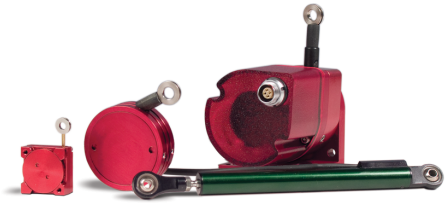
Low Cost

Custom
OEM

Heavy
Industrial



Testing
Applications

Linear and Rotary Measurement Solutions

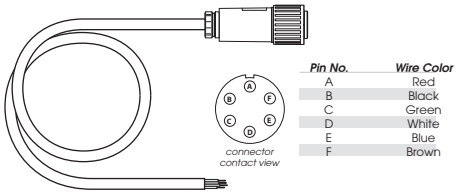
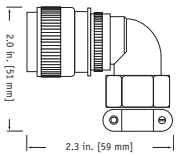
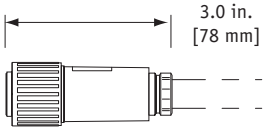
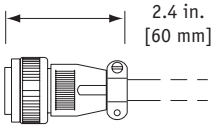
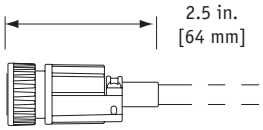
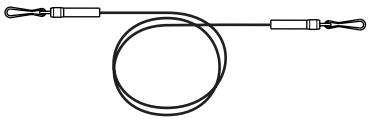
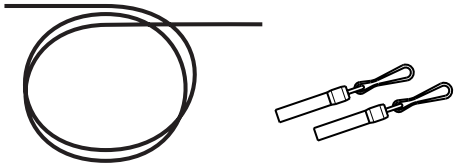
Easy, Simple, Reliable.

2009 | 2010

updated: 05.12.10

celesco

Accessories

Electrical Interconnect Cable Assembly	*specifications*	*transducer series*	*order number*
	6-pin plug with 15-ft. long 6-conductor shelded 24 AWG multiconductor cable. Mates to any of our position sensors with the 6-pin connector option. Available with either plastic or metal connector.	PT1, PT100, PT5, PT8000, PT9000, RT8000, RT9000, IT9000	9603513-0015 (plastic connector) 9603924-0015 (metal connector)
6-pin 90º Mating Plug			
	6-pin, 90-degree metal mating plug. Mates to any of our position sensors with the 6-pin connector option.	PT1, PT100, PT5, PT8000, PT9000, RT8000, RT9000, IT9000	9036810-0018
6-Pin Plastic Mating Plug			
	6-pin, plastic mating plug. Mates to any of our position sensors with the 6-pin plastic connector option.	PT1, PT100, PT5, PT8000, PT9000, RT8000, RT9000, IT9000	9036830-0001
6-Pin Metal Mating Plug			
	6-pin, metal mating plug. Mates to any of our position sensors with the 6-pin metal connector option.	PT1, PT100, PT5, PT8000, PT9000, RT8000, RT9000, IT9000	9036810-0001
18-Pin Plastic Mating Plug			
	18-pin, plastic mating plug. mates to encoder based position sensors with18-pin connector option.	DPT250, PT5E, PT8150 and PT9150 only. Used for Line Driver Option w/Index Channels	9036820-0003
Extension / Leader Cable Assemblies		*description*	
	Extension cable enables the position transducer to be mounted away from the range of measurement. XXXX = length in inches (example: 0025 = 25 in)	.019-inch nylon-coated stainless steel cable assembly	9603969-XXXX
		.034-inch nylon-coated stainless steel cable assembly	9603740-XXXX
		.047-inch nylon-coated stainless steel cable assembly	9603965-XXXX
Leader Cable and Hardware Kit		*description*	*order number*
		Bare .047-in. dia. stainless steel cable for making your own leader cable. *(sold by the foot)*	9000154-0047
		cable-end hardware kit *(includes 1 ea: swivel, clip,snubber)*	9610005-0005

