# SR1H Installation Guide

## includes SR1H-125 and SR1H-175
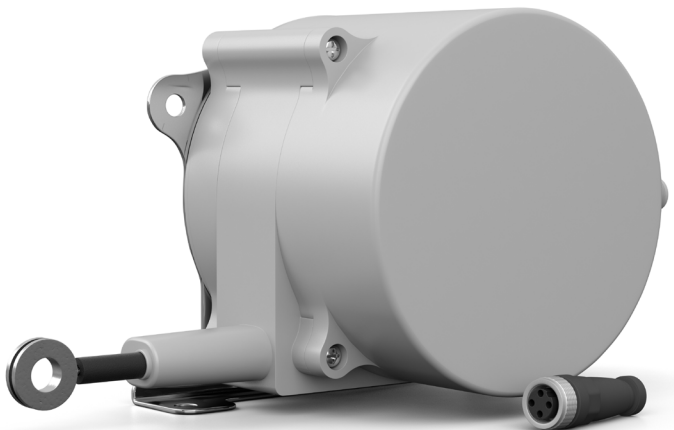
## Electrical Connection



| Output Signal | field installable connector | optional cordset | | |
|---|---|---|---|---|
| • | pin | pin | - | color |
| n/c | 1 | 1 | - | brown |
| 10..36 Vdc | 2 | 2 | - | white |
| common | 3 | 3 | - | blue |
| CAN - High | 4 | 4 | - | black |
| CAN - Low | 5 | 5 | - | gray |

## Field Installable Connector



customer supplied electrical cable
(.25 in [6 mm] max. dia.)

contact view

2.4" [60mm]
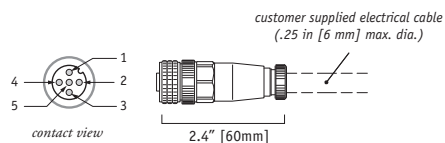
## Optional Cordsets
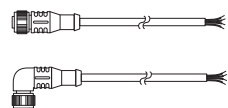


| Part Number | length | wire size | connector |
|---|---|---|---|
| 9036810-0030 | 16 ft (5 m) | 22 AWG (.34mm²) | straight 5-pin M12 |
| 9036810-0031 | 16 ft (5 m) | 22 AWG (.34mm²) | 90° 5-pin M12 |

## Position Data Overview



0x000 (out of range)   0x006 (0% fs.)   0xFE5 (100% fs.)   0xFFF (out of range)

Nominal Full Stroke Range Position Values

position data …

endpoint tolerance          endpoint tolerance

0x002 – 0x00A          0xFCC – 0xFFC

## Internal Contoller Board



to gain access to the controller board, remove the four phillips screws and remove rear cover.
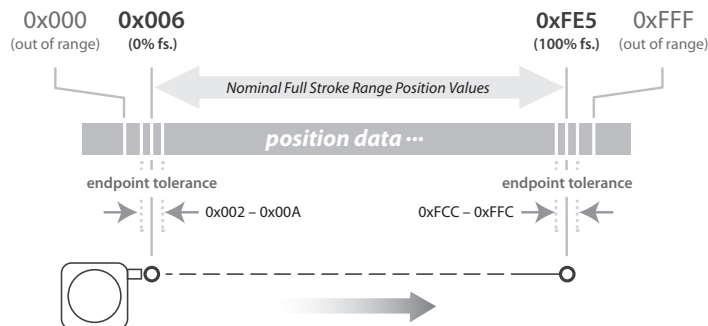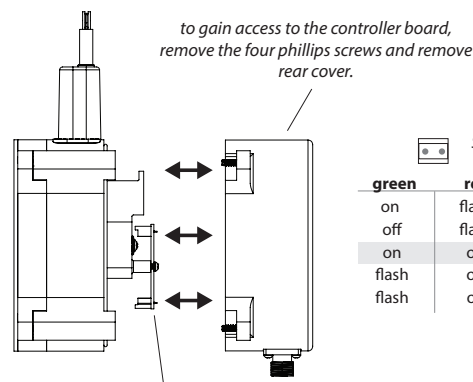
Status LED - Indicates Potentiometer Operating Conditions

| green | red | |
|---|---|---|
| on | flash | emergency message (high) |
| off | flash | buffer (high) |
| on | off | normal operating range |
| flash | off | buffer (low) |
| flash | on | emergency message (low) |

