

# SGJ

## SAE J1939 CANBus Output Signal

Compact Mid-Range String Pot • Absolute Position

80, 120-inch Stroke Range Options

Polycarbonate Enclosure • IP67

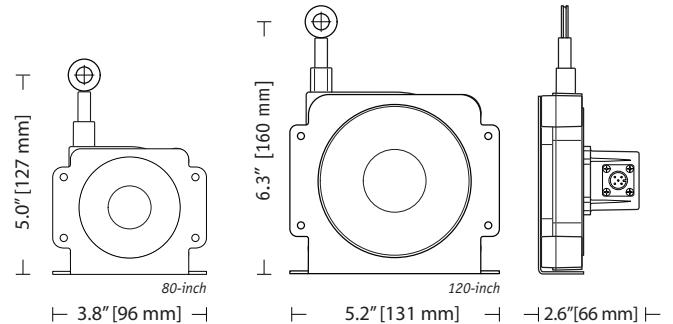
In Stock for Quick Delivery

### GENERAL

|  |   |
|--|---|
| Stroke Range Options                     | 80 inches (2032 mm), 120 inches (3048 mm)   |
| Accuracy                                 | .5% FS.                                     |
| Repeatability                            | .05% FS.                                    |
| Resolution                               | 12-bit                                      |
| Input Voltage                            | 10-36 VDC                                   |
| Input Current                            | 100 mA, max.                                |
| Measuring Cable                          | .019-inch dia. nylon-coated stainless steel |
| Measuring Cable Tension, 80-inch         | 14 oz. (3.9 N) ±30%                         |
| Measuring Cable Tension, 120-inch        | 9 oz. (2.5 N) ±30%                          |
| Maximum Acceleration                     | 10 g  |
| Sensor                                   | plastic-hybrid precision potentiometer      |
| Cycle Life                               | ≥ 250,000                                   |
| Electrical Connection                    | M12 connector (mating plug included)        |
| Enclosure                                | glass-filled polycarbonate                  |
| Environmental                            | IP 67                                       |
| Operating Temperature                    | -40° to 185° F (-40° to 85° C)              |
| Weight, 80-inch (not including bracket)  | .6 lbs (272 g)                              |
| Weight, 120-inch (not including bracket) | 1 lb. (454 g)                               |

### CANbus SPECIFICATIONS

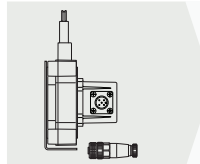
|                       |   |
|-----------------------|---|
| Communication Profile | CANbus SAE J1939                                  |
| Protocol              | Proprietary B                                     |
| Node ID               | Adjustable via dipswitch (0-63), default set to 0 |
| Baud Rate Options     | 125K (default), 250K, 500K, 1M                    |
| Data Rate Options     | 5ms (default), 20ms, 50ms, 100ms                  |
| Termination Resistor  | See Ordering Information                          |



The economically priced SGJ provides linear position sensing over J1939 CANbus for OEM, mobile equipment and factory automation applications. Designed to withstand IP67 environments, the SGJ is constructed with a rugged polycarbonate body, an extremely durable spring-loaded stainless steel measuring cable and a stainless steel mounting bracket. For the OEM, customized options are available.

### ORDERING INFORMATION

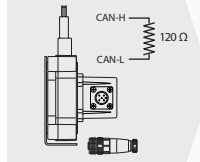
#### w/o terminating resistor



Part No.  
**SGJ-80-4**  
80-inch stroke range,  
no terminating resistor,  
5-pin M12 mating plug,  
mounting bracket included

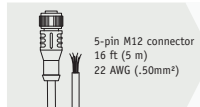
Part No.  
**SGJ-120-4**  
120-inch stroke range,  
no terminating resistor,  
5-pin M12 mating plug,  
mounting bracket included

#### w/ terminating resistor

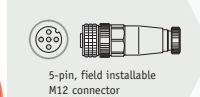


Part No.  
**SGJ-80-4-TR**  
80-inch stroke range,  
with terminating resistor,  
5-pin M12 mating plug,  
mounting bracket.

