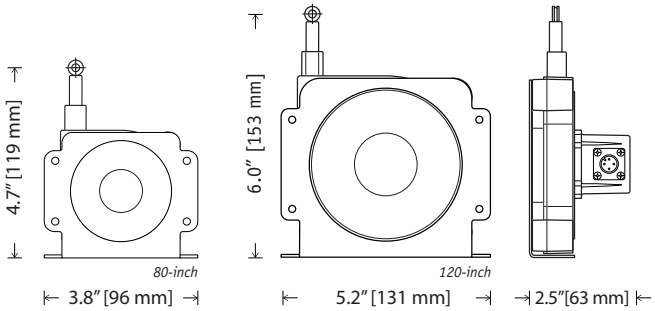
SG1

Voltage Divider Output Signal

Compact Mid-Range String Pot • Absolute Position
80, 120-inch Stroke Range Options
Polycarbonate Enclosure • IP67
In Stock for Quick Delivery



The SG1 provides absolute linear position up to a 10-ft. stroke range. Constructed with a rugged polycarbonate body, this model is available in an 80-inch or 120-inch stroke range and offers optional IP67 protection for wet or outdoor installations and an M12 connector for easy installation.

The SG1 uses a precision high-cycle plastic hybrid potentiometer and an extremely durable spring-loaded stainless steel measuring cable to provide an accurate reliable position feedback signal over the entire stroke. With it's slim design and versatile mounting bracket, the SG1 has been designed to fit into spaces no other measurment device can. For the OEM customer, custom mounting hardware and electrical connections are available.

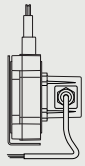
SPECIFICATIONS

Stroke Range Options	80 inches (2032 mm), 120 inches (3048 mm)
Output Signal	voltage divider (potentiometric)
Accuracy	.35% FS.
Repeatability	.05% FS.
Resolution	essentially infinite
Measuring Cable	.019-inch dia. nylon-coated stainless steel
Maximum Acceleration	10 g
Measuring Cable Tension	9 oz. (2,5 N) ±30%
Sensor	plastic-hybrid precision potentiometer
Input Resistance	10K ohms, ±10%
Power Rating, Watts	2.0 at 70°F
Recommended Maximum Input Voltage	30 V (AC/DC)
Output Signal Change Over Full Stroke Range	94% ±4% of V(+in)
Cycle Life	≥ 250,000
Electrical Connection	see ordering information
Enclosure	glass-filled polycarbonate
Environmental	IP 50 , IP67 (m12 connector & pigtail options)
Operating Temperature	-40˚ to 160˚ F (-40˚ to 70˚ C)
Weight, 80-inch (not including bracket)	.6 lbs. (272 g)
Weight, 120-inch (not including bracket)	1 lb. (453 g)

ORDERING INFORMATION

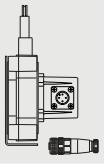
Part No. **SG1-80**
80-inch stroke range, solder terminal connection, IP50 environments, mounting bracket included

Part No. **SG1-120**
120-inch stroke range, solder terminal connection, IP50 environments, mounting bracket included



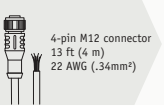
Part No. **SG1-80-2**
80-inch stroke range, 40-inch electrical cable, IP67 environments, mounting bracket included

Part No. **SG1-120-2**
120-inch stroke range, 40-inch electrical cable, IP67 environments, mounting bracket included



Part No. **SG1-80-3**
80-inch stroke range, M12 connector, IP67 environments, mounting bracket included

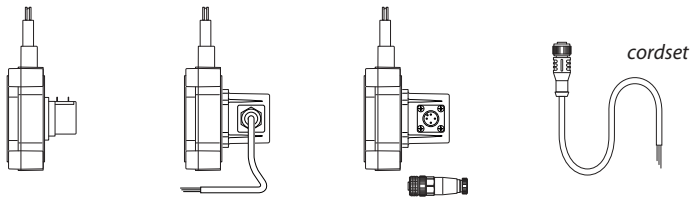
Part No. **SG1-120-3**
120-inch stroke range, M12 connector, IP67 environments, mounting bracket included



Optional Cordset Part No. **9036810-0040**
for short-run connections, a convenient optional 13-ft. cordset with a 4-pin M12 connector is available for the SG1-80-3 and SG1-120-3.

20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
measurement SPECIALTIES™
celesco
celesco.com • info@celesco.com

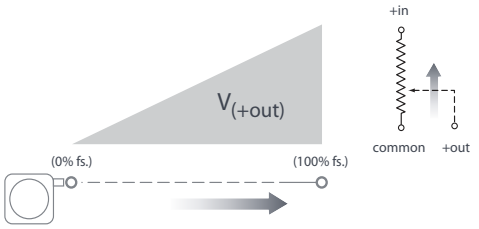
Electrical Connection:



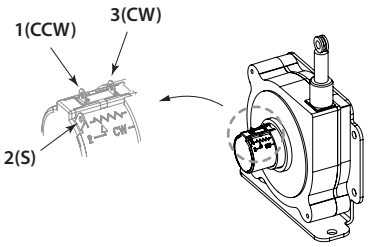
signals	terminal	colorcode	pin*	pin - colorcode*
+in	3 (cw)	red	1	1 - brown
common	1 (ccw)	black	2	2 - white
+out	2 (s)	green	3	3 - blue

note: connector pin 4 and the black wire on the **cordset are NOT used.*

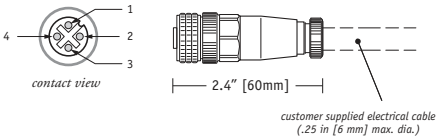
Output Signal:



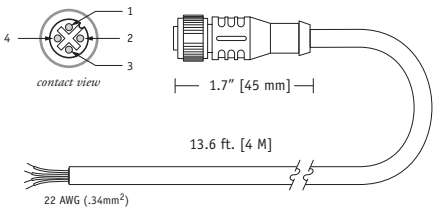
potentiometer connections
(SG1-80, SG1-120 only)



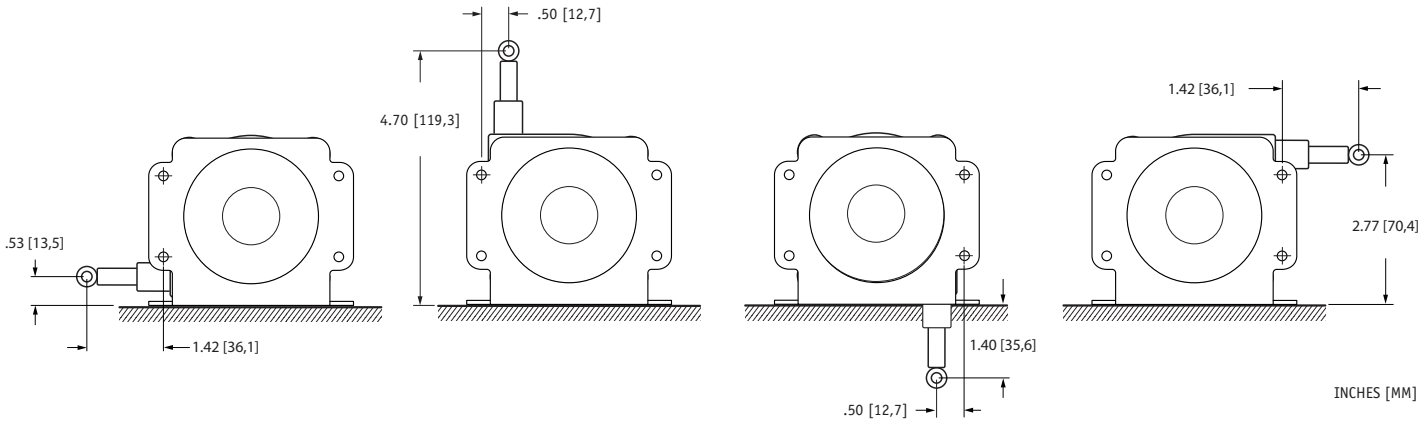
field installable connector
(SG1-xx-3, SGD-xx-3 only)



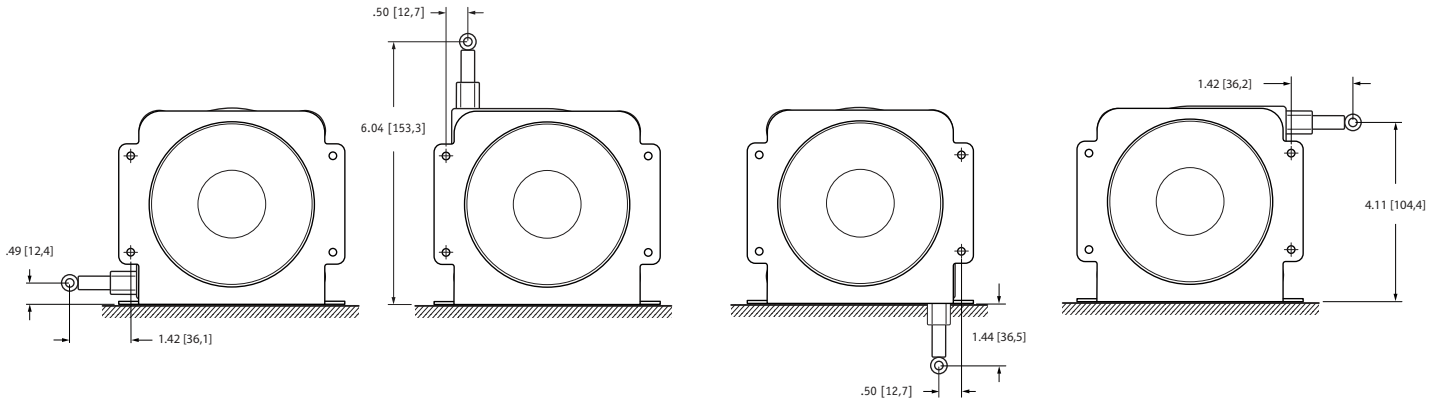
cordset, part no. 9036810-0040
(optional for SG1-xx-3, SGD-xx-3 only)