LSS, Baud Rate, Node ID Settings and Status LED located on controller board
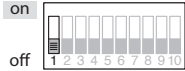
## LSS, Baud Rate and Node ID settings:

LSS, Baud Rate and Node ID settings are set via dip switch found on the internal controller board. As shown above, 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.

### LSS Settings:

IF DIP Switch 1 is set to "on" position, then LSS will be functional and uses the contents of EEPROM including Node ID and Baud Rate. If DIP Switch 1 is set to "off" position, then DIP switches will override information in EEPROM including the Node ID and Baud Rate.



| | LSS settings | SW1 |
|---|---|---|
| *LSS options* | disabled | off |
| | enabled | on |

## LSS, Baud Rate and Node ID settings (cont.):

### BAUD Rate:
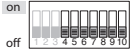
If DIP Switch 1 is set to "off" then BAUD rate is set via DIP switch 2 and 3 as shown :



| baud rate | SW2 | SW3 |
|---|---|---|
| 125 kbps | off | off |
| 250 kbps | on | off |
| 500 kbps | off | on |
| 1 Mbps | on | on |

*transmission rate options*

### Node ID:

If DIP Switch 1 is set to "off" then the Node ID is set via DIP switches 4 – 10 as shown below. The DIP switch settings are binary starting with switch number 4 ($=2^0$) and ending with switch number 10 ($=2^6$).

The Node ID is equal to the binary setting.



| node ID Dec. | Hex | SW4 ($2^0$) | SW5 ($2^1$) | SW6 ($2^2$) | SW7 ($2^3$) | SW8 ($2^4$) | SW9 ($2^5$) | SW10 ($2^6$) |
|---|---|---|---|---|---|---|---|---|
| 1 | 0x01 | on | off | off | off | off | off | off |
| 2 | 0x02 | off | on | off | off | off | off | off |
| 3 | 0x03 | on | on | off | off | off | off | off |
| ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 126 | 0x7E | off | on | on | on | on | on | on |
| 127 | 0x7F | on | on | on | on | on | on | on |

*node ID options 1–127 (0x01–0x7F)*

## Manufacturer Objects:

| Index | Sub-Index | Name | Default | Comment |
|---|---|---|---|---|
| 2000 | | Raw Position Value | | This is the averaged, non-scaled value from the encoder. |
| 2001 | | Emergency Buffer Distance | 0.1 | Emergency Message is sent when the output of the sensing potentiometer is outside it's calibrated range by more than .1% of the sensors full measurement range (Emwergency Buffer). This allows for non-repeatability of sensor and customers application. This object allows user ability to change buffer size along with transmission of Emergency Message, Manufacturer specific bit in error register set, and error added to error list. |

## Device Profile Area:

| Index | Sub-Index | Name | Default | Comment |
|---|---|---|---|---|
| 6000 | | Operating Parameters | 0X0000 | |
| 6004 | | Position Value | 0 | Counts proportional to measuring cable extension. Nominal values are 0x006 with cable fully retracted and 0xFE5 with cable fully extended. Format of data in CAN message is little endian – least significant byte pair first. Therefore 0x008 would be shown as "08 00" and 0xFE5 would be shown as "E5 0F" |
| 6400 | | Area State Register | | SubNumber= 2 (indicates underflow or overflow per CiA406) |
| | 0 | Highest Subindex | 0x01 | |
| | 1 | Work Area State Channel 1 | 0 | |