Part No.  
**SGJ-120-4-TR**  
80-inch stroke range,  
with terminating resistor,  
5-pin M12 mating plug,  
mounting bracket.



Optional  
**Cordset**  
Part No.  
**9036810-0030**  
for short-run connections, a convenient optional 16-ft. cordset with a 5-pin M12 connector.



**Field Installable Connector**  
Part No.  
**9036810-0032**  
While every SGJ ships with a field installable 5-pin M12 mating plug, additional connectors are available.

20630 Plummer Street • Chatsworth, CA 91311  
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

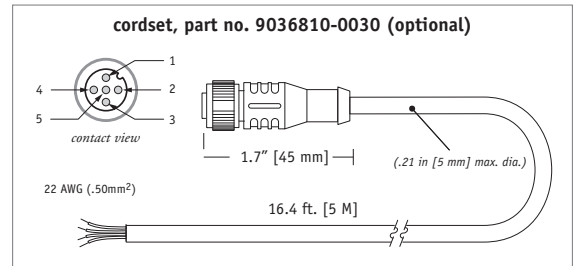
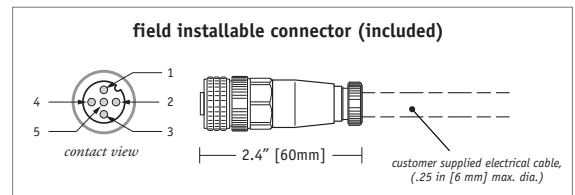


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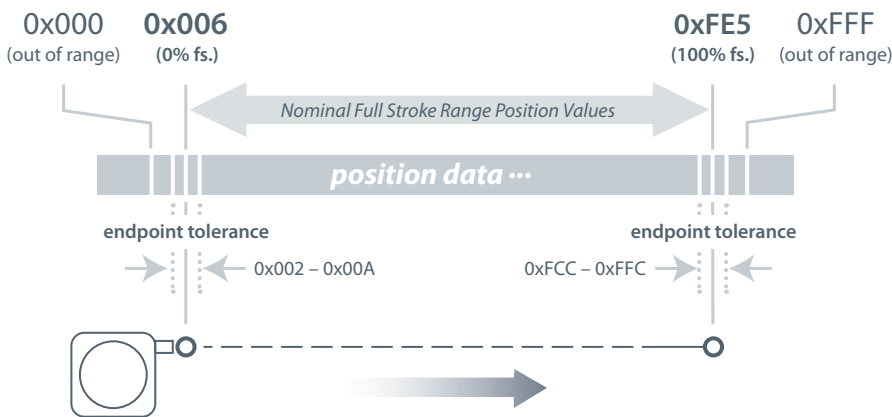
## Electrical Connection:



| signal      | pin | pin-colorcode    |
|-------------|-----|------------------|
| drain       | 1   | 1 - brown        |
| 10...36 Vdc | 2   | 2 - white        |
| common      | 3   | 3 - blue         |
| CAN high    | 4   | 4 - black        |
| CAN low     | 5   | 5 - green/yellow |



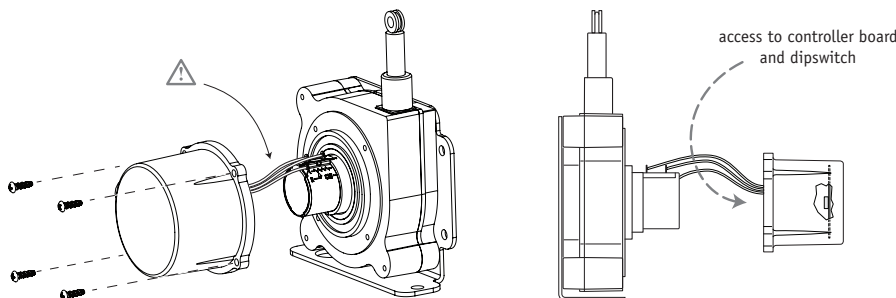
## Position Data Overview:



## Baud, Node ID and Data Rate:

Baud Rate, Node ID and Data Rate settings are set via dip switch found on the internal controller board. To gain access to the controller board, remove the 4 cover attaching screws and carefully separate the sensor cover from the main body. Be careful not to damage the small gage wires that connect the potentiometer to the controller board mounted directly to the rear cover.

