



## A850-D MEMS

Tuff Tilt Series  $\pm 5\text{VDC}$  Output

The A850 MEMS Tuff Tilt series is available in uniaxial and biaxial configurations. This presents a robust and rugged design for industrial use, but with the benefit of low-cost MEMS technology.



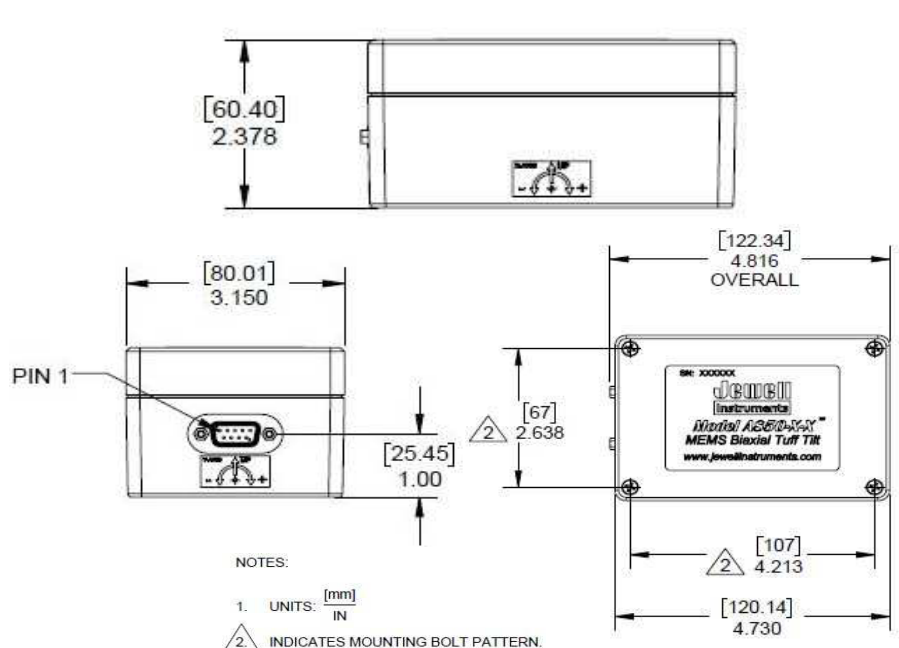
### FEATURES

- $\pm 14.5^\circ$ ,  $\pm 30^\circ$  and  $\pm 90^\circ$  ranges
- Robust and Rugged Enclosure
- Uniaxial and Biaxial Models Available
- Low-Cost MEMS Technology
- RoHS Compliant
- Dual Power Input
- Filtering Available
- $\pm 5\text{ VDC}$  Output
- Temperature Sensor Option Available
- IP65 Seal

### APPLICATIONS

- Platform Leveling/Positioning
- Structural Monitoring
- Construction Monitoring
- Industrial Machinery Positioning
- Radial Gate Measurement & Control

### OUTLINE DIAGRAM



### PIN OUT

| DUAL SUPPLY<br>9-PIN CONNECTOR |            |
|--------------------------------|------------|
| PIN                            | ASSIGNMENT |
| 1                              | +PWR       |
| 2                              | PWR RTN    |
| 3                              | -PWR       |
| 4                              | X OUT      |
| 5                              | Y OUT      |
| 6                              | N/C        |
| 7                              | SIG RTN    |
| 8                              | THRM +     |
| 9                              | THRM -     |



## PERFORMANCE SPECIFICATIONS

### STATIC/DYNAMIC

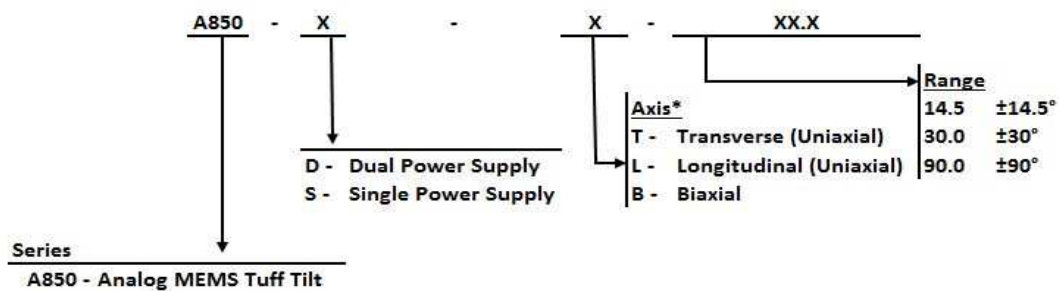
|   |  |             |             |
|---|--|-------------|-------------|
| Measurement Range <sup>1</sup> (°)          | $\pm 14.5$   | $\pm 30$    | $\pm 90$    |
| Output Voltage Range (VDC)                  | $\pm 5.00$   | $\pm 5.00$  | $\pm 5.00$  |
| Scale Factor Tolerance (%)                  | $\pm 1$  | $\pm 1$     | $\pm 1$     |
| Scale Factor Temp. Coefficient (PPM/°C max) | 150  | 150         | 150         |
| 0° Output (Volts max)                       | $\pm 0.03$   | $\pm 0.03$  | $\pm 0.03$  |
| 0° Output Temp. Sensitivity (V/°C max)      | $\pm 0.004$  | $\pm 0.004$ | $\pm 0.004$ |
| Transverse Axis Misalignment (° max)        | $\pm 0.5$  | $\pm 0.5$   | $\pm 0.5$   |
| Resolution (° max)                          | 0.002  | 0.002       | 0.004       |
| Threshold (° max)                           | 0.002  | 0.002       | 0.002       |
| Non-linearity (% FRO max)                   | 0.05   | 0.05        | 0.05        |
| Nonrepeatability, Hysteresis (% FRO max)    | 0.014  | 0.007       | 0.004       |
| Bandwidth (Hz nom) (-3 dB)                  | 5  | 5           | 5           |
| Warm Up Time (Seconds max)                  | 0.5  | 0.5         | 0.5         |
| Voltage to Radian conversion <sup>2</sup>   | ASIN(<voltage>/20)    ASIN(<voltage>/10)    ASIN(<voltage>/5)                  |             |             |
| Temperature Sensor                          | PTC Thermistor, Nominal resistance is 1kohm, +/-2%, dissipation constant 2mW/C |             |             |