## Device Profile Area (cont.):

| Index | Sub-Index | Name | Default | Comment |
|-------|-----------|------|---------|---------|
| 6401 | | Work Area Low Limit | | The averaged, non-scaled (raw) encoder data below which the encoder is out of range. |
| | 0 | Highest Subindex | 0x01 | |
| | 1 | Work Area Low Limit Channel1 | 0x024 | |
| 6402 | | Work Area High Limit | | The averaged, non-scaled (raw) encoder data above which the encoder is out of range. |
| | 0 | Highest Subindex | 0x01 | |
| | 1 | Work Area High Limit Channel 1 | 0xF4E | |
| 6500 | | Operating Status | 0x0000 | |
| 6501 | | Measuring Step | 1 | Position Measuring Step. Can be set by user to convert Position Value (Object 6004) to measurement units (inches, mm). Default is set to 1. |

## Communication Area Profile:

| Index | Sub-Index | Name | Default | Comment |
|-------|-----------|------|---------|---------|
| 1000 | | Device Type | 000080196 | Device Profile 406 |
| 1001 | | Error Register | 0 | Manufacturer Specific Error bit 7 is set when sensor is outside of calibrated range and cleared when back in range. |
| 1003 | | Pre-Defined Error Field | | SubNumber= 9 (lists last eight Emergency Messages) |
| | 0 | Number of Errors | 0 | |

## Communication Area Profile (cont.):

| Index | Sub-Index | Name | Default | Comment |
|-------|-----------|------|---------|---------|
| | 1 | Standard Error Field 1 | | |
| | 2 | Standard Error Field 2 | | |
| | 3 | Standard Error Field 3 | | |
| | 4 | Standard Error Field 4 | | |
| | 5 | Standard Error Field 5 | | |
| | 6 | Standard Error Field 6 | | |
| | 7 | Standard Error Field 7 | | |
| | 8 | Standard Error Field 8 | | |
| 1005 | | SYNC COB-ID | 0x80 | |
| 1010 | | Store Parameters | | SubNumber=2 |
| 1010 | 0 | Highest Subindex | 0x01 | Only "Save All Parameters" feature supported |
| | 1 | Save All Parameters | | Write "save" or "evsa" to save parameters to EEPROM. They are automatically loaded on power up/reset. Saves the value of all R/W object dictionary entries. |
| 1014 | | Emergency COB-ID | $NodeID + 0x80 | COB-ID Emergency Message |
| 1015 | | Emergency Inhibit Time | 0 | Multiple of 100us. Minimum time between transmissions of emergency messages. |
| 1017 | | Producer Heartbeat Time | 0 | Multiples of 1ms. Time between transmission of heartbeat messages. 0 = disabled |

## Communication Area Profile (cont.):

| Index | Sub-Index | Name | Default | Comment |
|---|---|---|---|---|
| 1018 | | Identity Object | | |
| | 0 | Number of Entries | 4 | |
| | 1 | Vendor Id | 0x2E0 | |
| | 2 | Product Code | 0x10D | Celesco Reference # 604269 |
| | 3 | Revision Number | 3 | |
| | 4 | Serial Number | 0xFFFFFFFF | not supported |
| 1800 | | Tx PDO Comm. Parameter | | PDO1 |
| | 0 | Number of Entries | 5 | |
| | 1 | COB-ID | $NodeID + 0x180 | COB-ID used by PDO1 |
| | 2 | Transmission Type | 0xFE | PDO1 Tx Type: 0 = on Sync Message.  254 = Asynchronous Tx |
| | 3 | Inhibit Time | 0 | Multiple of 100us. Minimum time between transmissions of the PDO |
| | 5 | Event Timer | 0x32 | If non-zero then transmits the PDO periodically.  This value is a multiple of 1ms. |
| 1801 | | Tx PDO Comm. Parameter | | PDO2 |
| | 0 | Number of Entries | 5 | |
| | 1 | COB-ID | $NodeID + 0x280 | COB-ID used by PDO2 |
| | 2 | Transmission Type | 0 | PDO2 Tx Type: 0 = on Sync Message.  254 = Asynchronous Tx |
| | 3 | Inhibit Time | 0 | Multiple of 100us. Minimum time between transmissions of the PDO |