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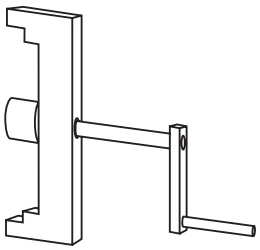
Measuring Cable Crimping Tool			
Used when making your own measuring cables. Sized perfectly for crimps provided in measuring cable hardware kits.		measuring cable crimping tool	9610035-0000
Spring Winding Tool	*description*		
	PT8000 Spring Winding Tool		9610018-0000
	PT8600 Spring Winding Tool		9610031-0000
	PT9000 and PT9600 Spring Winding Tool		9610021-0000
Underwater Testing			
Recommended for Underwater Applications	Celesco will pressure test and certify transducer for water tightness. Transducer is subjected to an elevated air pressure of 55 psia for 2 hours and monitored for internal seal failure. For extreme depth applications, please contact factory.		Form 7.3_29
Certificate of Conformance			
Certifies that a transducer shipped on an order was produced in accordance with and perform to contractually applicable government, customer and/or company specifications.	Certificate of Conformance		Form 7.3_24
Certificate of Calibration			
Certifies that a transducer shipped on an order was calibrated to measurement standards.	Certificate of Calibration		Form 7.3_25

Incremental Encoder Output
Ranges: 0-1000 to 0-1250 mm
Compact Size • OEM Applications

A125

Specification Summary:

GENERAL

Full Stroke Ranges	0-1000 & 0-1250 mm
Spool Circumference	125 mm
Output Signal	incremental (quadrature) encoder
Accuracy	+0.04% of F.S.
Repeatability	+0.02% of F.S.
Resolution	0.8 to 20 pulses per mm*
Measuring Cable	0.034-in dia. nylon-coated stainless steel
Optional Measuring Cable	0.040-in. dia. thermoplastic
Sensor	incremental optical encoder
Frame Material	zinc-plated steel
Weight, max.	1 lb.

ELECTRICAL

Encoder Output Driver Options	TTL-CMOS, open collector and line-driver
Output Channels	A, B and index (with and without compliments)*
Input Voltage	4.5 to 26.4 VDC*
Current Consumption	80 mA max.*
Sink Current	20 mA max.*

ENVIRONMENTAL

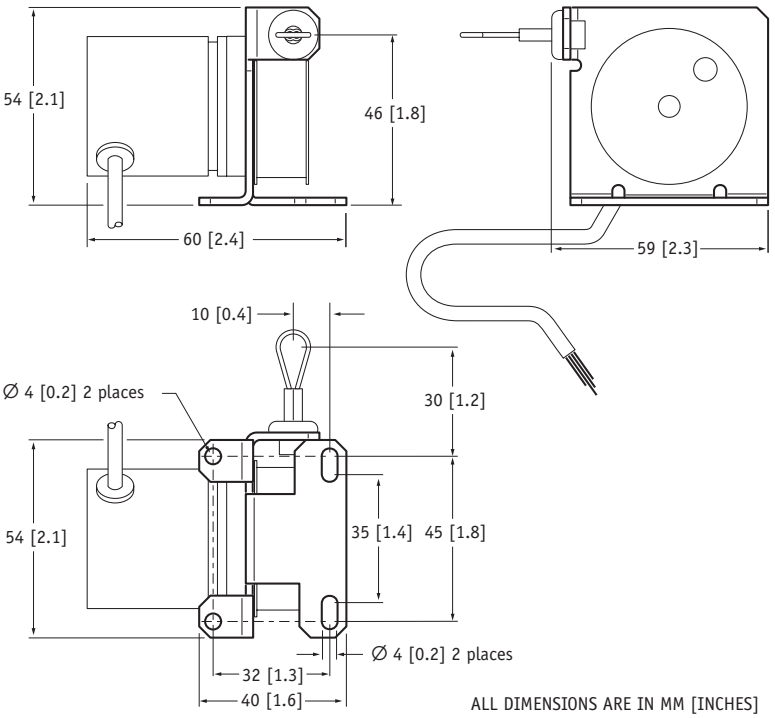
Operating Temperature	-10°C to +70°C
Storage Temperature	-30°C to +80°C
Humidity	RH 85%, no condensation
Vibration	10 ~ 55 Hz / 1.5 mm 2 hr.
Shock	30 G 11ms (X,Y, Z each 3 times)

**specifications may vary with configuration, please consult factory*

The A125 Cable-ExtensionTransducer is an optical encoder-based compact, flexible and highly accurate position feedback transducer.