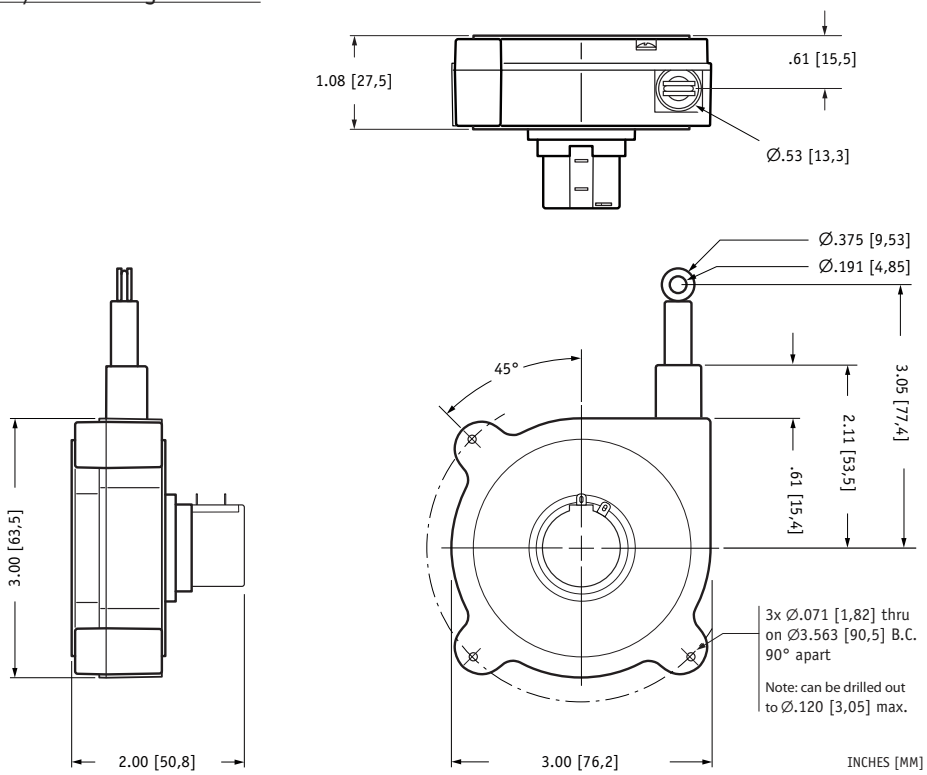
Mounting Options (SG1-80, SG1-80-2, SG1-80-3):

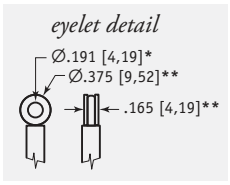


Mounting Options (SG1-120, SG1-120-2, SG1-120-3):



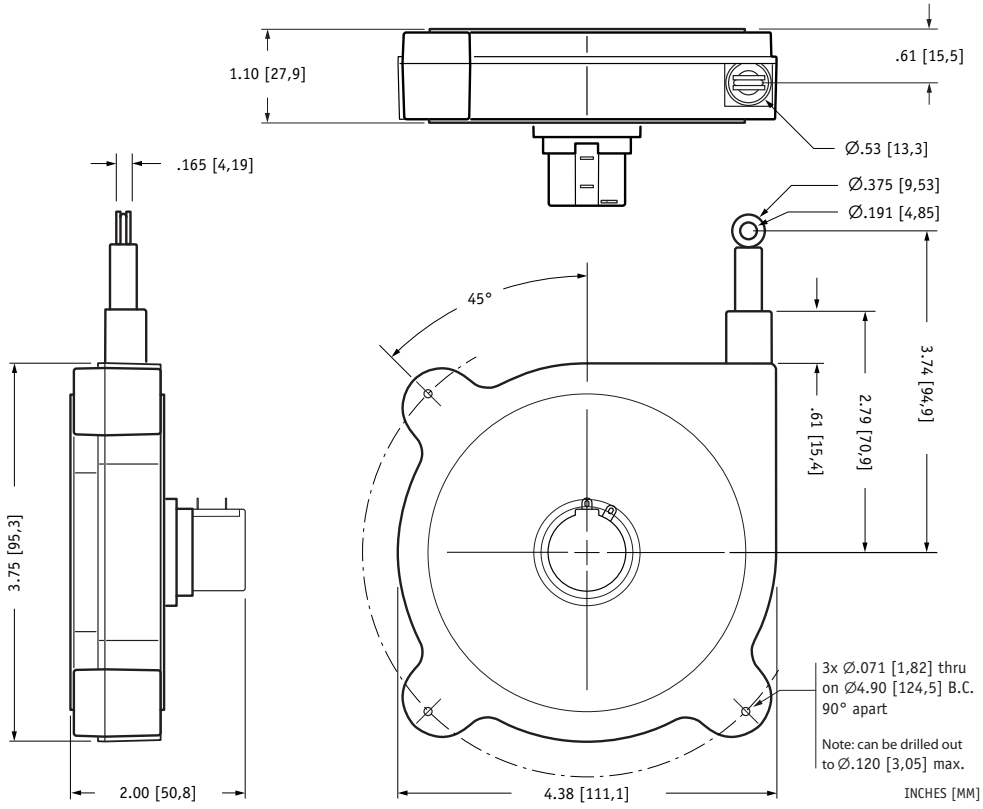
SG1-80 w/o Mounting Bracket:

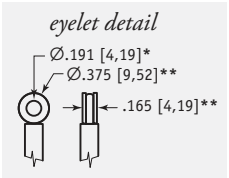




*tolerance = +.005 –.001 [+.13 –.03]
**tolerance = +.005 –.005 [+.13 –.13]

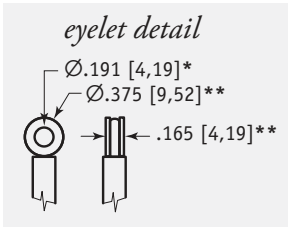
SG1-120 w/o Mounting Bracket:



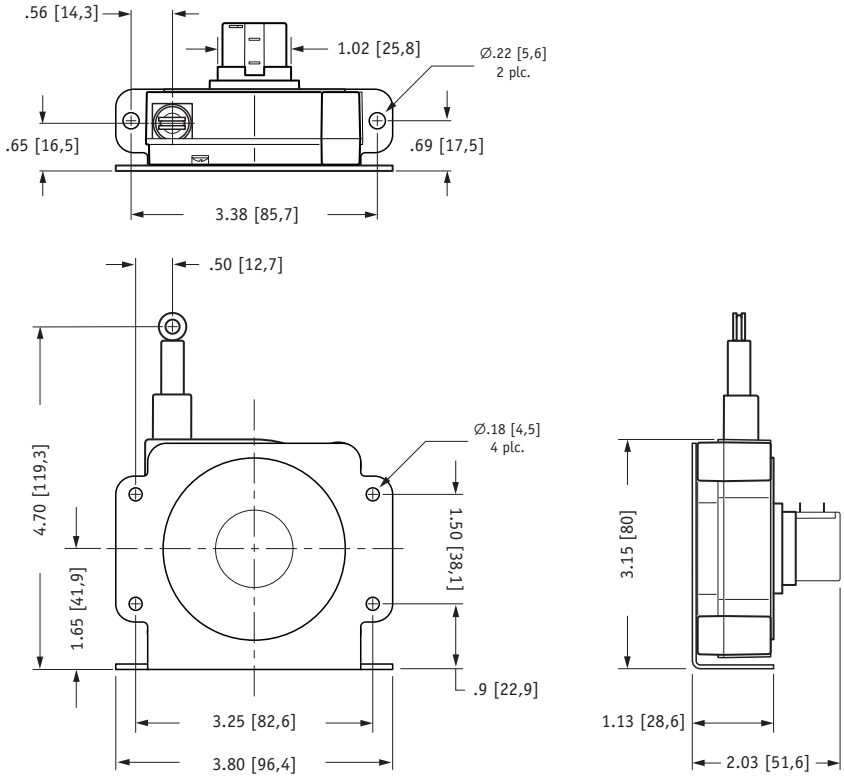


*tolerance = +.005 –.001 [+.13 –.03]
**tolerance = +.005 –.005 [+.13 –.13]

SG1-80 w/ Mounting Bracket:

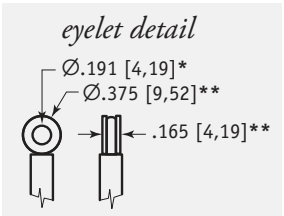


*tolerance = +.005 –.001 [+.13 –.03]
**tolerance = +.005 –.005 [+.13 –.13]

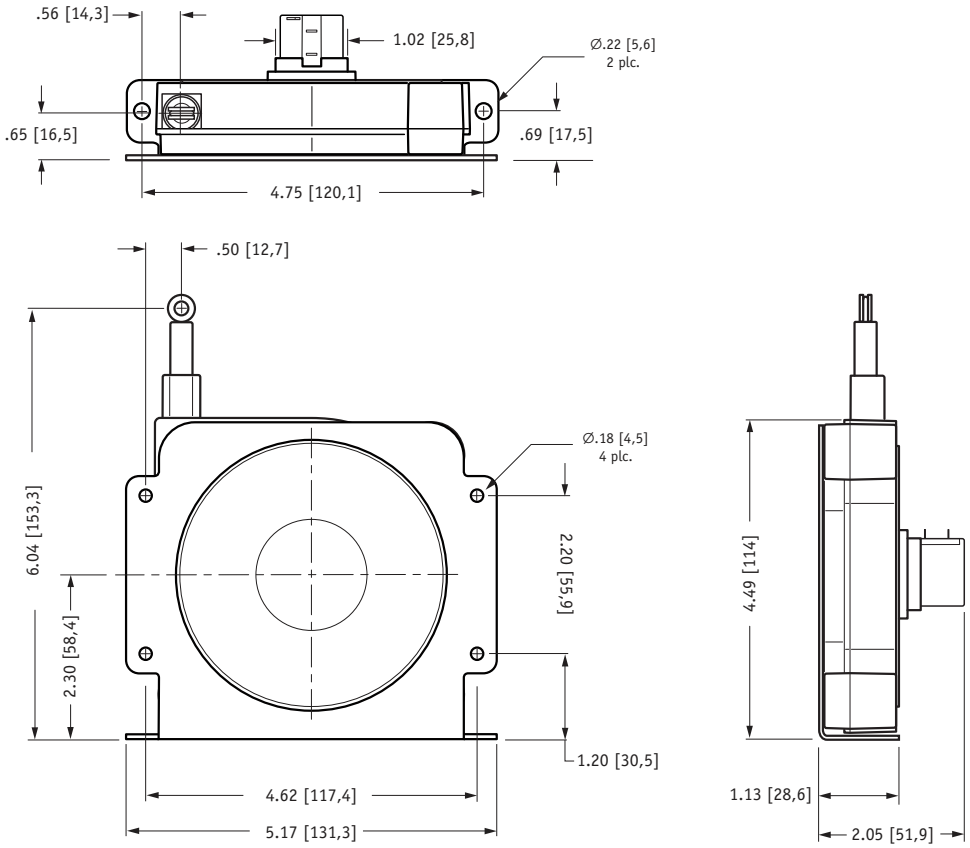


INCHES [MM]