## Communication Area Profile (cont.):

| Index | Sub-Index | Name | Default | Comment |
|-------|-----------|------|---------|---------|
| | 5 | Event Timer | 0 | If non-zero then transmits the PDO periodically. This value is a multiple of 1ms. |
| 1A00 | | Tx PDO Mapping Parameter | | Subnumber = 2 |
| | 0 | Number of Entries | 1 | |
| | 1 | PDO Mapping Entry | 0x60040020 | Mapping Parameter |
| 1A01 | | Tx PDO Mapping Parameter | | Subnumber = 2 |
| | 0 | Number of Entries | 1 | |
| | 1 | PDO Mapping Entry | 0x60040020 | Mapping Parameter |

# Changing the Cable Exit and 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.

## Cable Exit Direction Options

To change measuring cable exit direction, simply remove the 4 mounting bracket screws, rotate the bracket to desired position and replace the screws. See figures 1 - 4 on the following pages for mounting dimensions.

see fig. 1

see fig. 2

see fig. 3

see fig. 4
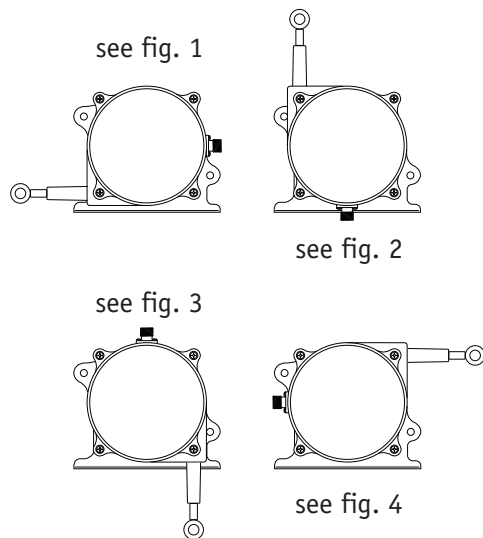
## Changing Electrical Connector Direction

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.
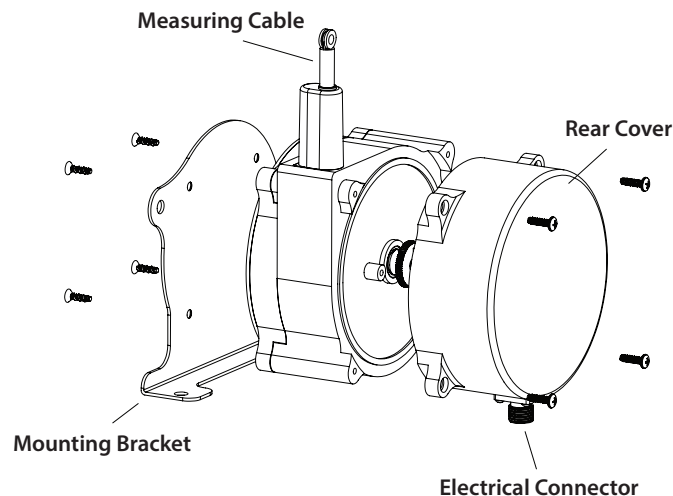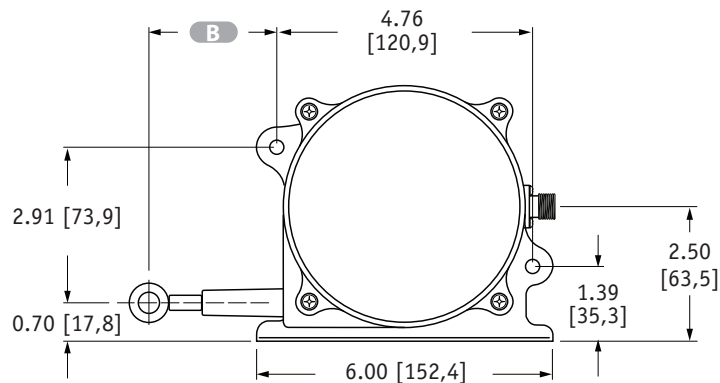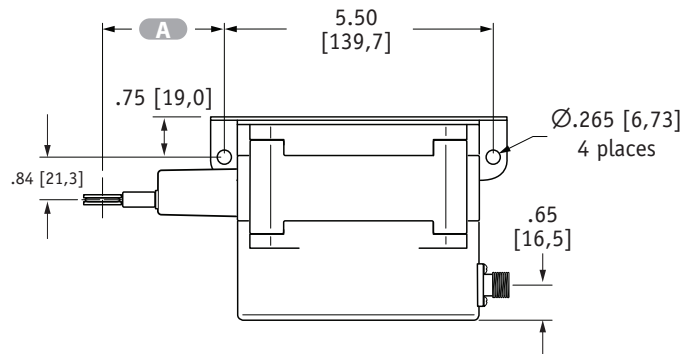