Follow the instructions below for desired settings and reinstall sensor cover.



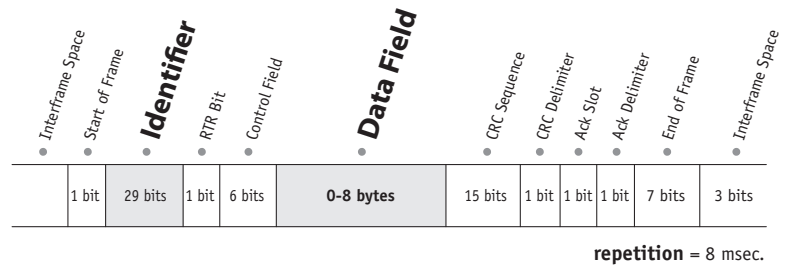
| BAUD rate options | baud rate | SW2 |     | SW3 |     |
|-------------------|-----------|-----|-----|-----|-----|
|                   |           | on  | off | on  | off |
| 125 kbps          | 125 kbps  | off | off | off | off |
|                   | 250 kbps  | on  | off | off | off |
|                   | 500 kbps  | off | on  | off | off |

| Data Rate options | Data Rate | SW9 |     | SW10 |     |
|-------------------|-----------|-----|-----|------|-----|
|                   |           | on  | off | on   | off |
| 5 ms              | 5 ms      | off | off | off  | off |
|                   | 20 ms     | on  | off | off  | off |
|                   | 50 ms     | off | on  | off  | off |
|                   | 100 ms    | on  | on  | off  | off |

node ID options  
0-63  
(0x00-0x3F)

| node ID | Dec. | Hex | SW1               |                   | SW2               |                   | SW3               |                   | SW4               |                   | SW5 |     | SW6 |     |
|---------|------|-----|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----|-----|-----|-----|
|         |      |     | (2 <sup>0</sup> ) | (2 <sup>1</sup> ) | (2 <sup>2</sup> ) | (2 <sup>3</sup> ) | (2 <sup>4</sup> ) | (2 <sup>5</sup> ) | (2 <sup>6</sup> ) | (2 <sup>7</sup> ) |     |     |     |     |
| 0       | 0x00 |     | off               | off               | off               | off               | off               | off               | off               | off               | off | off | off | off |
| 1       | 0x01 |     | on                | off               | off               | off               | off               | off               | off               | off               | off | off | off | off |
| 2       | 0x02 |     | off               | off               | on                | off               | off               | off               | off               | off               | off | off | off | off |
| 3       | 0x03 |     | on                | off               | on                | off               | off               | off               | off               | off               | off | off | off | off |
| ...     | ...  |     | ...               | ...               | ...               | ...               | ...               | ...               | ...               | ...               | ... | ... | ... | ... |
| 62      | 0x3E |     | off               | on                | on                | on                | on                | on                | on                | on                | on  | on  | on  | on  |
| 63      | 0x3F |     | on                | on                | on                | on                | on                | on                | on                | on                | on  | on  | on  | on  |

I/O Format:



Identifier:

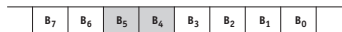
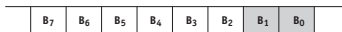
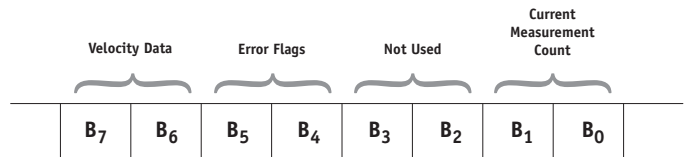
|                      | Message Priority |    |    |    | Future Use |    | J1939 Reference Proprietary B |    |    |    |    |    |    |    | Data Field Type* |    |    |    |    |   |   |   | Not Used |   | Node ID** |   |   |   |   |   |   |   |
|----------------------|------------------|----|----|----|------------|----|-------------------------------|----|----|----|----|----|----|----|------------------|----|----|----|----|---|---|---|----------|---|-----------|---|---|---|---|---|---|---|
| Example –            | 1                | 0  | 0  | 0  | 0          | 0  | 1                             | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1                | 1  | 0  | 1  | 0  | 1 | 0 | 0 | 1        | 1 | 0         | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| Identifier Bit No. – | 28               | 27 | 26 | 25 | 24         | 23 | 22                            | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14               | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6        | 5 | 4         | 3 | 2 | 1 | 0 |   |   |   |
| Hex Value –          | 0                |    |    |    | F          |    | F                             |    | 5  |    |    |    |    |    |                  |    | 3  |    | 3  |   | F |   |          |   |           |   |   |   |   |   |   |   |

\*Sensor field data can be factory set to customer specific value. \*\*Customer defined, set via Dips 1-6. Bit values shown for example only, see **Address Setting** below.

Data Field:

**B<sub>0</sub>** = LSB current measurement count byte  
**B<sub>1</sub>** = MSB current measurement count byte  
**B<sub>2</sub>** = not used  
**B<sub>3</sub>** = not used

**B<sub>4</sub>** = error flag  
**B<sub>5</sub>** = error flag  
**B<sub>6</sub>** = LSB velocity data byte  
**B<sub>7</sub>** = MSB velocity data byte



**Current Measurement Count**

The **Current Measurement Count (CMC)** is the output data that indicates the present position of the measuring cable. The CMC is a 12-bit value that occupies bytes **B<sub>0</sub>** and **B<sub>1</sub>** of the data field. **B<sub>0</sub>** is the **LSB** (least significant byte) and **B<sub>1</sub>** is the **MSB** (most significant byte).

The **CMC** starts at **0x008** with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at **0xFE5**. This holds true for all ranges.

**Converting CMC to Linear Measurement**

To convert the current measurement count to inches or millimeters, simply divide the count by 4061 (total counts over the range) and then multiply that value by the full stroke range:

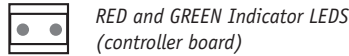
$$\left( \frac{\text{current measurement count}}{4061} \right) \times \text{full stroke range}$$

Sample Conversion:

If the full stroke range is **80 inches** and the current position is **0x4FF** (1279 Decimal) then,

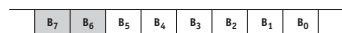
$$\left( \frac{1279}{4061} \right) \times 80.00 \text{ inches} = 25.2 \text{ inches}$$

**Error Flags**



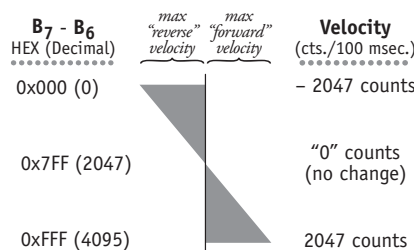
**0x00** (GREEN - ON, RED - OFF) indicates the sensor is operating within normal calibrated limits.

**0x33, 0x55, 0xAA, 0xCC** (RED or GREEN - FLASHING) indicates sensor is at or beyond its calibrated measurement range. Should any of these conditions occur within calibrated range, return unit to factory for evaluation or service.



**Velocity**

Data in bytes **B<sub>7</sub>** - **B<sub>6</sub>** is the change in the **CMC** (current measurement count) over a 100 msec time period. This data can then be used to calculate velocity in a post processing operation.