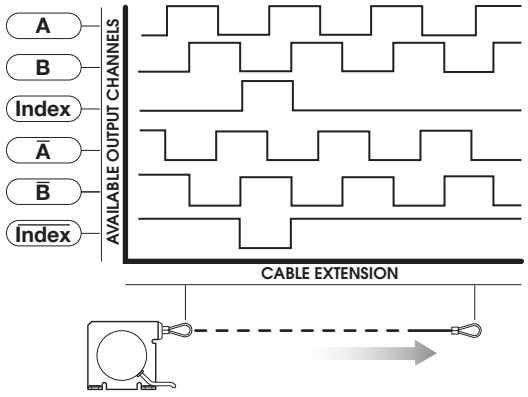
The standard A125 can be simply modified to meet specific OEM requirements. Just about any encoder type can be used for your specific requirment. Designs are available for new applications or as drop-in replacements of current assemblies. You can specify custom mounting, custom electrical connections and even customer-specified life testing. Quantities are available as small as 100 units.

Outline Drawing



ALL DIMENSIONS ARE IN MM [INCHES]

Output Signal



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celesco.com • info@celesco.com

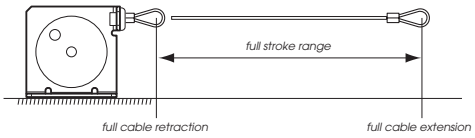
Order Form • Application Worksheet

Application

please provide a brief description of application. include exact stroke range, velocity of stroke and estimated number of cycles per year.

Full Stroke Range

select available range or specify complete requirements

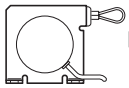


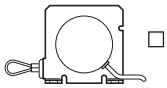
☐ 1000 mm
☐ 1250 mm
☐ other:

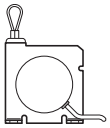
Measuring Cable

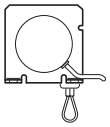
☐ 0.034" dia. nylon-coated stainless steel
☐ 0.040" dia. thermoplastic

Measuring Cable Exit


☐ front

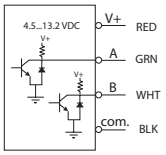

☐ rear


☐ up

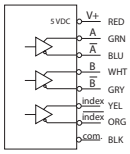

☐ down

Encoder

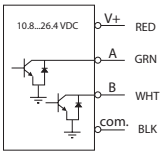
☐ TTL - CMOS compatible



☐ line driver



☐ open collector

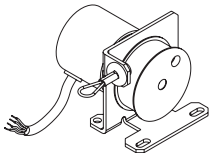


Resolution

☐ 0.8 pulses per mm
☐ 8 pulses per mm
☐ 16 pulses per mm
☐ 20 pulses per mm

Enclosure

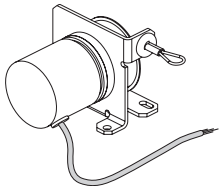
select no cover or specity custom enclosure requirements



☐ no cover

☐ custom enclosure:

Electrical Connection



☐ without connector

☐ with connector
- ☐ cable length:
- ☐ connector
  - manufacturer:
  - manufacturer's part no.:

Incremental Encoder Output
Ranges: 0-2000 to 0-2500 mm
Compact Size • OEM Applications

A250

Specification Summary:

GENERAL
Full Stroke Ranges.....0-2000 & 0-2500 mm
Spool Circumference..... 250 mm
Output Signal.....incremental (quadrature) encoder
Accuracy.....+0.04% of F.S.
Repeatability.....+0.02% of F.S.
Resolution.....0.4 to 10 pulses per mm*
Measuring Cable.....0.034-in dia. nylon-coated stainless steel
Optional Measuring Cable..... 0.040-in. dia. thermoplastic
Sensor..... incremental optical encoder
Frame Material..... zinc-plated steel
Weight, max..... 1 lb.

