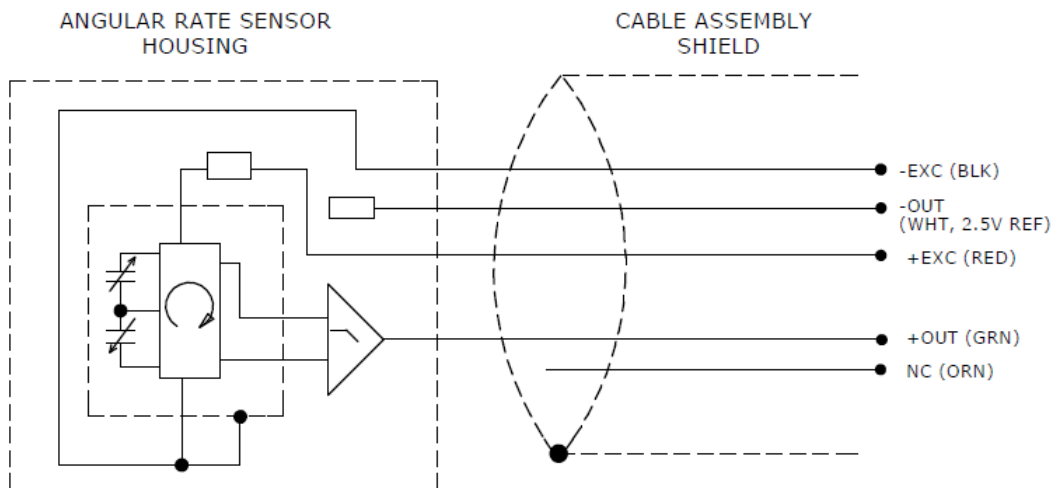
SHUNT CALIBRATION SUPPORTED FOR EITHER OUTPUT LEAD TO BLACK LEAD. UNIT BEHAVES LIKE 400Ω BRIDGE POWERED BY 5V EXCITATION.

# MODEL 609 & 610 ANGULAR RATE SENSORS

## DIMENSIONS, MODEL 610



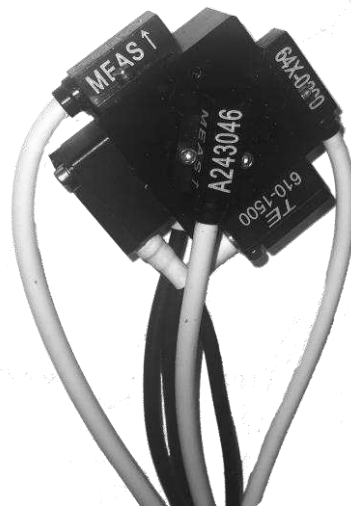
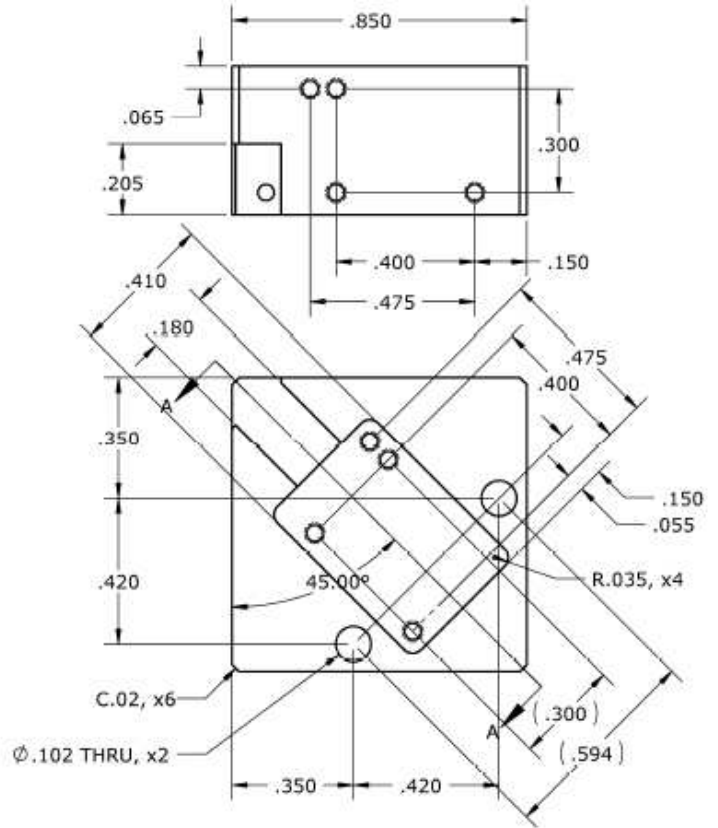
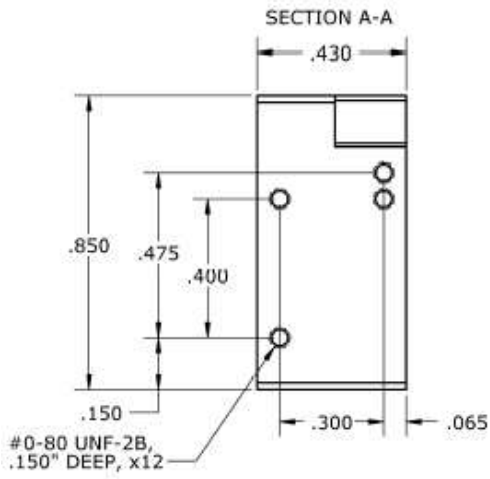
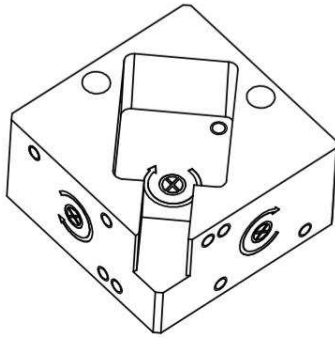
## SCHEMATIC, MODEL 610



SHUNT CALIBRATION SUPPORTED FOR EITHER OUTPUT LEAD TO BLACK LEAD. UNIT BEHAVES LIKE 400Ω BRIDGE POWERED BY 5V EXCITATION.

# MODEL 609 & 610 ANGULAR RATE SENSORS

## TRIAxIAL MOUNTING BLOCK (PN AC-A05700)



## ORDERING INFORMATION

|                           |             |            |           |
|---------------------------|-------------|------------|-----------|
| <b>609 or 610</b>         | <b>GGGG</b> | <b>ZZZ</b> | <b>XX</b> |
| <b>Range</b>              |             |            |           |
| 500=500deg/sec            |             |            |           |
| 1500=1500deg/sec          |             |            |           |
| 6000=6000deg/sec          |             |            |           |
| 8000=8000deg/sec          |             |            |           |
| 12K=12,000deg/sec         |             |            |           |
| 18K=18,000deg/sec         |             |            |           |
| 24K=24,000deg/sec         |             |            |           |
| <b>Cable length</b>       |             |            |           |
| 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  |             |            |           |
| 394=394 inches, 10 meters |             |            |           |

Example; 609-1500-360  
Model 609, 1500deg/sec range, 360inch (30ft) cable length

Example; 610-12K-276  
Model 610, 12,000deg/sec range, 276inch (7meter) cable length

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