**Velocity Calculation**

$$\left( \frac{\text{count change} - 2047}{.1 \text{ sec. time period}} \right) \times \left( \frac{\text{full stroke range}}{4061} \right)$$

**Sample Calculations**

Cable Extension (positive direction):

**B<sub>7</sub>.B<sub>6</sub> = 0x8D3** (2259Dec), **full stroke = 80 in.**

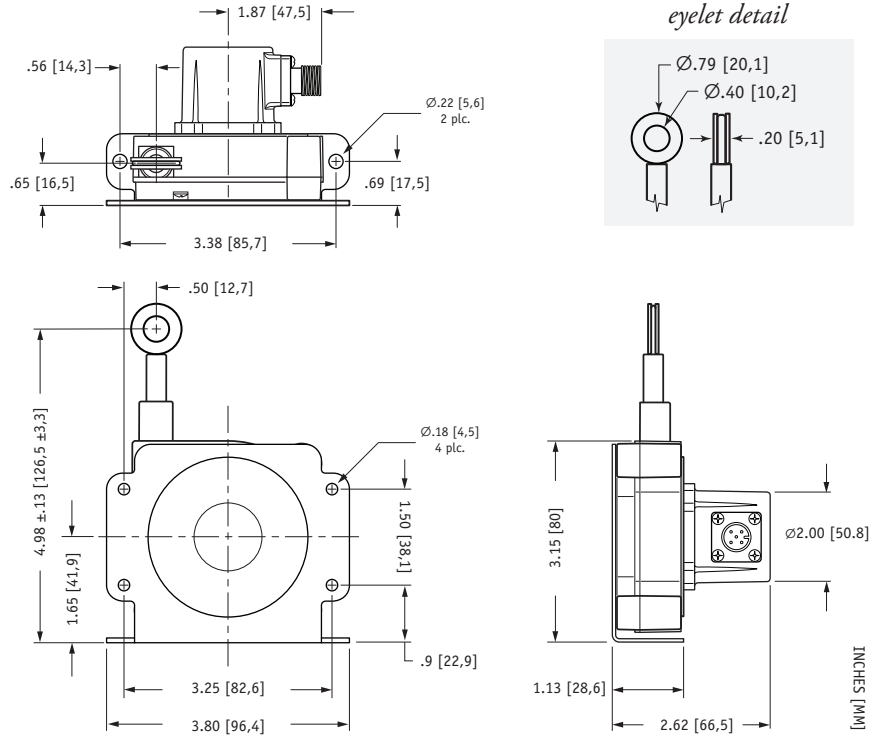
$$\left( \frac{2259 - 2047}{.1 \text{ sec}} \right) \times \left( \frac{80 \text{ in.}}{4061} \right) = 41.76 \text{ in. / sec.}$$

Cable Retraction (negative direction):

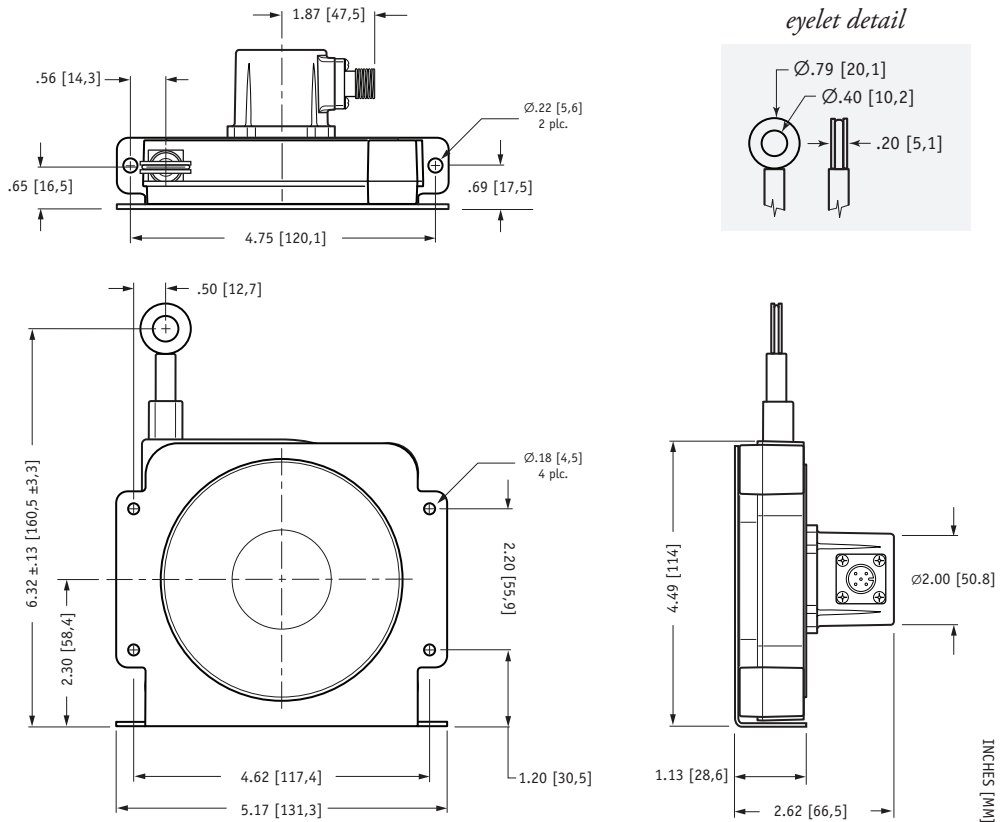
**B<sub>7</sub>.B<sub>6</sub> = 0x7D0** (2000Dec), **full stroke = 80 in.**