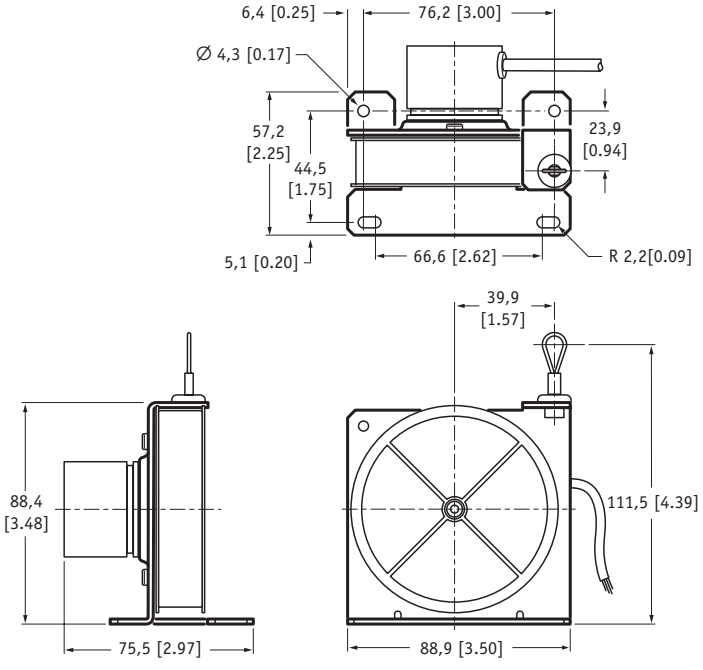
ELECTRICAL
Encoder Output Driver Options..... TTL-CMOS, open collector and line-driver
Output Channels.....A, B and index (with and without compliments)*
Input Voltage..... 4.5 to 26.4 VDC*
Current Consumption.....80 mA max.*
Sink Current.....20 mA max.*

ENVIRONMENTAL
Operating Temperature.....-10°C to +70°C
Storage Temperature..... -30°C to +80°C
Humidity.....RH 85%, no condensation
Vibration..... 10 ~ 55 Hz / 1.5 mm 2 hr.
Shock..... 30 G 11ms (X,Y, Z each 3 times)
**specifications may vary with configuration, please consult factory*

The A250 Cable-ExtensionTransducer is an optical encoder-based compact, flexible and highly accurate position feedback transducer.

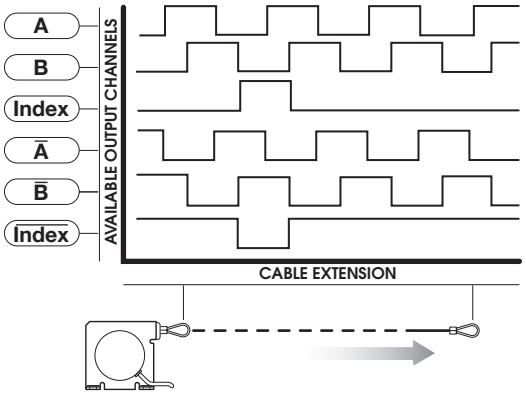
The standard A250 can be simply modified to meet specific OEM requirements. Just about any encoder type can be used for your specific requirment. Designs are available for new applications or as drop-in replacements of current assemblies. You can specify custom mounting, custom electrical connections and even customer-specified life testing. Quantities are available as small as 100 units.

Outline Drawing



ALL DIMENSIONS ARE IN MM [INCHES]

Output Signal



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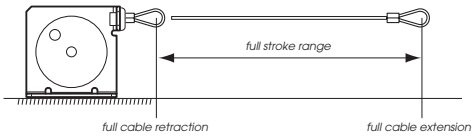
Order Form • Application Worksheet

Application
please provide a brief description of application. include exact stroke range, velocity of stroke and estimated number of cycles per year.

Full Stroke Range
select available range or specify complete requirements

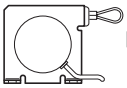


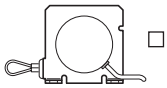
☐ 2000 mm
☐ 2500 mm
☐ other:

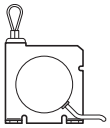
Measuring Cable

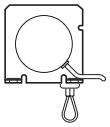
☐ 0.034" dia. nylon-coated stainless steel
☐ 0.040" dia. thermoplastic