**Measuring Cable**

**Rear Cover**

**Mounting Bracket**

**Electrical Connector**

# Fig. 1 – Outline Drawing (as shipped)



| Model | **A** |
|---|---|
| **125-inch** | 2.00 ± .13 [50,8 ± 3,2] |
| **175-inch** | 2.87 ± .13 [72,8 ± 3,2] |

| Model | **B** |
|---|---|
| **125-inch** | 2.37 ± .13 [60,22 ± 3,2] |
| **175-inch** | 3.24 ± .13 [82,2 ± 3,2] |

Eyelet Detail

Cable Guide Detail

Dimensions are in inches [mm]
Tolerances are 0.04 in. [1,0 mm] unless otherwise noted.
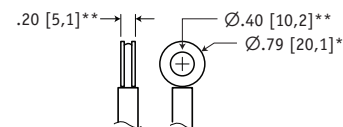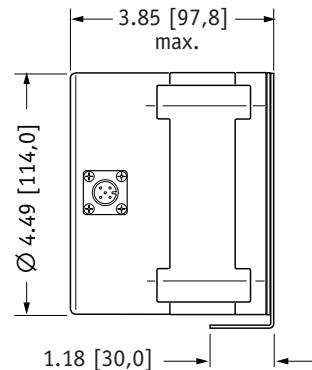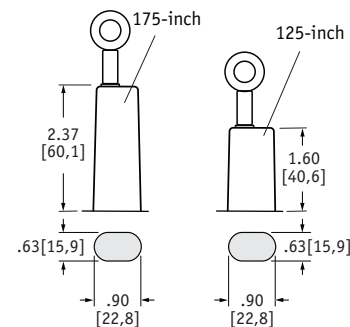
*tolerance = +.005 −.001 [+0,1 −0,0]
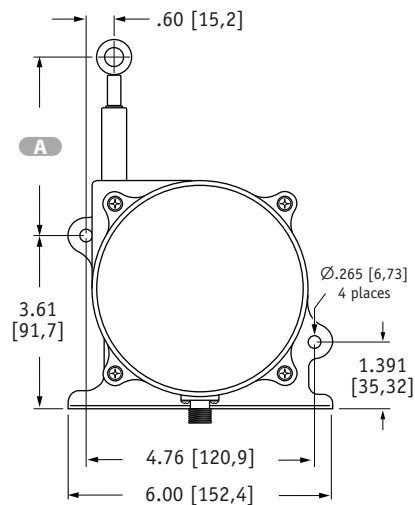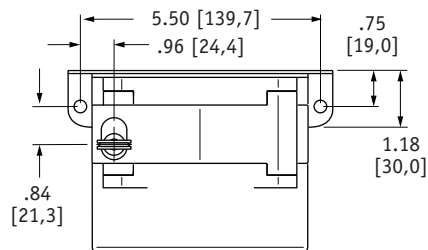**tolerance = +.005 −.005 [+0,1 −0,1]