SG1-120 w/ Mounting Bracket:

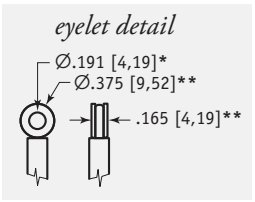


*tolerance = +.005 –.001 [+.13 –.03]
**tolerance = +.005 –.005 [+.13 –.13]



INCHES [MM]

SG1-80-2 w/ Mounting Bracket:



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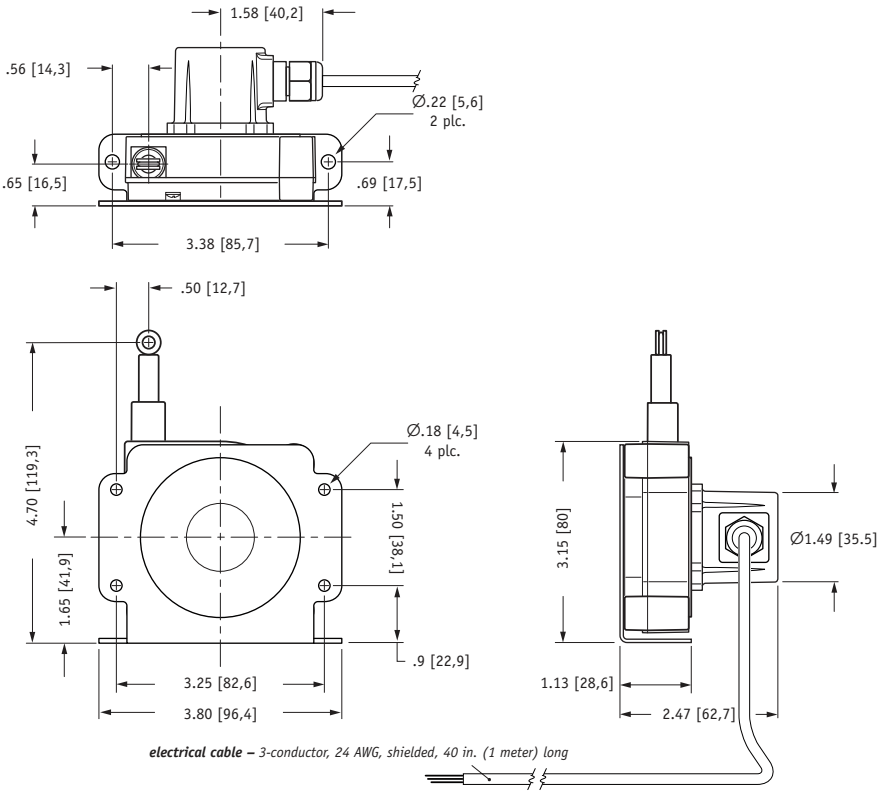
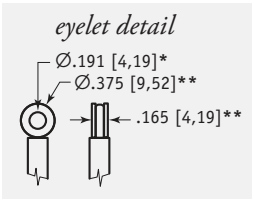


INCHES [MM]

electrical cable – *3-conductor, 24 AWG, shielded, 40 in. (1 meter) long*

SG1-120-2 w/ Mounting Bracket:



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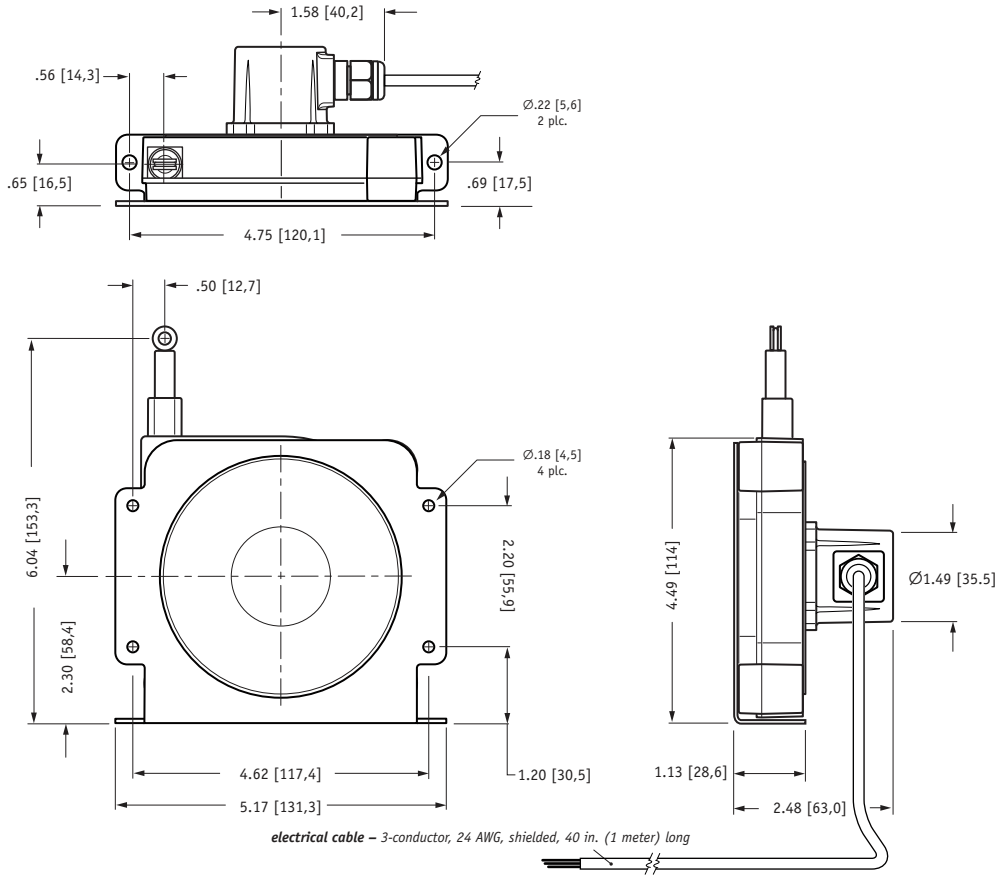
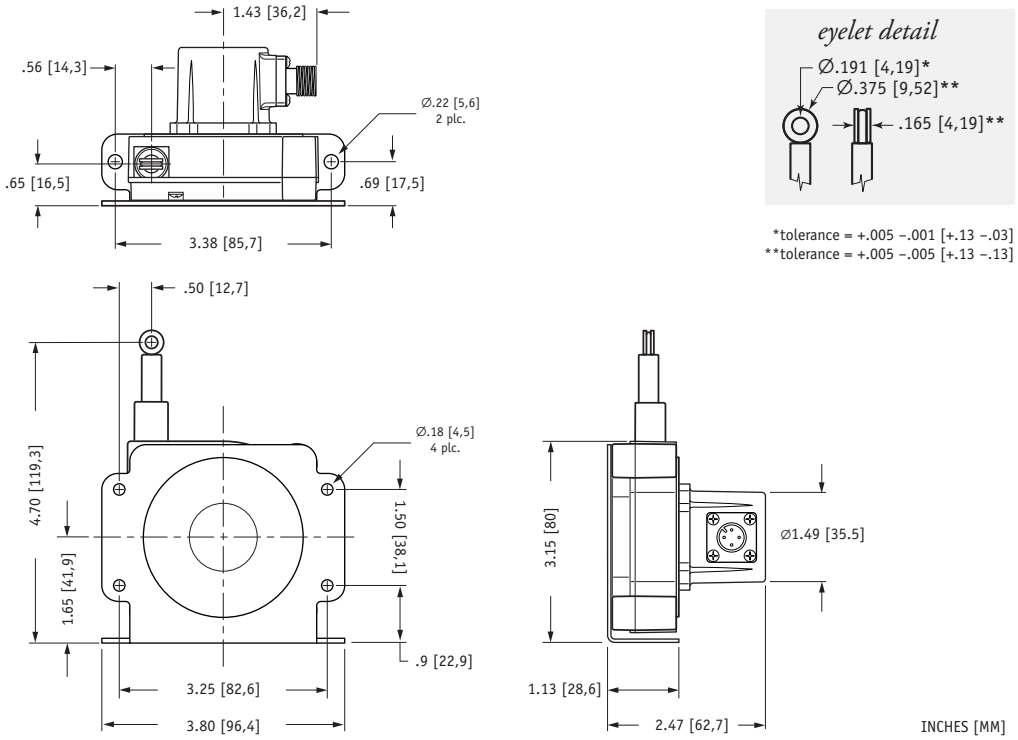


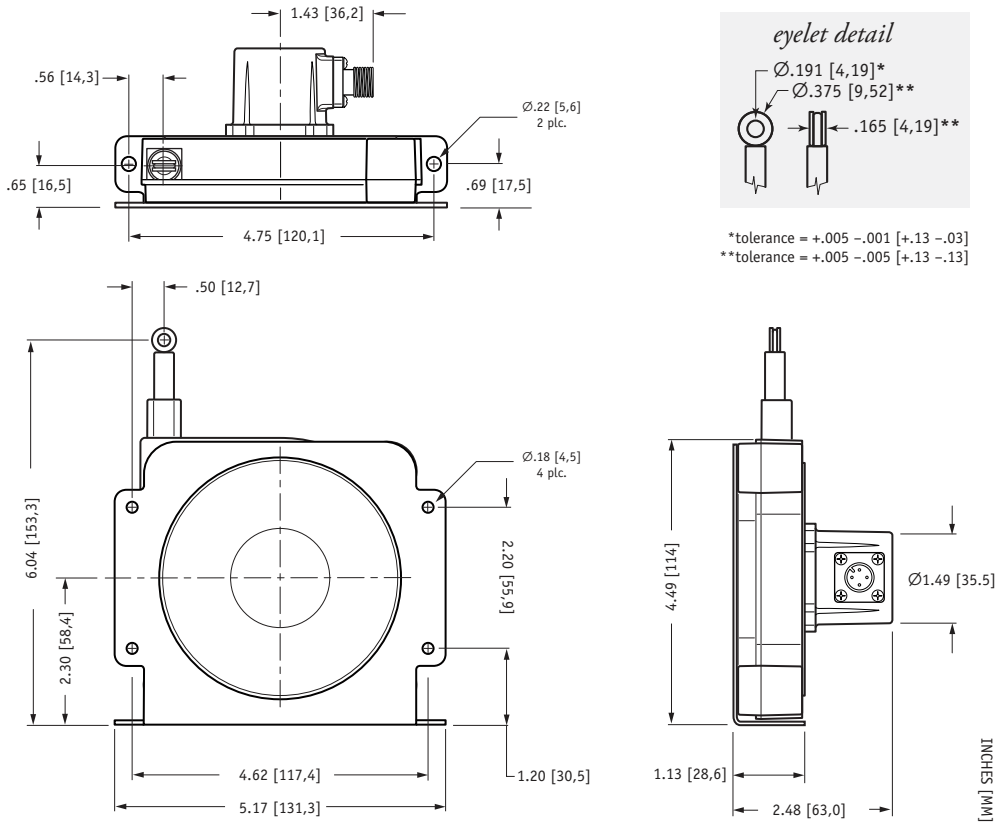
INCHES [MM]

electrical cable – *3-conductor, 24 AWG, shielded, 40 in. (1 meter) long*

SG1-80-3 w/ Mounting Bracket:



SG1-120-3 w/ Mounting Bracket:

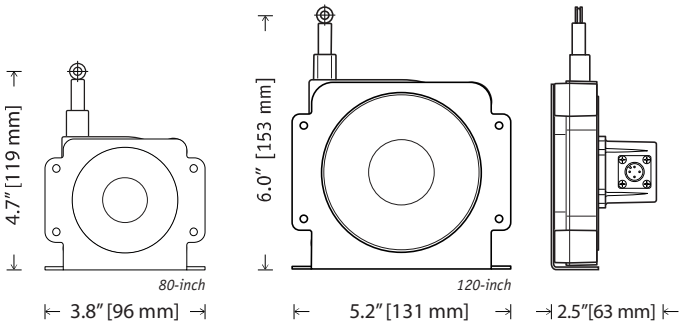


Version: **3.0** last updated: **February 4, 2013**

SGD

4..20mA • 0..10 Vdc Output Signal

Compact Mid-Range String Pot • Absolute Position
80, 120-inch Stroke Range Options
Polycarbonate Enclosure • IP67
In Stock for Quick Delivery



Suited for IP67 (wet) environments, the SGD provides a user-selectable 4-20mA or 0-10VDC absolute linear position signal over an 80-inch or 120-inch full stroke range option. Signal selection is simply made by connecting the appropriate pins on the included connector or selecting the proper wires in the optional cordset.

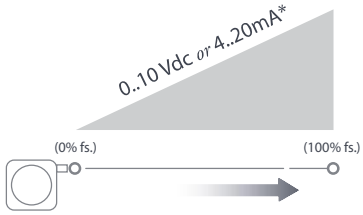
Additionally, this sensor is constructed with a rugged poly-carbonate body, an extremely durable spring-loaded stain-less steel measuring cable and a mounting bracket that lets the customer mount this sensor in just about any direction. The SGD is in stock for quick delivery.

Customized options are also available for OEM customers.

SPECIFICATIONS

Stroke Range	80 inches (2032 mm), 120 inches (3048 mm)
User Selectable Output Signal	4...20 mA (2-wire) / 0...10 Vdc
Input Voltage, 4...20 mA option	8-40 VDC
Input Voltage, 0...10 Vdc option	12-32 VDC
Accuracy	.35% FS.
Repeatability	.05% FS.
Resolution	essentially infinite
Measuring Cable	.019-inch dia. nylon-coated stainless steel
Maximum Acceleration	10 g
Measuring Cable Tension	9 oz. (2,5 N) ±30%
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	0˚ to 160˚ F (-18˚ to 70˚ C)
Weight, 80-inch (not including bracket)	.6 lbs. (272 g)
Weight, 120-inch (not including bracket)	1 lb. (453 g)

Output Signal:

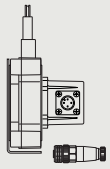


signal endpoint tolerances

*Output Signal**	*0% fs.*	*100% fs.*
4...20 mA	*4 – 4.25 mA*	*19.2 – 20 mA*
0...10 Vdc	*0 – .2 Vdc*	*9.5 – 10 Vdc*

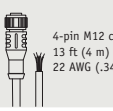
*note: signal endpoints are set at the time of manufacture and cannot be adjusted

ORDERING INFORMATION



Part No. **SGD-80-3**
80-inch stroke range, 4–20 mA / 0–10 Vdc output M12 connector, IP67 environments, mounting bracket included

Part No. **SGD-120-3**
120-inch stroke range, 4–20 mA / 0–10 Vdc output M12 connector, IP67 environments, mounting bracket included



Optional Cordset Part No. **9036810-0040**
for short-run connections, a convenient optional 13-ft. cordset with a 4-pin M12 connector is available for the SGD-80-3 and SGD-120-3.

20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
measurement SPECIALTIES™
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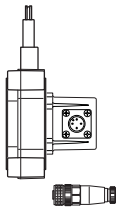
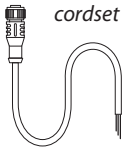
Electrical Connection:

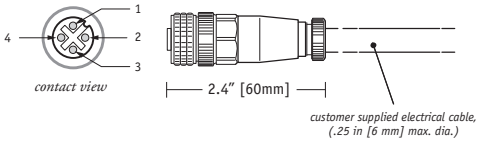
Output Signals

0...10 Vdc	4...20 mA	pin	pin - colorcode
12...32 Vdc	8...40 Vdc	1	1 - brown
0...10 Vdc	n/c	2	2 - white
n/c	n/c	3	3 - blue
common	4...20 mA	4	4 - black

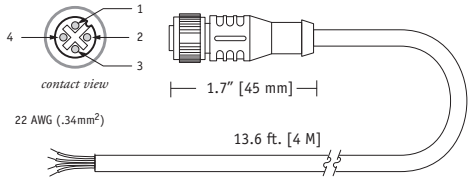


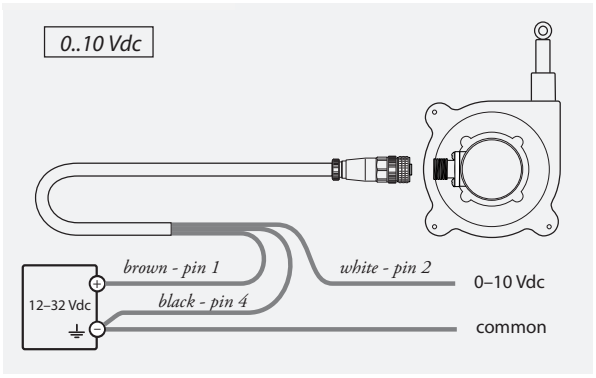


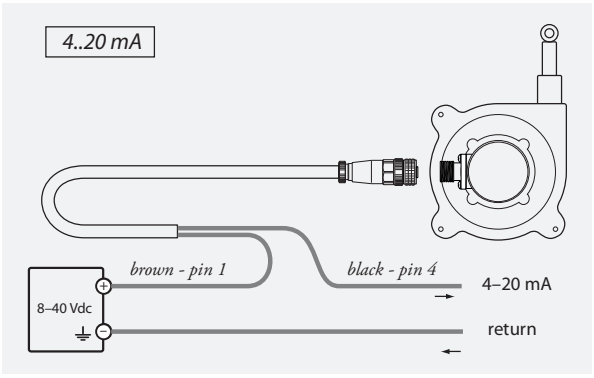
field installable connector (included)



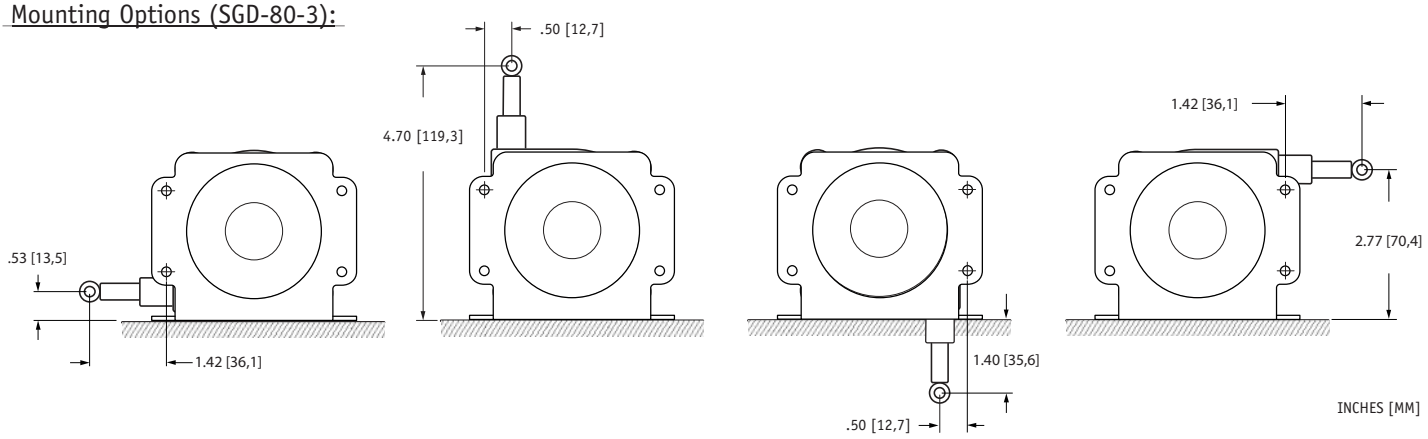
cordset, part no. 9036810-0040 (optional)