Measuring Cable Exit


☐ front

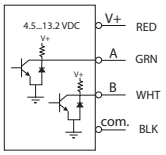

☐ rear


☐ up

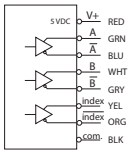

☐ down

Encoder

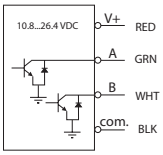
☐ TTL - CMOS compatible



☐ line driver



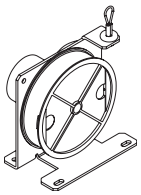
☐ open collector



Resolution

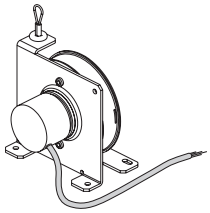
☐ 0.4 pulses per mm
☐ 4 pulses per mm
☐ 8 pulses per mm
☐ 10 pulses per mm

Enclosure
select no cover or specity custom enclosure requirements



☐ no cover
☐ custom enclosure:

Electrical Connection



☐ without connector

☐ with connector
- ☐ cable length:
- ☐ connector
  - manufacturer:
  - manufacturer's part no.:

version: **1.0** last updated: **April 14, 2005**

CH25

100 to 5000 Pulses Per Revolution
5...30 VDC • Push-Pull Driver
M12 Connector • IP67

Introducing Celesco's CH25 Incremental Encoder. This encoder comes with a 2.5-inch square flange, 3/8-inch shaft and a push-pull output driver. The CH25 also accepts a wide input voltage from 5 to 30 VDC and is available in resolutions from 100 to 5000 pulses per revolution.

This encoder is perfect for many applications including electric motors, packaging machines, conveyor systems and elevators.

Specification Summary:

ELECTRICAL

Pulses Per Revolution Options 100, 360, 500, 1024, 2048, 4096, 5000
Output Driver ..... push-pull ($V_{out} = V_{in}$)
Input Voltage (V_{in}) ..... 5...30 VDC
Input Current ..... 70 mA max.
Load ..... 40 mA max.
Output Level (@ 20 mA load)
High ..... > V_{in} – 10%
Low ..... < 2.5 VDC
Pulse Frequency ..... 200 kHz
Circuit Protection ..... inverse-polarity protection
Electrical Connection ..... M12 (8-pin) connector–*mating plug not included*

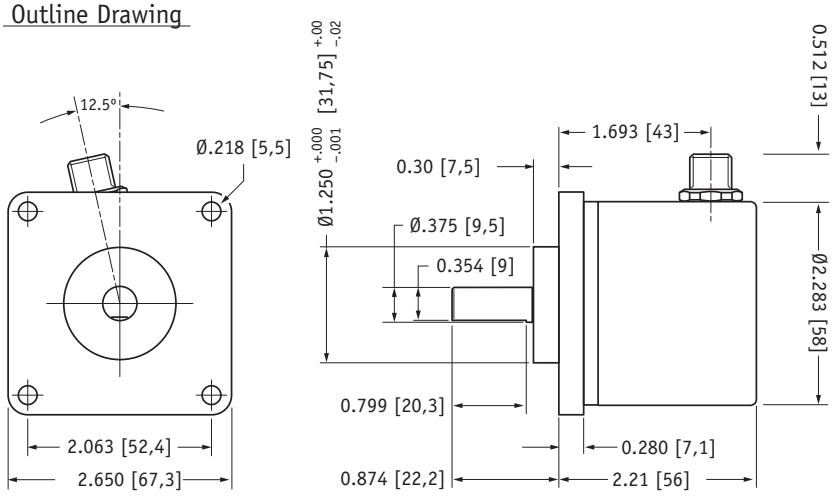
MECHANICAL

Housing ..... aluminum, powder-coated
Flange ..... aluminum
Shaft ..... stainless steel
Shaft Loading, Radial ..... 49.5 lbs (220 N) max.
Shaft Loading, Axial ..... 27 lbs (120 N) max .
Starting Torque ..... approx. 1.4 oz-in. (1 N-cm) @ ambient temperature
Bearing Type ..... precision ball bearings
Bearing Life:
@ 100% of full rated load ..... 10^9 shaft revolutions
@ 40% of full rated load ..... 10^{10} shaft revolutions
@ 20% of full rated load ..... 10^{11} shaft revolutions
Maximum Operating Speed ..... 8000 RPM
Weight (approx) ..... 10.5 oz (300g)