Fig. 2 - "Up" Cable Exit Direction

5.50 [139,7]

.96 [24,4]

.75 [19,0]
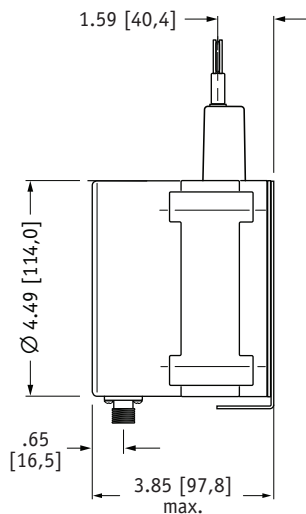
| Model | A |
|---|---|
| 125-inch | 3.64 ±.13 [92,5 ±3,3] |
| 175-inch | 4.54 ±.13 [115,3 ±3,3] |

1.18 [30,0]

.84 [21,3]

.60 [15,2]

A

3.61 [91,7]

∅.265 [6,73] 4 places

1.391 [35,32]

4.76 [120,9]

6.00 [152,4]

1.59 [40,4]

∅ 4.49 [114,0]

.65 [16,5]

3.85 [97,8] max.



Fig. 3 - "Down" Cable Exit Direction

5.50 [139,7]

.96 [24,4]

.75 [19,0]
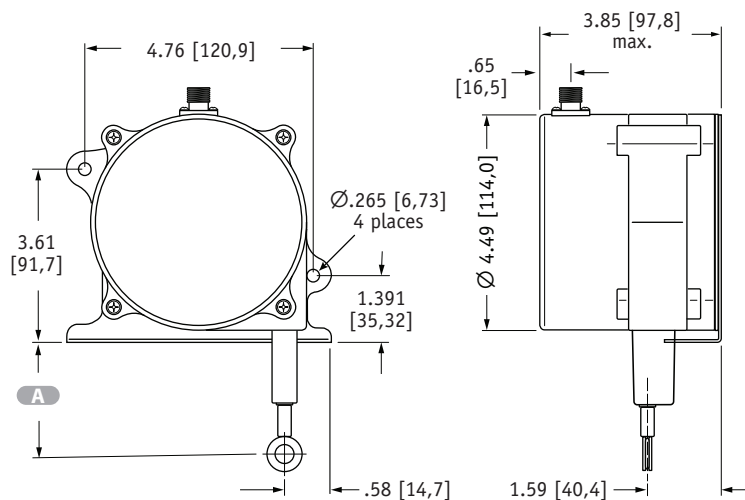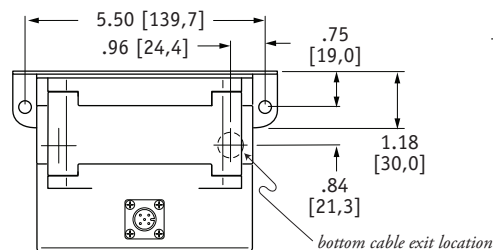
| Model | A |
|---|---|
| 125-inch | 2.25 ±.13 [57,2 ±3,3] |
| 175-inch | 3.17 ±.13 [80,5 ±3,3] |

1.18 [30,0]

.84 [21,3]

*bottom cable exit location*

4.76 [120,9]

3.61 [91,7]

∅.265 [6,73] 4 places

1.391 [35,32]

A

.58 [14,7]

3.85 [97,8] max.

.65 [16,5]

∅ 4.49 [114,0]

1.59 [40,4]

## Fig. 4 - "Rear" Cable Exit Direction

5.50 [139,7]

.75 [19,0]

.84 [21,3]

.65 [16,5]

| Model | A |
|-------|---|
| **125-inch** | 2.00 ± .13 [50,8 ± 3,2] |
| **175-inch** | 2.87 ± .13 [72,8 ± 3,2] |

| Model | B |
|-------|---|
| **125-inch** | 2.37 ± .13 [60,22 ± 3,2] |
| **175-inch** | 3.24 ± .13 [82.2 ± 3,2] |

4.76 [120,9]

3.61 [91,7]

2.50 [63,5]

Ø.265 [6,73] 4 places

4.30 [109,2]

1.39 [35,3]

6.00 [152,4]

3.85 [97,8] max.