### ELECTRICAL AND ENVIRONMENTAL

|                             |                            |
|-----------------------------|----------------------------|
| Number of Axes              | 1 or 2                     |
| Input Voltage Range (VDC)   | $\pm 12$ to $\pm 18$       |
| Input Current (mA max)      | $\pm 6$                    |
| Output Noise (vrms max)     | 0.005                      |
| Output Impedance (Ohms nom) | 1                          |
| Operating Temp. Range (°C)  | -40 to +85                 |
| Storage Temp. Range (°C)    | -40 to +95                 |
| Shock                       | 100 g, 0.011 sec, ½ sine   |
| Weight (grams)              | 165 (1 axis), 170 (2 axes) |
| Seal                        | IP65                       |

Notes: 1 - Custom ranges available on request. 2 - Does not take into account any sources of error.

## HOW TO ORDER



Example: A850-D-B-14.5 = A850 MEMS Tuff Tilt, Dual Power Supply, Biaxial,  $\pm 14.5^\circ$  range

\*Call factory for customized axis configurations

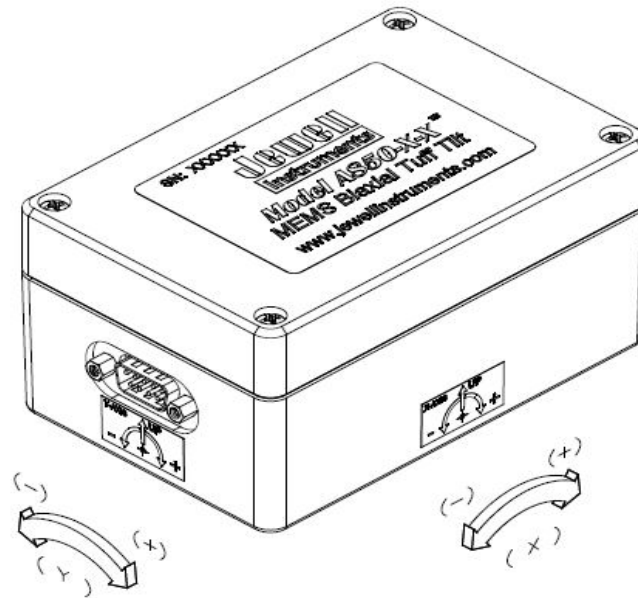
| Transverse Part Numbers |          |
|-------------------------|----------|
| A850-D-T-14.5           | 98850-07 |
| A850-D-T-30             | 98850-08 |
| A850-D-T-90             | 98850-09 |

| Longitudinal Part Numbers |          |
|---------------------------|----------|
| A850-D-L-14.5             | 98850-13 |
| A850-D-L-30               | 98850-14 |
| A850-D-L-90               | 98850-15 |

| Biaxial Part Numbers |          |
|----------------------|----------|
| A850-D-B-14.5        | 98850-01 |
| A850-D-B-30          | 98850-02 |
| A850-D-B-90          | 98850-03 |



■ **OUTLINE DIAGRAM:**



X = Longitudinal  
Y = Transverse

■ **Accessories**

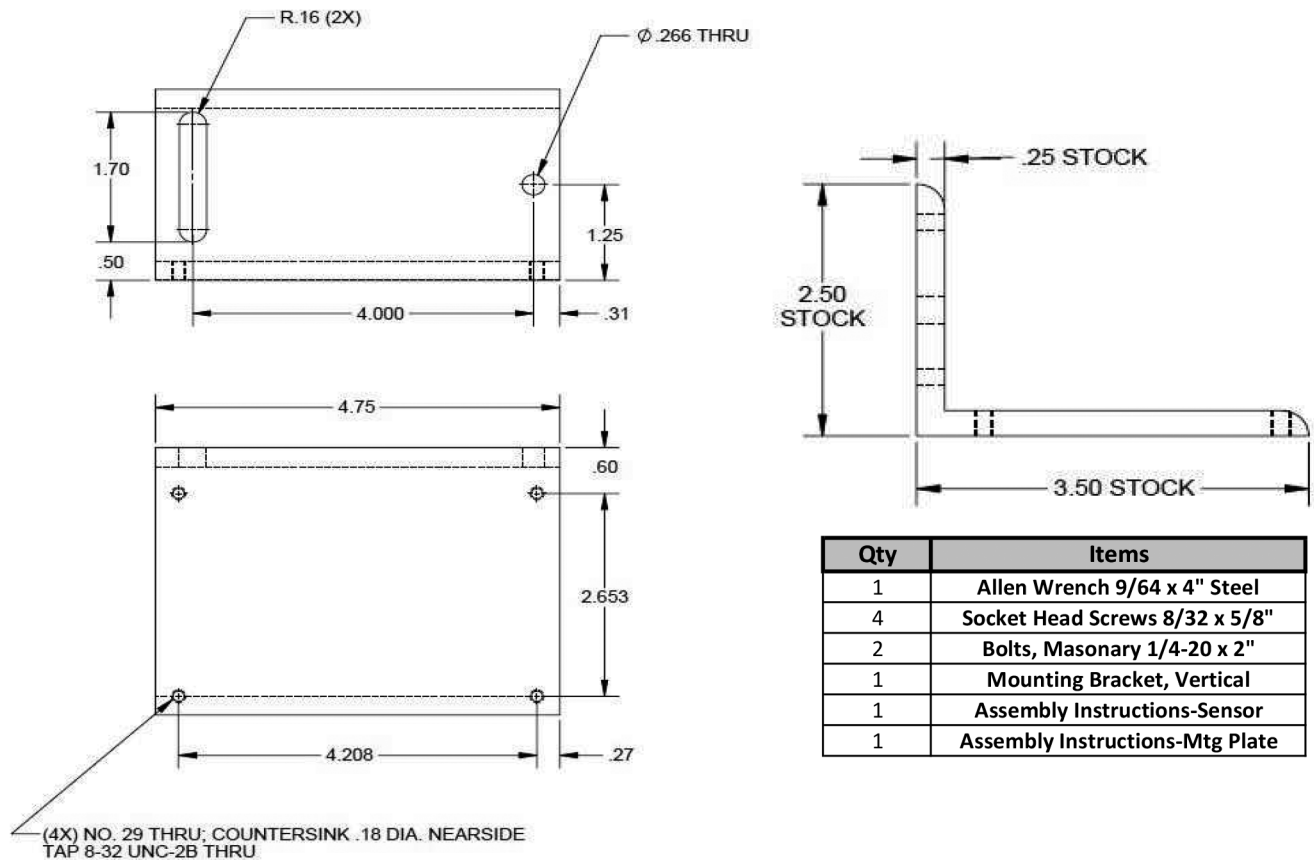
| Model     | Part Number | Description  |
|-----------|-------------|--|
| 84051     | 84051-01    | Horizontal Mounting Plate Kit w/Mounting Hardware (See plate dimesions)                        |
| 81439     | 81439-01    | Vertical Mounting Plate Kit w/Mounting Hardware (see plate dimensions)                         |
| 602-00013 | 602-00013   | Extra Mounting Kit (Includes Allen Wrench, four (4) Mounting Studs, and Circular Bubble Level) |
| 65050     | 65050       | Mating Female D-sub Connector, 9 Pin   |
| 65052     | 65052-01    | Connector Hood for a 9 Pin D-sub   |
| 70304     | 70304       | Power/signal 10-conductor Cable, 24 AWG, Polypropylene Jacket (Specify total length on order)  |