ENVIRONMENTAL

Enclosure Design IP67
Shaft Seals IP65
Operating Temperature ..... -4º to 176ºF (-20º to 80ºC)
Storage Temperature ..... -22º to 176ºF (-30º to 80ºC)

Outline Drawing



inches [mm]

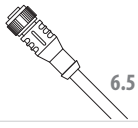
Ordering Information:

Encoder:

Order Number	*Pulses Per Turn*
CH25-100	100
CH25-360	360
CH25-500	500
CH25-1024	1024
CH25-2048	2048
CH25-4096	4096
CH25-5000	5000

Accessories:

Shielded Cord-Set



order #: 9036810-0050
(w/ **straight** cable socket)
6.5 ft (2 M)

Celesco Transducer Products, Inc.
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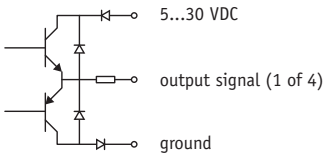
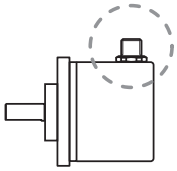
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco.com • info@celesco.com

Output Driver:



Output Signal Connections:

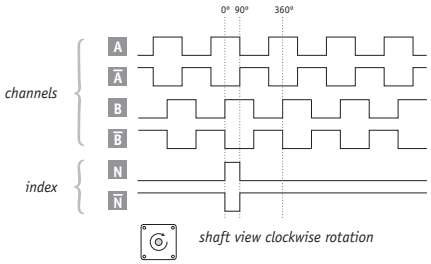


M12 Connector

Encoder Pin Connections

pin	signal	pin	signal
1	**ground**	**5**	**N**
2	**5...30 VDC**	**6**	**channel A′**
3	**channel A**	**7**	**channel B′**
4	**channel B**	**8**	**N′**

Output Waveforms



part # 9036810-0050

Cord Set Connections

pin	conductor	signal	pin	conductor	signal
(1)	**white**	**ground**	**(5)**	**gray**	**N**
(2)	**brown**	**5...30 VDC**	**(6)**	**pink**	**channel A′**
(3)	**green**	**channel A**	**(7)**	**blue**	**channel B′**
(4)	**yellow**	**channel B**	**(8)**	**red**	**N′**

cable specifications

length:	6.5 ft. (2m)
wire size:	24 AWG (.25mm^2)
shield:	yes
cable material:	PVC
cable color:	gray

version: **3.0** last updated: **April 11, 2008**

CLP

Precision Potentiometric Output
Ranges: 0-1 to 0-11.5 inches [0-25 to 0-290 mm]
2.5K – 11.6K ohms • IP65

Specification Summary:

GENERAL

Full Stroke Ranges ..... 0-1 to 0-11.5 in. (0-25 to 0-290 mm)
Output Signal ..... voltage divider (potentiometer)
Linearity ..... ± 0.1 to 0.2% full stroke, *see ordercode*
Repeatability ..... 0.01 mm
Resolution ..... essentially infinite
Life Expectancy ..... > 25 million cycles
Operating Speed ..... 400 inches (10 M) per second max.
Enclosure Material ..... aluminum
Sensor ..... conductive plastic linear potentiometer
Weight ..... 3 - 7 oz. (87 - 197 g.), *see ordercode*