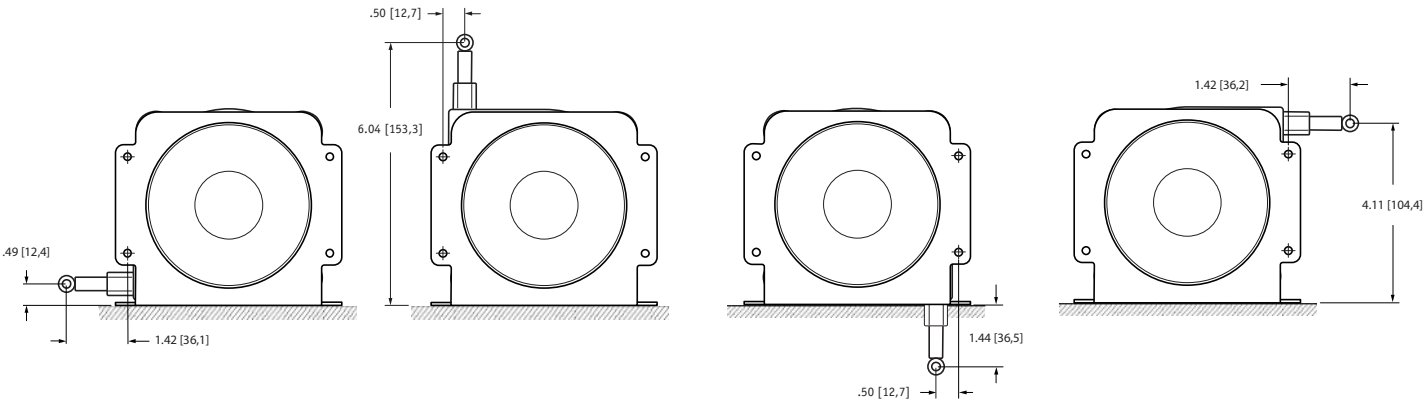




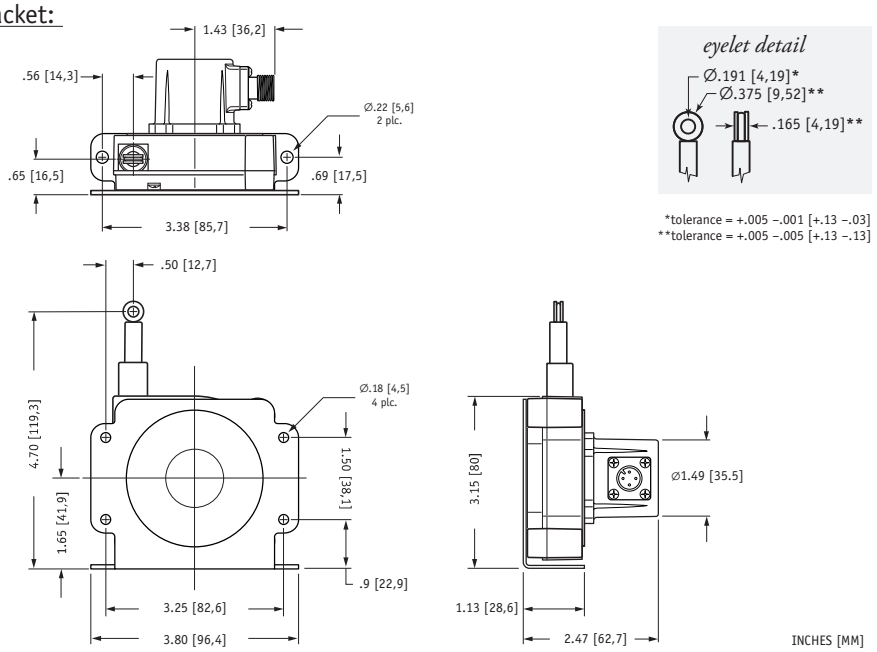
Mounting Options (SGD-80-3):



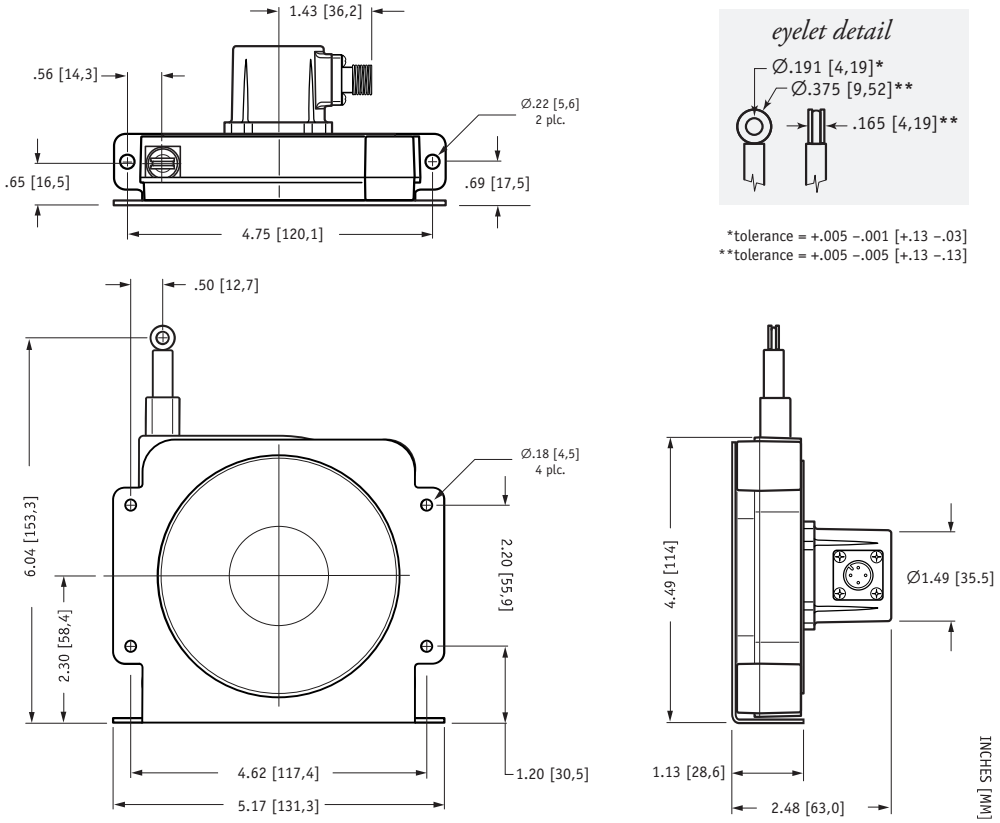
Mounting Options (SGD-120-3):



SGD-80-3 w/ Mounting Bracket:



SGD-120-3 w/ Mounting Bracket:

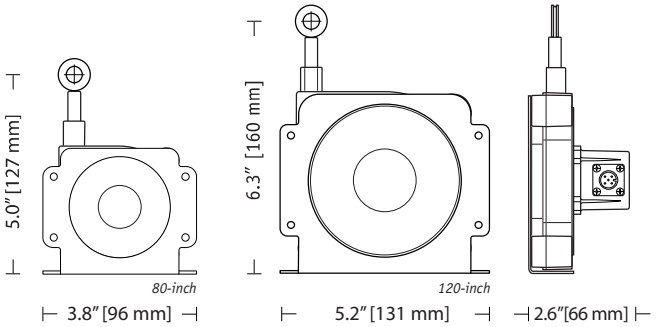


version: **2.1** last updated: **September 27, 2012**

SGH

CANopen Output Signal

Compact Mid-Range String Pot • Absolute Position
80, 120-inch Stroke Range Options
Rugged 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 200˚ F (-40˚ to 90˚ C)
Weight, 80-inch (not including bracket)	.6 lbs (272 g)
Weight, 120-inch (not including bracket)	1 lb. (454 g)

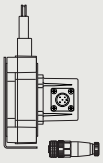
CANopen SPECIFICATIONS

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 Ordering Information

A perfect solution for both OEM and single-piece user, this string pot provides an economically priced CANopen sensor for 80-inch and 120-inch stroke range applications. This sensor is constructed with a rugged polycarbonate enclosure, a stainless steel mounting bracket and universally accepted M12 connector for operation in both outdoor or factory dry environments. For the OEM, customized options are available.

ORDERING INFORMATION

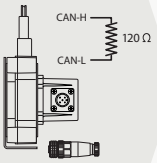
w/o terminating resistor



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

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

w/ terminating resistor



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

Part No. **SGH-120-4-TR**
80-inch stroke range, 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.

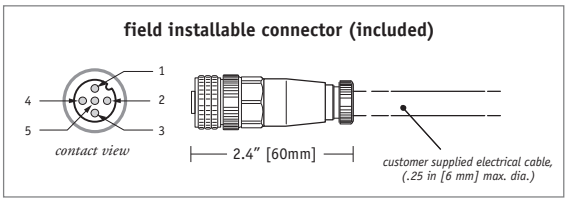
Field Installable Connector Part No. **9036810-0032**
While every SGH ships with a field installable 5-pin M12 mating plug, additional connectors are available.

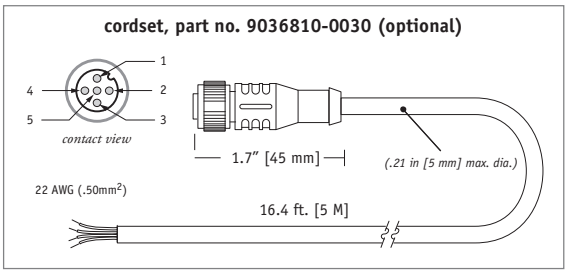
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
measurement SPECIALTIES™
celesco
celesco.com • info@celesco.com

Electrical Connection:

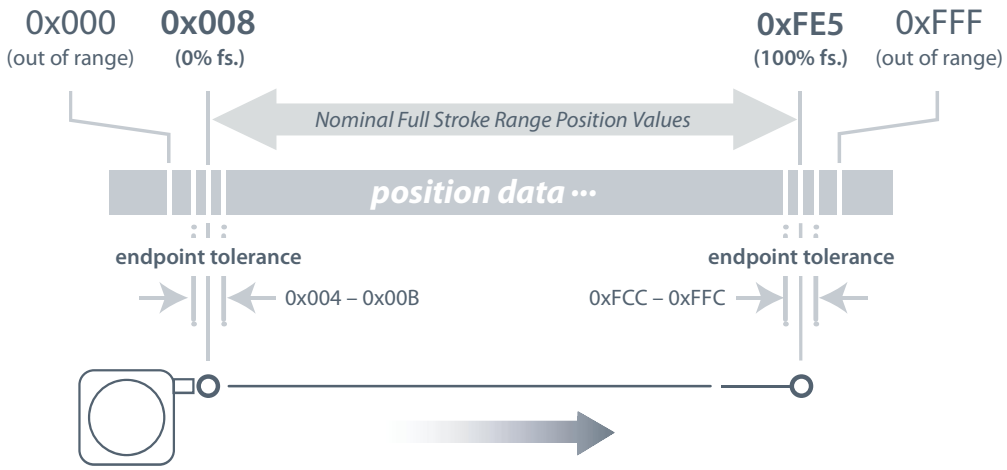
connector cordset

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

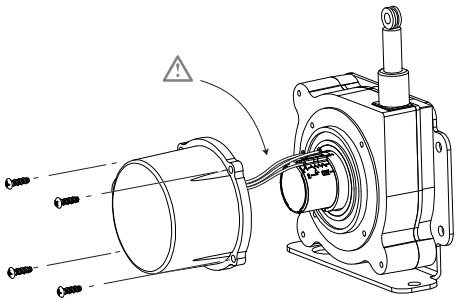


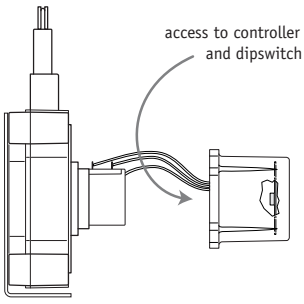


Position Data Overview:



Internal Controller Board





Status LED - Indicates Operating Condition of the Potentiometer

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 and Node ID settings:

LSS, Baud Rate and Node ID 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.