Ø 4.44 [114,0]

1.18 [30,0]
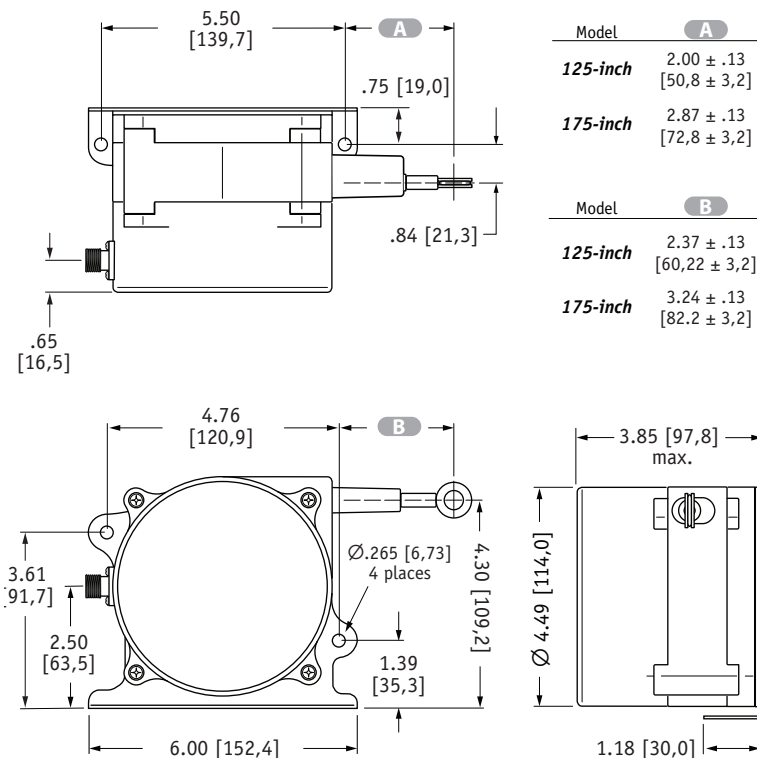
## Specifications

| | |
|---|---|
| Stroke Range Options | 125 inches (3175 mm), 175 inches (4445 mm) |
| Accuracy | .5% FS. |
| Repeatability | .05% FS. |
| Resolution | 12-bit |
| Input Voltage | 10-36 VDC |
| Input Current | 100 mA, max. |
| Measuring Cable | .031-inch dia. bare stainless steel rope |
| Measuring Cable Tension | 23 oz. (6,3 N) ±30% |
| Maximum Acceleration | 10 g |
| Maximum Velocity | 80 inches (2 meters) per second |
| 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 | 2.5 lbs (1.3 kg) |

## CANOpen Specifications

| | |
|---|---|
| Communication Profile | CiA 301 V 4.0.2, CANopen Slave |
| Device Type | CiA 406 V3.2, Encoder |
| Vendor ID | Company x0002E0, Dept x00 |
| Node ID | 1-127 (Adjustable via dipswitch or LSS, default set to 1) |
| Baud Rate Options | 125K (default), 250K, 500K, 1M |
| Data Rate | 50ms (default) |
| Error Control | Heartbeat, Emergency Message |
| PDO | 2 TxPDO, 0 RxPDO, no linking, static mapping |
| PDO Modes | Event / Time triggered, Synch / Asynch |
| SDO | 1 server, 0 client |
| Position Data | Object Dictionary 6004 |
| Cam Switches | Not Supported |
| Termination Resistor | See Datasheet Ordering Information |
| EDS File** | Contact Factory |

*\*\*–objects 1018, 1A03, 2002, and 6804 in EDS file are not supported*