**Extra Mounting Kit, Tuff Tilt, Part Number 602-00013**

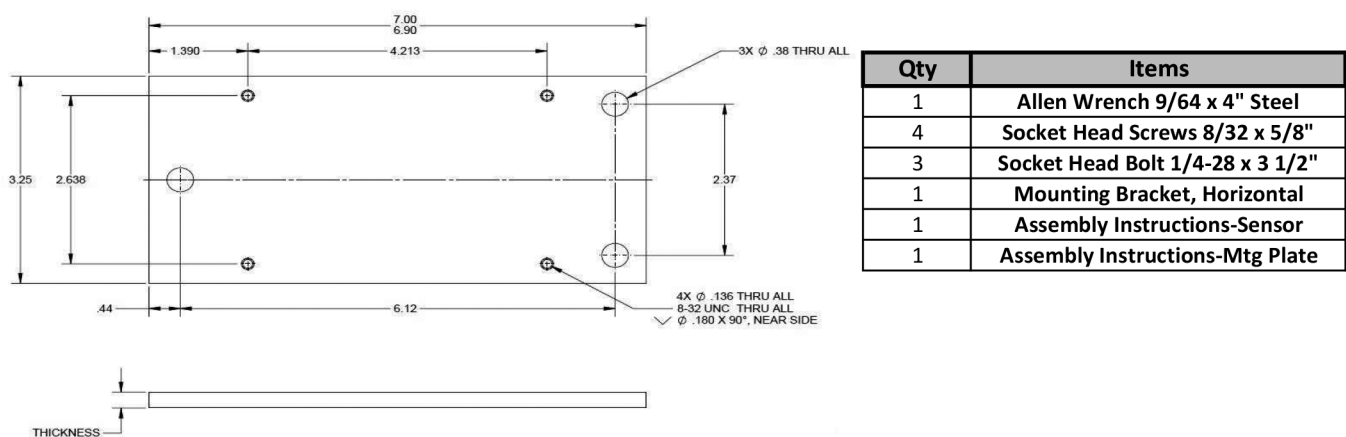
| Qty | Items                 | Item Description   |
|-----|-----------------------|--|
| 1   | Allen Wrench          | 9/64" x 4", Alloy steel                                      |
| 1   | Circular Bubble Level | Acrylic Circular Bubble Level                                |
| 4   | Stud Mounting Assys   | 2-Hex Nuts, 3-Flat Washers, 1-Socket Head Screw, & 1-Locknut |
| 1   | Assembly Instructions | Assembly Mounting Instructions                               |



**RIGHT ANGLE MOUNTING BRACKET DIAGRAM - MODEL: 81439, PART NUMBER: 81439-01**



**HORIZONTAL MOUNTING PLATE DIAGRAM - MODEL: 84051, PART NUMBER 84051-01**





## A850-S MEMS

Tuff Tilt Series 0-5VDC Output

The A850 MEMS Tuff Tilt series is available in uniaxial and biaxial configurations. This presents a robust and rugged design for industrial use, but with the benefit of low-cost MEMS technology.