$$\left( \frac{2000 - 2047}{.1 \text{ sec}} \right) \times \left( \frac{80 \text{ in.}}{4061} \right) = -9.26 \text{ in. / sec.}$$

80-inch SGJ-80-4 w/ Mounting Bracket:



120-inch SGJ-120-4 w/ Mounting Bracket:



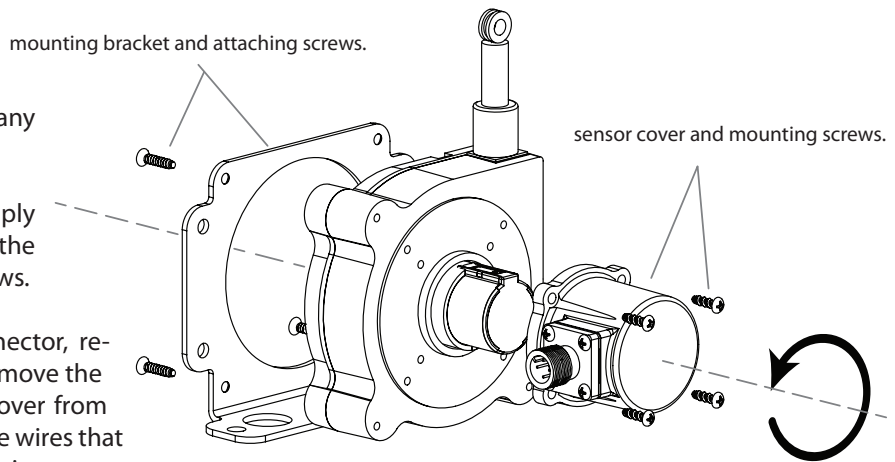
## Mounting Options:

### Changing Measuring Cable Exit and Electrical Connector Direction:

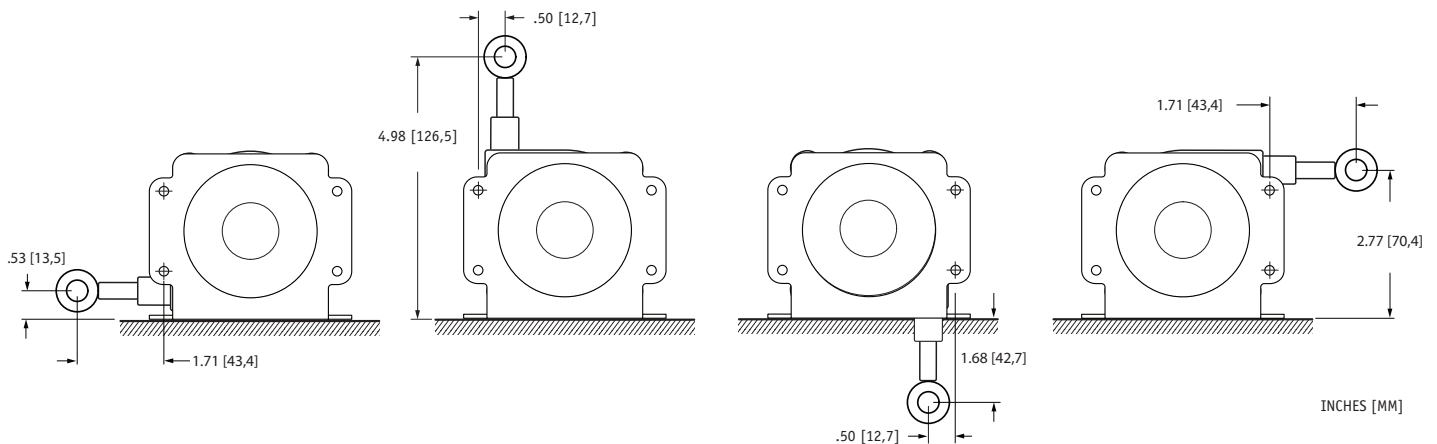
For the ultimate in flexibility, the measuring cable exit direction and the direction of the electrical connector can be rotated around in 90° increments to accommodate just about any installation requirement.

To change measuring cable exit direction, simply remove the 4 mounting bracket screws, rotate the bracket to desired position and replace the screws.

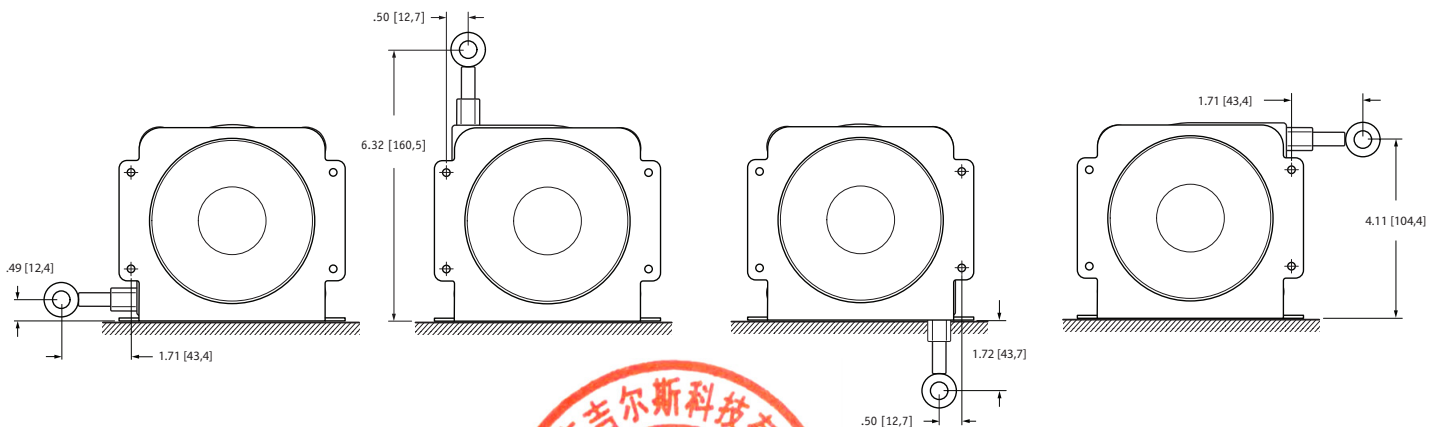
To change the direction of the electrical connector, remove the 4 sensor cover screws and carefully remove the sensor cover just far enough to separate the cover from the main body. Be careful of the three small gage wires that attach the internal controller board to the potentiometer.



### Mounting Option Mounting Dimensions (SGJ-80-4):



### Mounting Option Mounting Option Dimensions (SGJ-120-4):



version: 2.0 last updated: January 21, 2015