Settings (cont.):

LSS options

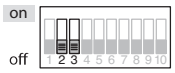
LSS settings	SW1
disabled	off
enabled	on

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.

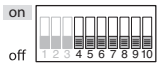
BAUD Rate:

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



transmission rate options

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



node ID options 1–127 (0x01–0x7F)

node ID Dec.	node ID 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:

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.

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 (Emergency 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 0x008 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.):

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.

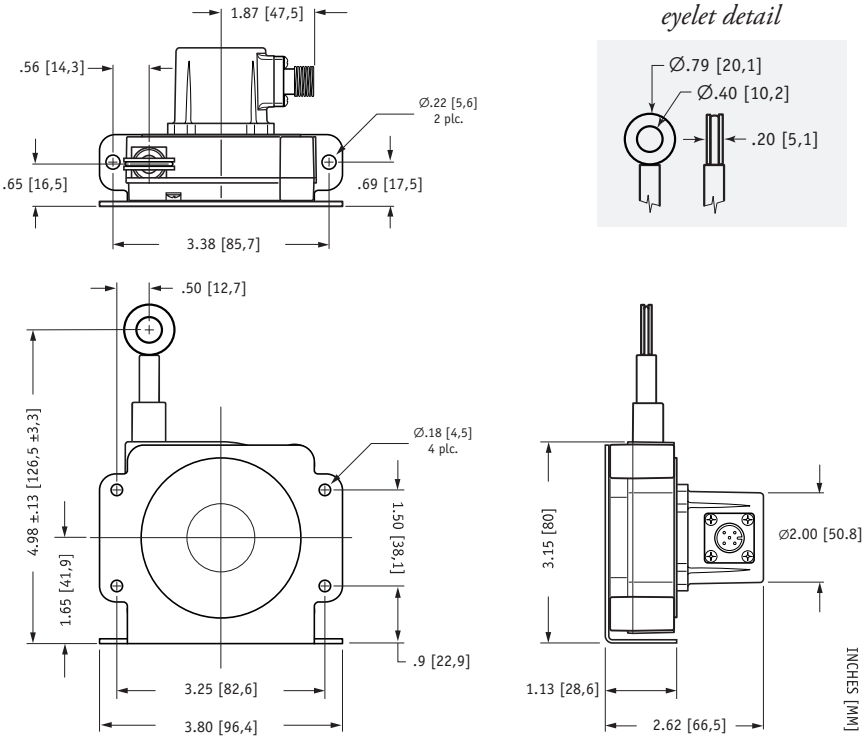
Communication Area Profile:

Index	Sub-Index	Name	Default	Comment
1000		Device Type	0X00080196	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	
	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				
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

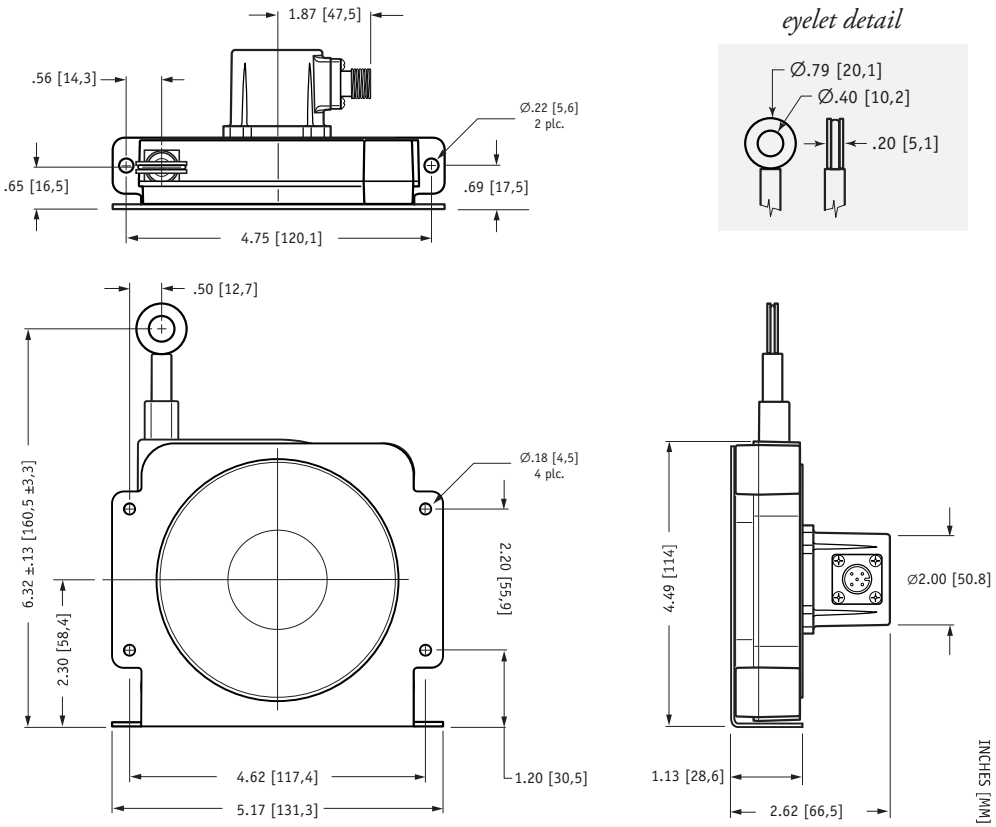
Communication Area Profile (cont.):

1018		Identity Object		
	0	Number of Entries	4	
	1	Vendor Id	0x2E0	
	2	Product Code	269 (decimal)	Celesco Reference # 604269
	3	Revision Number	1	
	4	Serial Number	0x00000000	
1800		Tx PDO Comm. Parameter		PDO1
	0	Number of Entries	5	
	1	COB-ID	$NodeID + 0x108	COB-ID used by PDO1
	2	Transmission Type	254	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
	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

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



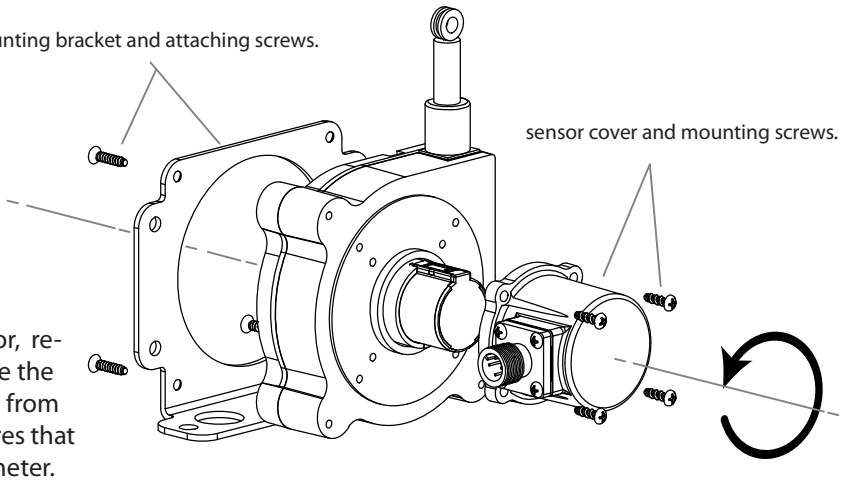
120-inch SGH-120-4 w/ Mounting Bracket:



Mounting Options:

Changing Measuring Cable Exit and Electrical Connector Direction:

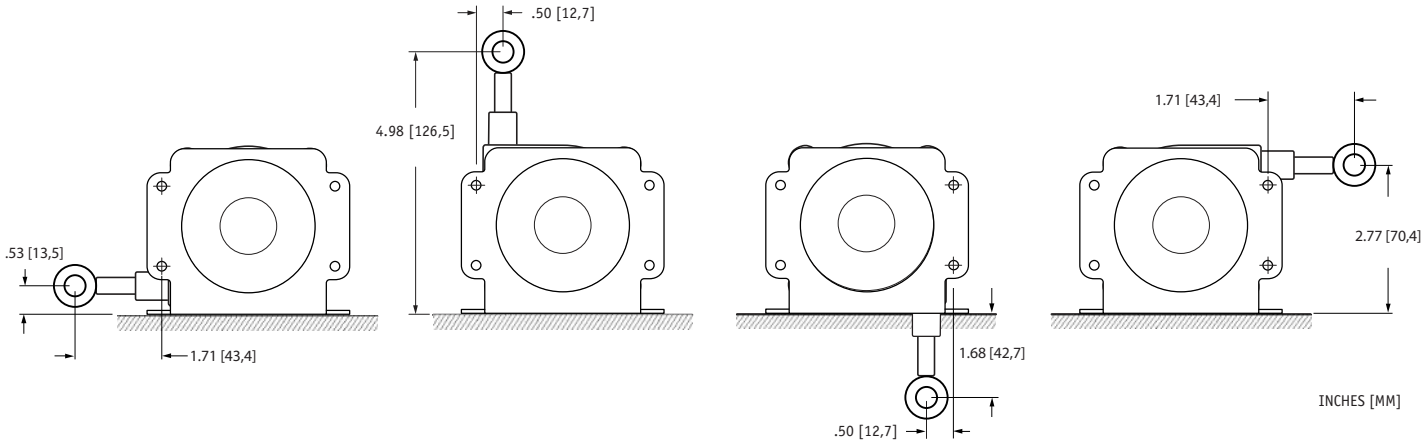
For the ultimate in flexibility, the measuring cable exit direction and the direction of the electrical connector can be rotated around in 90° increments to accommodate just about any installation requirement.