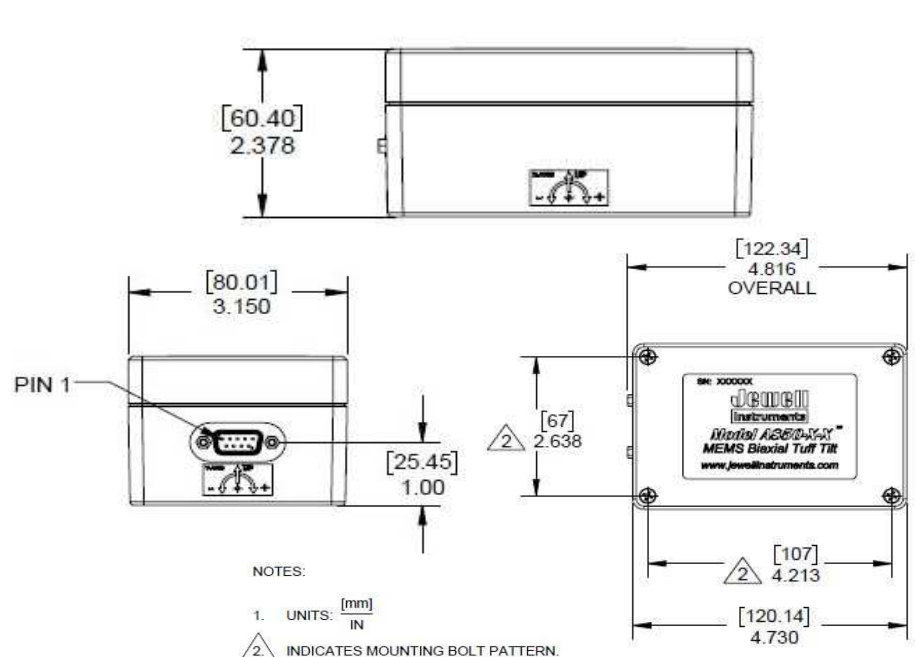
### FEATURES

- $\pm 14.5^\circ$ ,  $\pm 30^\circ$  and  $\pm 90^\circ$  ranges
- Robust and Rugged Enclosure
- Uniaxial and Biaxial Models Available
- Low-Cost MEMS Technology
- RoHS Compliant
- Filtering Available
- Single Power Input
- 0-5 VDC Output
- Temperature Sensor Option Available
- IP65 Seal

### APPLICATIONS

- Platform Leveling/Positioning
- Structural Monitoring
- Construction Monitoring
- Industrial Machinery Positioning
- Radial Gate Measurement & Control

### OUTLINE DIAGRAM



### PIN OUT

| SINGLE SUPPLY<br>9-PIN CONNECTOR |            |
|----------------------------------|------------|
| PIN                              | ASSIGNMENT |
| 1                                | +PWR       |
| 2                                | PWR RTN    |
| 3                                | N/C        |
| 4                                | X OUT      |
| 5                                | Y OUT      |
| 6                                | N/C        |
| 7                                | SIG RTN    |
| 8                                | THRM +     |
| 9                                | THRM -     |



## PERFORMANCE SPECIFICATIONS

### STATIC/DYNAMIC

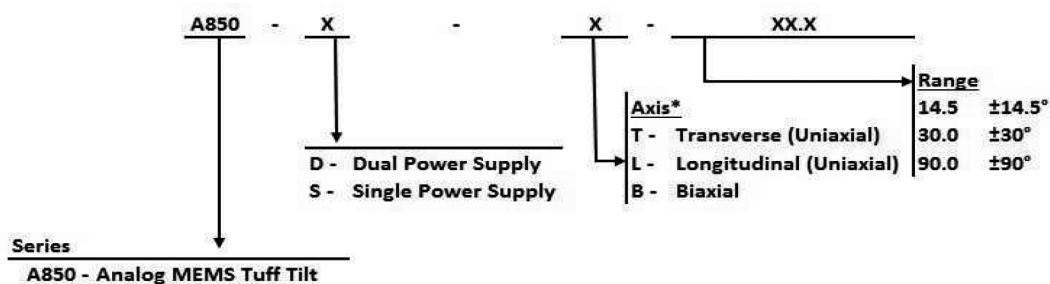
|   |  |        |        |
|---|--|--------|--------|
| Measurement Range <sup>1</sup> (°)          | ±14.5  | ±30    | ±90    |
| Output Voltage Range (VDC)                  | 0-5  | 0-5    | 0-5    |
| Scale Factor Tolerance (%)                  | ±1   | ±1     | ±1     |
| Scale Factor Temp. Coefficient (PPM/°C max) | 150  | 150    | 150    |
| 0° Output (Volts max)                       | ±0.03  | ±0.03  | ±0.03  |
| 0° Output Temp. Sensitivity (V/°C max)      | ±0.004   | ±0.004 | ±0.004 |
| Transverse Axis Misalignment (° max)        | ±0.5   | ±0.5   | ±0.5   |
| Resolution (° max)                          | 0.002  | 0.002  | 0.004  |
| Threshold (° max)                           | 0.002  | 0.002  | 0.002  |
| Non-linearity (% FRO max)                   | 0.05   | 0.05   | 0.05   |
| Nonrepeatability, Hysteresis (% FRO max)    | 0.014  | 0.007  | 0.004  |
| Bandwidth (Hz nom) (-3 dB)                  | 5  | 5      | 5      |
| Warm Up Time (Seconds max)                  | 0.5  | 0.5    | 0.5    |
| Voltage to Radian conversion <sup>2</sup>   | $\text{ASIN}((\text{voltage} - 2.5)/10)$ $\text{ASIN}((\text{voltage} - 2.5)/5)$ $\text{ASIN}((\text{voltage} - 2.5)/2.5)$ |        |        |
| Temperature Sensor                          | PTC Thermistor, Nominal resistance is 1kohm, +/-2%, dissipation constant 2mW/C   |        |        |

### ELECTRICAL AND ENVIRONMENTAL

|                             |                            |
|-----------------------------|----------------------------|
| Number of Axes              | 1 or 2                     |
| Input Voltage Range (VDC)   | 12 to 30                   |
| Input Current (mA max)      | 7                          |
| Output Noise (vrms max)     | 0.005                      |
| Output Impedance (Ohms nom) | 1                          |
| Operating Temp. Range (°C)  | -40 to +85                 |
| Storage Temp. Range (°C)    | -40 to +95                 |
| Shock                       | 100 g, 0.011 sec, ½ sine   |
| Weight (grams)              | 165 (1 axis), 170 (2 axes) |
| Seal                        | IP65                       |

Notes: 1 - Custom ranges available on request.