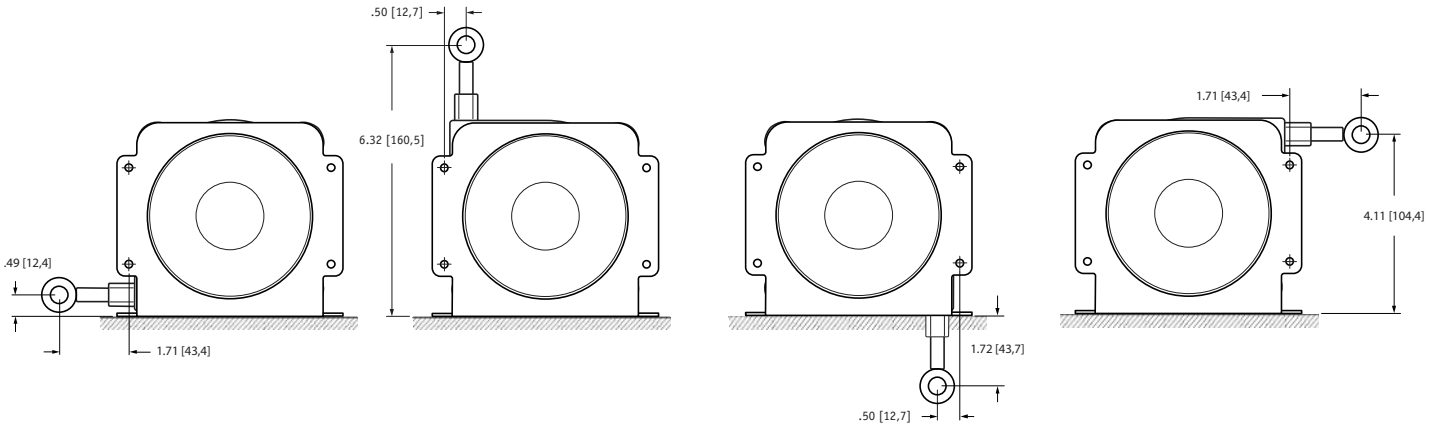
To change measuring cable exit direction, simply remove the 4 mounting bracket screws, rotate the bracket to desired position and replace the screws.

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 (SGH-80-4):



Mounting Option Mounting Option Dimensions (SGH-120-4):

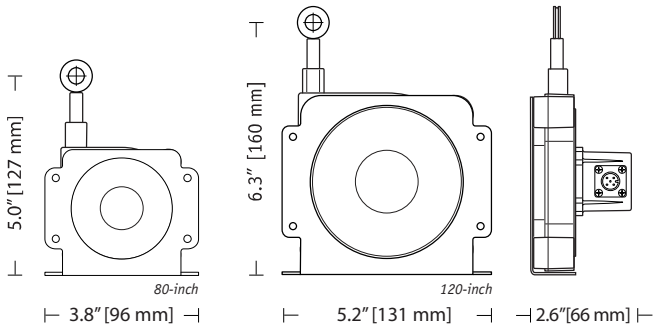


version: **1.4** last updated: **January 21, 2013**

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 200˚ F (-40˚ to 90˚ C)
Weight, 80-inch (not including bracket)	.6 lbs (272 g)
Weight, 120-inch (not including bracket)	1 lb. (454 g)

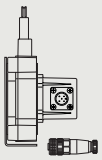
CANbus SPECIFICATIONS

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

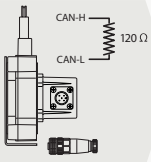
w/o terminating resistor



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

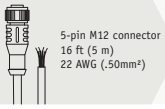
Part No. **SGJ-120-4**
120-inch stroke range, no terminating resistor, 5-pin M12 mating plug, mounting bracket included

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
measurement SPECIALTIES™
celesco
celesco.com • info@celesco.com

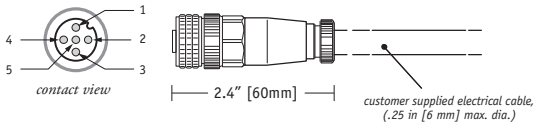
Electrical Connection:

connector

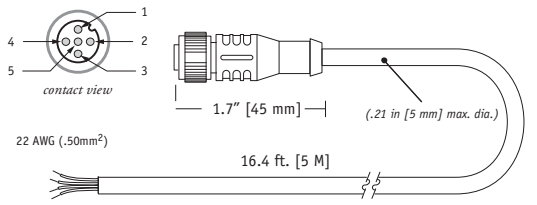
cordset

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

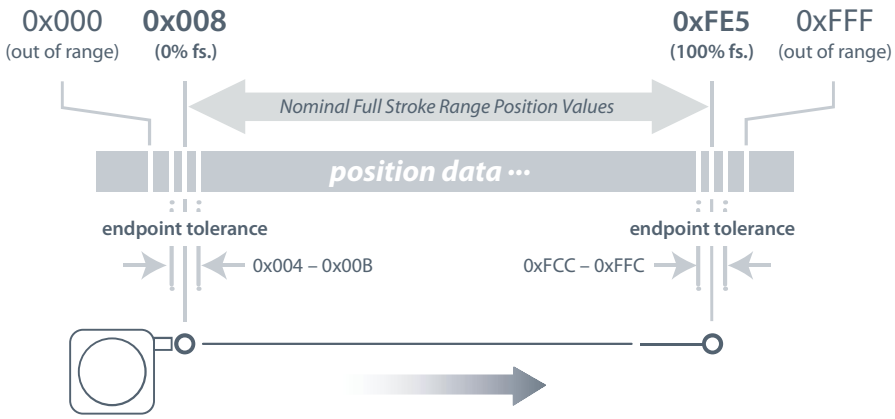
field installable connector (included)



cordset, part no. 9036810-0030 (optional)



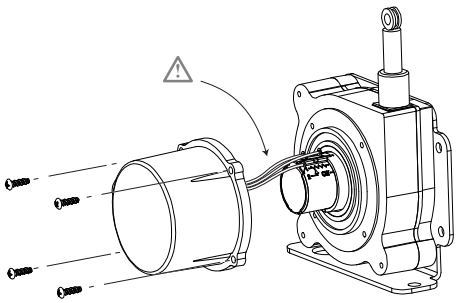
Position Data Overview:

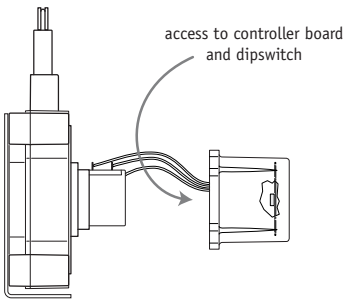


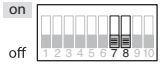
Baud, Node ID and Data Rate:

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.

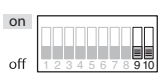






BAUD rate options

baud rate	SW2	SW3
125 kbps	off	off
250 kbps	on	off
500 kbps	off	on



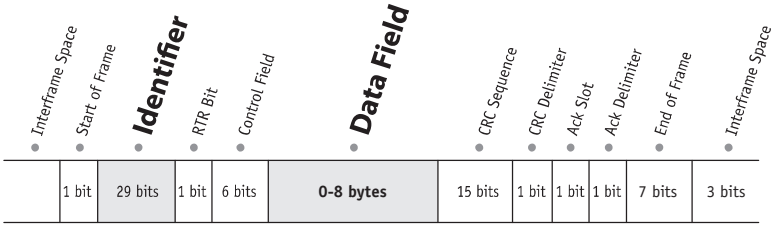
Data Rate options

Data Rate	SW9	SW10
5 ms	off	off
20 ms	on	off
50 ms	off	on
100 ms	on	on

node ID options 0–63 (0x00–0x3F)

node ID Dec.	node ID Hex	SW1 (2^0)	SW2 (2^1)	SW3 (2^2)	SW4 (2^3)	SW5 (2^4)	SW6 (2^5)
0	0x00	off	off	off	off	off	off
1	0x01	on	off	off	off	off	off
2	0x02	off	on	off	off	off	off
3	0x03	on	on	off	off	off	off
...	...	...	...	...	...	...	...
62	0x3E	off	on	on	on	on	on
63	0x3F	on	on	on	on	on	on

I/O Format:



repetition = 8 msec.

Identifier:

	Message Priority			Future Use		J1939 Reference Proprietary B								Data Field Type*								Not Used		Node ID**					
Example –	1	0	0	0	0	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.

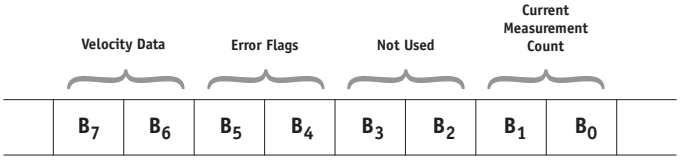
Data Field:

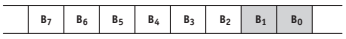
B_0 = LSB current measurement count byte
B_1 = MSB current measurement count byte

B_2 = not used
B_3 = not used

B_4 = error flag
B_5 = error flag

B_6 = LSB velocity data byte
B_7 = MSB velocity data byte





Current Measurement Count

The **C**urrent **M**easurement **C**ount (**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_0 and B_1 of the data field. B_0 is the **LSB** (least significant byte) and B_1 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

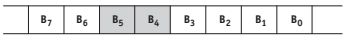
To convert the current measurment count to inches or millimeters, simply divide the count by 4061 (total counts over the range) and then multiply that value by the full stroke range:

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

Sample Conversion:

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

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

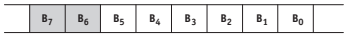


Error Flags

RED and GREEN Indicator LEDS (controller board)

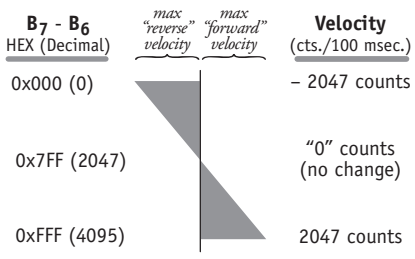
0x00 (GREEN - ON, RED - OFF) indicates the sensor is operating within normal calibrated limits.