## HOW TO ORDER



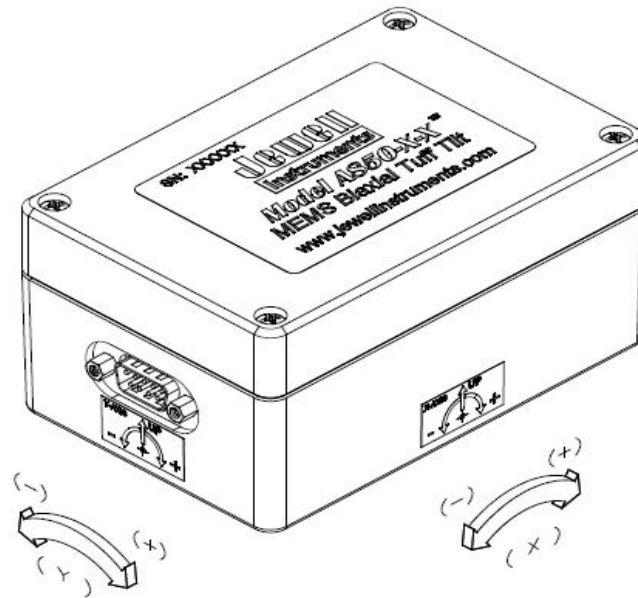
Example: A850-S-B-14.5 = A850 MEMS Tuff Tilt, Single Power Supply, Biaxial, ±14.5° range

\*Call factory for customized axis configurations

| Transverse Part Numbers |          | Longitudinal Part Numbers |          | Biaxial Part Numbers |          |
|-------------------------|----------|---------------------------|----------|----------------------|----------|
| A850-S-T-14.5           | 98850-10 | A850-S-L-14.5             | 98850-16 | A850-S-B-14.5        | 98850-04 |
| A850-S-T-30             | 98850-11 | A850-S-L-30               | 98850-17 | A850-S-B-30          | 98850-05 |
| A850-S-T-90             | 98850-12 | A850-S-L-90               | 98850-18 | A850-S-B-90          | 98850-06 |



■ **OUTLINE DIAGRAM:**



X = Longitudinal  
Y = Transverse

■ **Accessories**

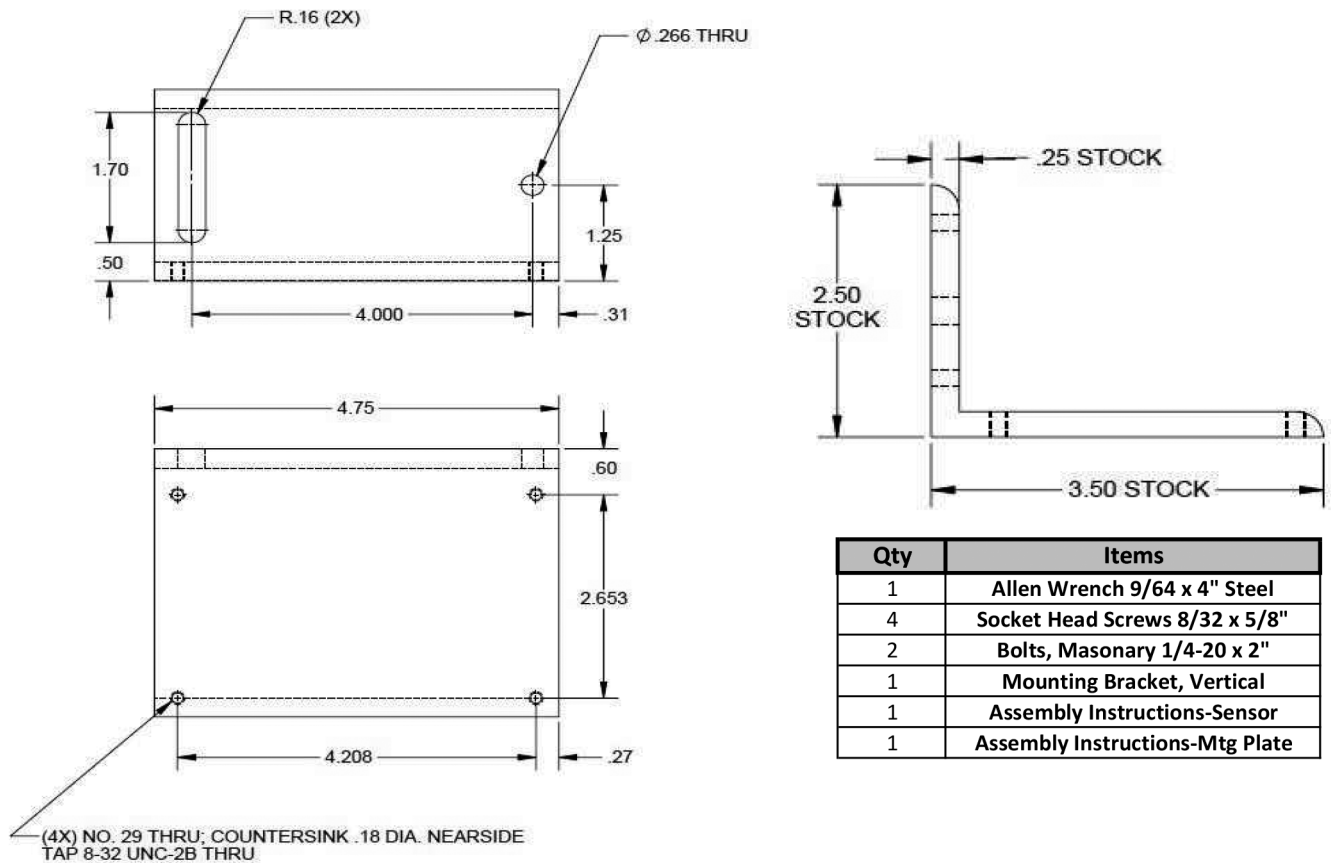
| Model     | Part Number | Description  |
|-----------|-------------|--|
| 84051     | 84051-01    | Horizontal Mounting Plate Kit w/Mounting Hardware (See plate dimesions)                        |
| 81439     | 81439-01    | Vertical Mounting Plate Kit w/Mounting Hardware (see plate dimensions)                         |
| 602-00013 | 602-00013   | Extra Mounting Kit (Includes Allen Wrench, four (4) Mounting Studs, and Circular Bubble Level) |
| 65050     | 65050       | Mating Female D-sub Connector, 9 Pin   |
| 65052     | 65052-01    | Connector Hood for a 9 Pin D-sub   |
| 70304     | 70304       | Power/signal 10-conductor Cable, 24 AWG, Polypropylene Jacket (Specify total length on order)  |