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



Velocity

Data in bytes B_7 - B_6 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

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

Sample Calculations

Cable Extension (positive direction):

$B_7..B_6$ = **0x8D3** (2259Dec), **full stroke = 80 in.**

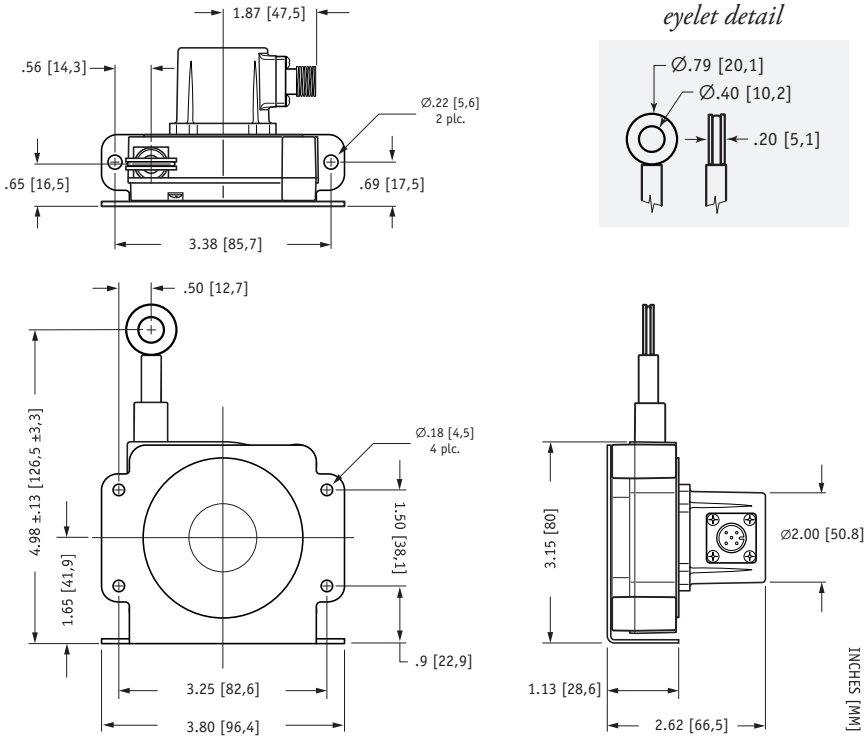
$$\left(\frac{2259 - 2047}{.1 \text{ sec}}\right) \text{X} \left(\frac{80 \text{ in.}}{4061}\right) = 41.76 \text{ in./sec.}$$

Cable Retraction (negative direction):

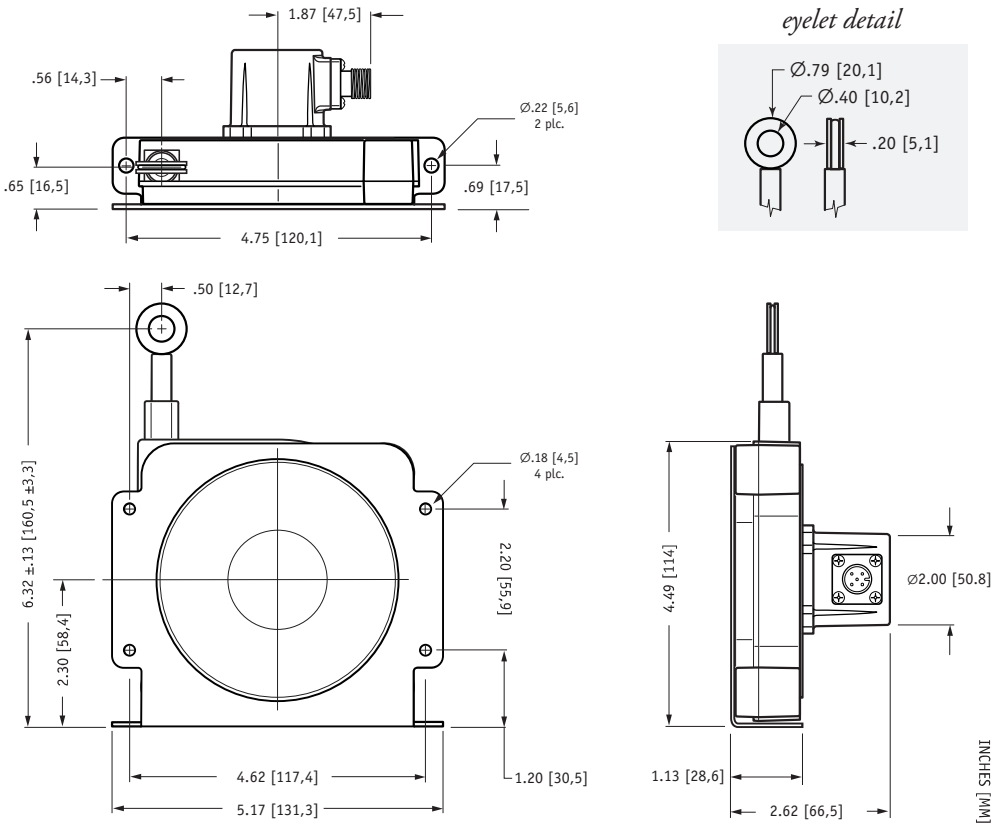
$B_7..B_6$ = **0x7D0** (2000Dec), **full stroke = 80 in.**

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

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



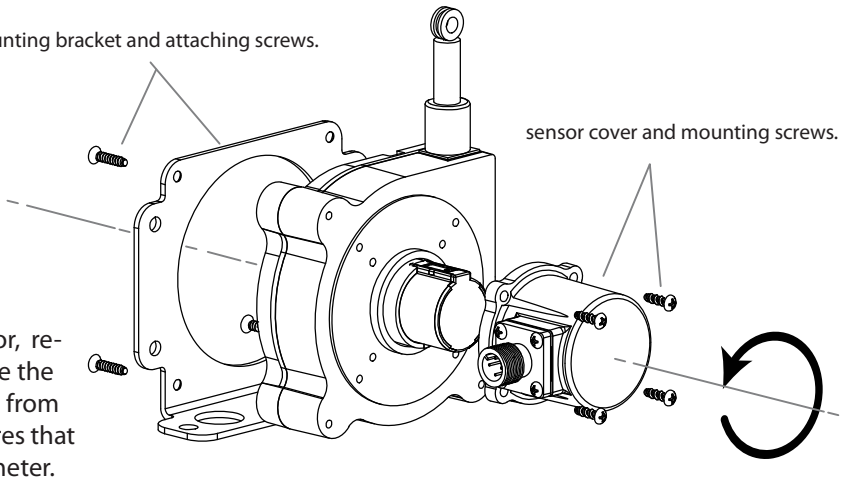
120-inch SGJ-120-4 w/ Mounting Bracket:



Mounting Options:

Changing Measuring Cable Exit and Electrical Connector Direction:

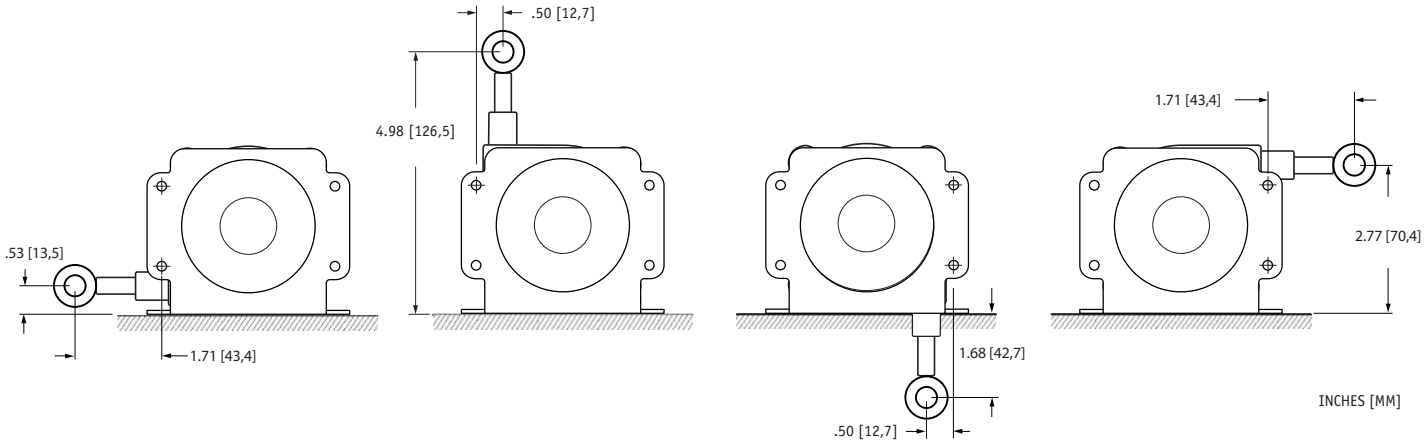
For the ultimate in flexibility, the measuring cable exit direction and the direction of the electrical connector can be rotated around in 90° increments to accommodate just about any installation requirement.



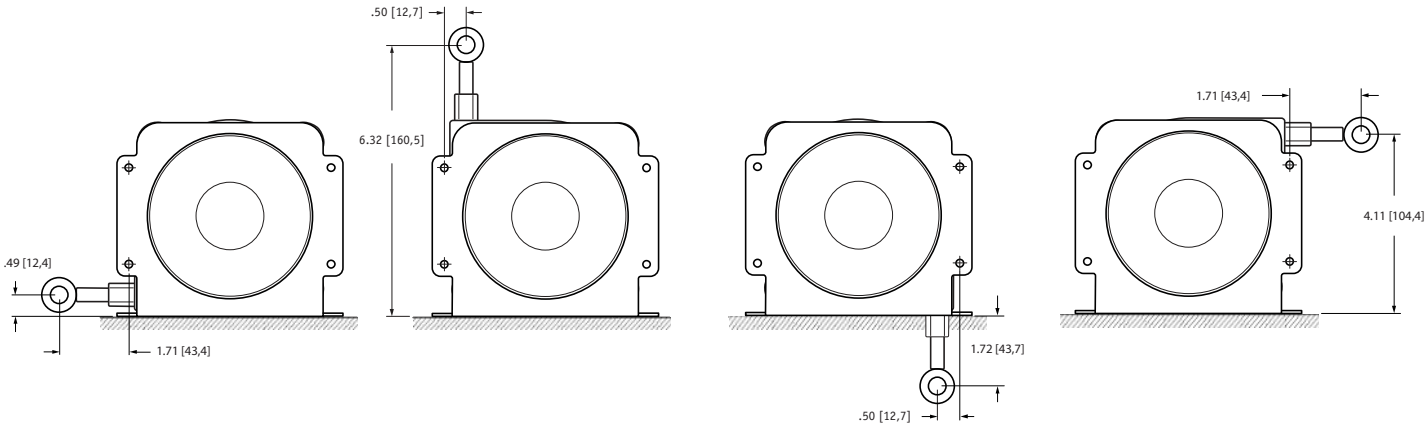
To change measuring cable exit direction, simply remove the 4 mounting bracket screws, rotate the bracket to desired position and replace the screws.

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: **1.0** last updated: **January 23, 2013**