**Extra Mounting Kit, Tuff Tilt, Part Number 602-00013**

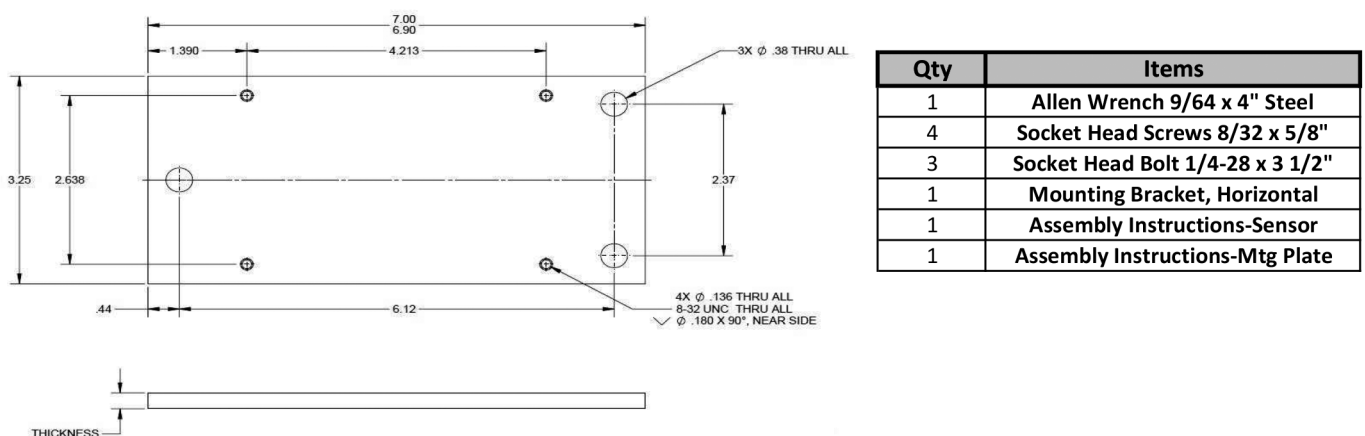
| Qty | Items                 | Item Description   |
|-----|-----------------------|--|
| 1   | Allen Wrench          | 9/64" x 4", Alloy steel                                      |
| 1   | Circular Bubble Level | Acrylic Circular Bubble Level                                |
| 4   | Stud Mounting Assys   | 2-Hex Nuts, 3-Flat Washers, 1-Socket Head Screw, & 1-Locknut |
| 1   | Assembly Instructions | Assembly Mounting Instructions                               |



■ RIGHT ANGLE MOUNTING BRACKET DIAGRAM - MODEL: 81439, PART NUMBER: 81439-01



■ HORIZONTAL MOUNTING PLATE DIAGRAM - MODEL: 84051, PART NUMBER 84051-01





## C850 MEMS

Tuff Tilt Series 4-20mA Output

The C850 MEMS Tuff Tilt series is available in uniaxial and biaxial configurations. This presents a robust and rugged design for industrial use, but with the benefit of low-cost MEMS technology.



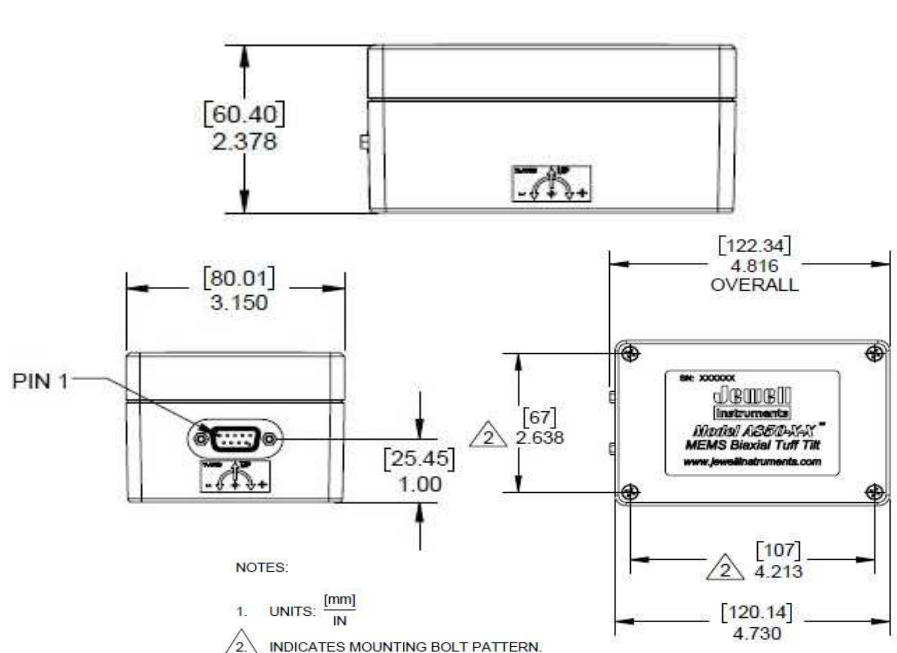
### FEATURES

- $\pm 14.5^\circ$ ,  $\pm 30^\circ$  and  $\pm 90^\circ$  ranges
- Robust and Rugged Enclosure
- Uniaxial and Biaxial Models Available
- Low-Cost MEMS Technology
- RoHS Compliant
- Filtering Available
- Single Power Input
- 4-20mA Output
- Temperature Sensor Option Available
- IP65 Seal

### APPLICATIONS

- Platform Leveling/Positioning
- Structural Monitoring
- Construction Monitoring
- Industrial Machinery Positioning
- Radial Gate Measurement & Control

### OUTLINE DIAGRAM



### PIN OUT

| SINGLE SUPPLY/<br>4-20mA OUTPUT<br>9-PIN CONNECTOR |            |
|--|------------|
| PIN  | ASSIGNMENT |
| 1  | +PWR       |
| 2  | PWR RTN    |
| 3  | N/C        |
| 4  | X OUT      |
| 5  | Y OUT      |
| 6  | N/C        |
| 7  | SIG RTN    |
| 8  | THRM +     |
| 9  | THRM -     |



## PERFORMANCE SPECIFICATIONS

### STATIC/DYNAMIC

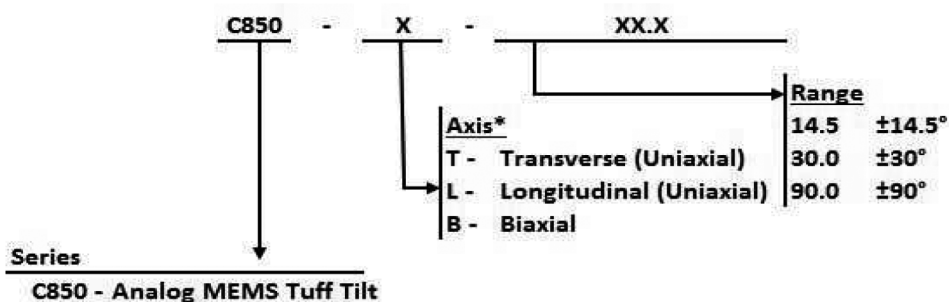
|   |   |         |         |
|---|---|---------|---------|
| Measurement Range <sup>1</sup> (°)          | ±14.5   | ±30     | ±90     |
| Output Current Range (mA)                   | 4-20  | 4-20    | 4-20    |
| Scale Factor Tolerance (%)                  | ±1  | ±1      | ±1      |
| Scale Factor Temp. Coefficient (PPM/°C max) | 150   | 150     | 150     |
| 0° Output (mA)                              | 12 ±0.3   | 12 ±0.3 | 12 ±0.3 |
| 0° Output Temp. Sensitivity (mA/°C max)     | ±0.004  | ±0.004  | ±0.004  |
| Transverse Axis Misalignment (° max)        | ±0.5  | ±0.5    | ±0.5    |
| Resolution (° max)                          | 0.002   | 0.002   | 0.004   |
| Threshold (° max)                           | 0.002   | 0.002   | 0.002   |
| Non-linearity (% FRO max)                   | 0.05  | 0.05    | 0.05    |
| Nonrepeatability, Hysteresis (% FRO max)    | 0.004   | 0.004   | 0.004   |
| Bandwidth (Hz nom) (-3 dB)                  | 5   | 5       | 5       |
| Warm Up Time (Seconds max)                  | 0.5   | 0.5     | 0.5     |
| Current to Radian conversion <sup>2</sup>   | $\arcsin((\text{<output>} - 12\text{mA}) / 32\text{mA})$ $\arcsin((\text{<output>} - 12\text{mA}) / 16\text{mA})$ $\arcsin((\text{<output>} - 12\text{mA}) / 8\text{mA})$ |         |         |
| Temperature Sensor                          | PTC Thermistor, Nominal resistance is 1kohm, +/-2%, dissipation constant 2mW/C  |         |         |

### ELECTRICAL AND ENVIRONMENTAL

|                             |                            |
|-----------------------------|----------------------------|
| Number of Axes              | 1 or 2                     |
| Input Voltage Range (VDC)   | 12 to 30                   |
| Input Current (mA max)      | 28                         |
| Output Noise (vrms max)     | 0.01                       |
| Output Impedance (Ohms nom) | 1                          |
| Operating Temp. Range (°C)  | -40 to +85                 |
| Storage Temp. Range (°C)    | -40 to +95                 |
| Shock                       | 100 g, 0.011 sec, ½ sine   |
| Weight (grams)              | 165 (1 axis), 170 (2 axes) |
| Seal                        | IP65                       |

Notes: 1 - Custom ranges available on request. 2 - Does not take into account any sources of error.

## HOW TO ORDER



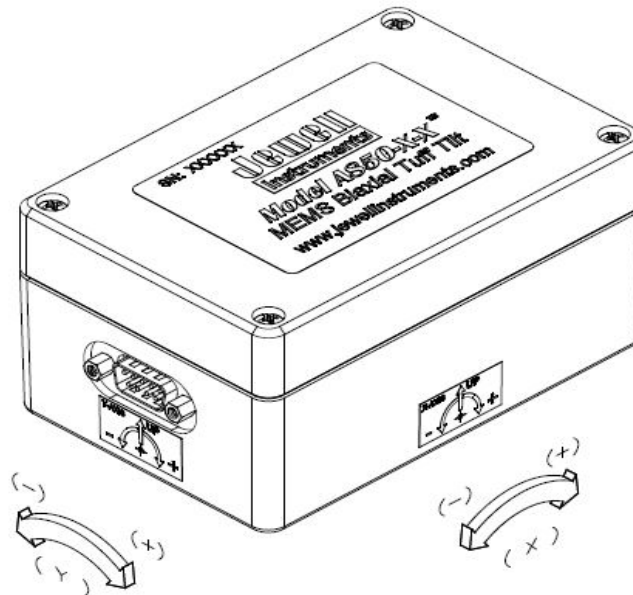
**Example: C850-B-14.5 = C850 MEMS Tuff Tilt, Biaxial, ±14.5° range**

**\*Call factory for customized axis configurations**

| Transverse Part Numbers |          | Longitudinal Part Numbers |          | Biaxial Part Numbers |          |
|-------------------------|----------|---------------------------|----------|----------------------|----------|
| C850-T-14.5             | 98850-23 | C850-L-14.5               | 98850-26 | C850-B-14.5          | 98850-20 |
| C850-T-30               | 98850-24 | C850-L-30                 | 98850-27 | C850-B-30            | 98850-21 |
| C850-T-90               | 98850-25 | C850-L-90                 | 98850-28 | C850-B-90            | 98850-22 |



■ **OUTLINE DIAGRAM:**



X = Longitudinal  
Y = Transverse

■ **Accessories**

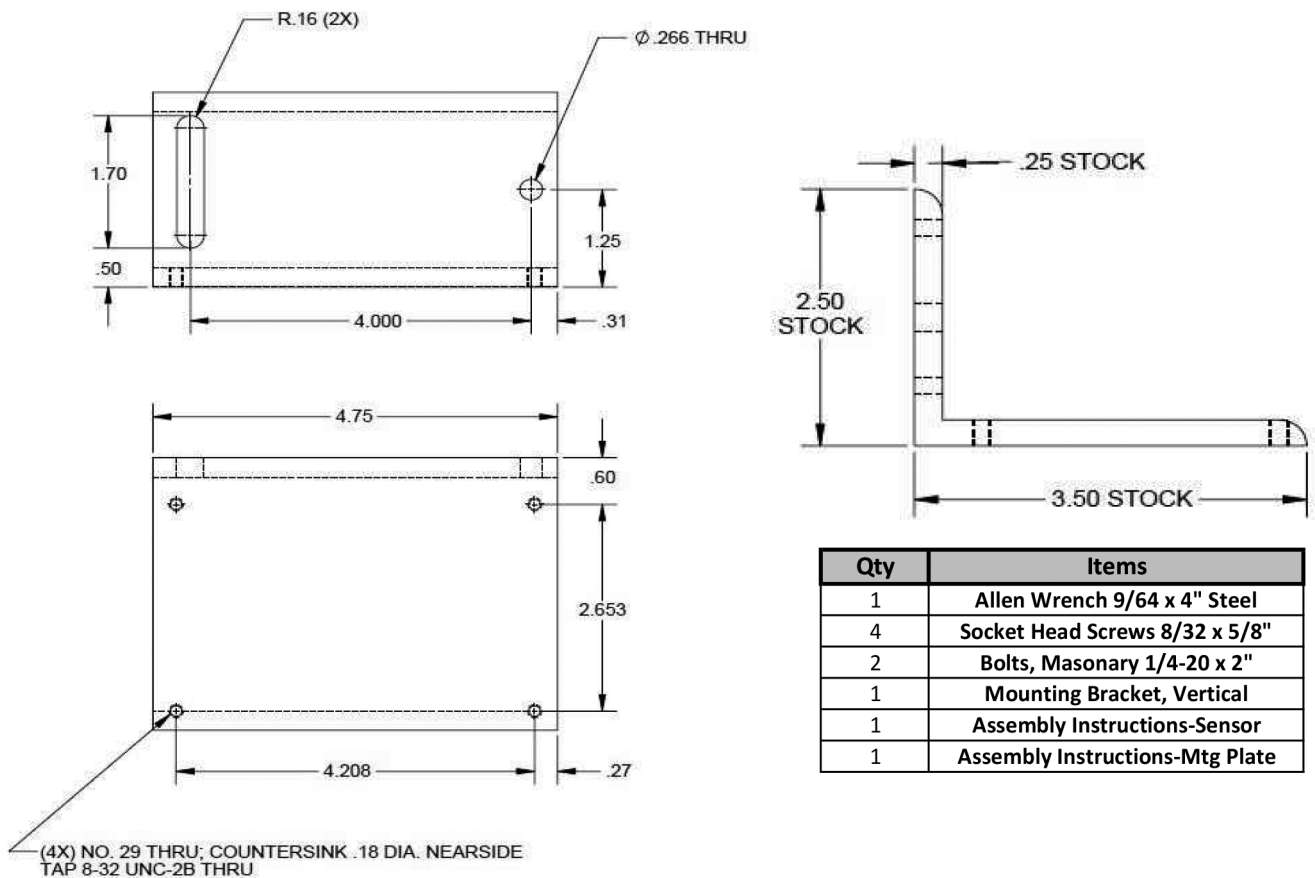
| Model     | Part Number | Description   |
|-----------|-------------|---|
| 84051     | 84051-01    | Horizontal Mounting Plate Kit w/Mounting Hardware<br>(See plate dimesions)                        |
| 81439     | 81439-01    | Vertical Mounting Plate Kit w/Mounting Hardware (see<br>plate dimensions)                         |
| 602-00013 | 602-00013   | Extra Mounting Kit (Includes Allen Wrench, four (4)<br>Mounting Studs, and Circular Bubble Level) |
| 65050     | 65050       | Mating Female D-sub Connector, 9 Pin  |
| 65052     | 65052-01    | Connector Hood for a 9 Pin D-sub  |
| 70304     | 70304       | Power/signal 10-conductor Cable, 24 AWG,<br>Polypropylene Jacket (Specify total length on order)  |

**Extra Mounting Kit, Tuff Tilt, Part Number 602-00013**

| Qty | Items                 | Item Description   |
|-----|-----------------------|--|
| 1   | Allen Wrench          | 9/64" x 4", Alloy steel                                      |
| 1   | Circular Bubble Level | Acrylic Circular Bubble Level                                |
| 4   | Stud Mounting Assys   | 2-Hex Nuts, 3-Flat Washers, 1-Socket Head Screw, & 1-Locknut |
| 1   | Assembly Instructions | Assembly Mounting Instructions                               |



**RIGHT ANGLE MOUNTING BRACKET DIAGRAM - MODEL: 81439, PART NUMBER: 81439-01**



**HORIZONTAL MOUNTING PLATE DIAGRAM - MODEL: 84051, PART NUMBER 84051-01**