ELECTRICAL

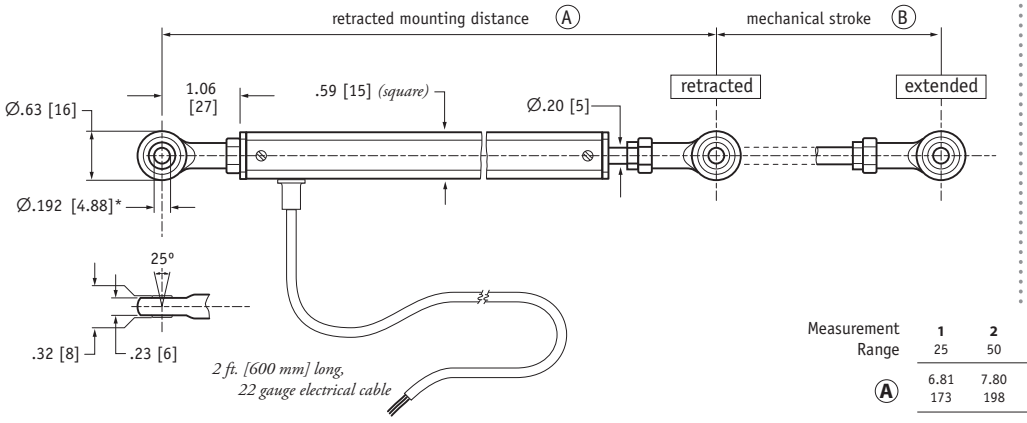
Input Resistance ..... 2.5K to 11.6K ohms (±20%), *see ordercode*
Recommended Maximum Input Voltage ..... 42 VDC
Recommended Operating Wiper Current ..... < 1µA

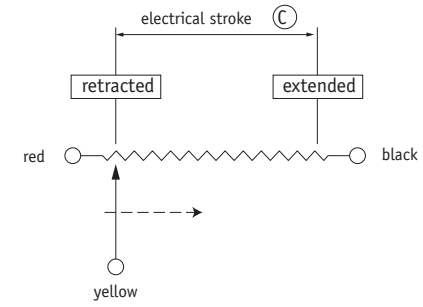
ENVIRONMENTAL

Enclosure Design IP65
Environmental Sealing ..... O-ring and felt shaft seal
Operating Temperature ..... -40º to 212ºF
Vibration ..... up to 10 G's to 2000 Hz maximum

Developed specifically to meet the needs of the auto racing industry and proven in industrial applications, Celesco's CLP series position transducers offer unrivalled performance in terms of accuracy, repeatability, life expectancy and ease of mounting.

The combination of individually corrected conductive plastic elements and precious metal wipers provide a cost effective measuring system which can operate effectively without being unduly influenced by external environmental conditions.





Measurement Range	1 25	2 50	3 75	4 100	6 150	8 200	10 250	11.5 290	in mm
Ⓐ	6.81 173	7.80 198	8.75 222	9.76 248	11.73 298	13.82 351	15.79 401	18.27 464	(± 0.1) in (± 2) mm
Ⓑ	1.12 28.5	2.11 53.5	3.09 78.5	4.08 103.5	6.04 153.5	8.13 206.5	10.10 256.5	11.55 293.5	(± 0.02) in (± 0.5) mm
Ⓒ	1.06 27.0	2.05 52.0	3.03 77.0	4.02 102.0	5.98 152.0	8.07 205.0	10.04 255.0	11.50 292.0	in mm

All DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted

*tolerance = +.030 –.000 [+0,76 -0,00]

Ordering Information:

Item Number	CLP-25	CLP-50	CLP-75	CLP-100	CLP-150	CLP-200	CLP-250	CLP-290
measurement range, in. [mm]:	1[25]	2[50]	3[75]	4[100]	6[150]	8[200]	10[250]	11.5[290]
resistance, (±20%):	2.5K	5.0K	5.0K	5.0K	10K	10K	10K	11.6K
linearity, %:	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%
weight, oz. [grams]:	3.0[87]	3.4[97]	3.8[108]	4.1[117]	4.8[138]	5.5[157]	6.2[177]	6.9[197]

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CLWG

Precision Potentiometric Output
Ranges: 0-3 to 0-30 inches [0-75 to 0-750 mm]
5K – 10K ohms • IP65

CE

Specification Summary:

GENERAL

Full Stroke Ranges ..... 0-3 to 0-30 in. (0-75 to 0-750 mm)
Output Signal ..... voltage divider (potentiometer)
Linearity ..... ± 0.04 to 0.1% full stroke, see ordercode
Repeatability ..... < 0.01 mm
Resolution ..... essentially infinite
Life Expectancy ..... 50 million cycles
Enclosure Material ..... aluminum
Sensor ..... conductive plastic linear potentiometer
Operating Speed ..... 200 inches (5 M) per second, max.

ELECTRICAL

Input Resistance ..... 5K to 10K ohms (±20%), see ordercode
Recommended Maximum Input Voltage ..... 25-30 V(AC or DC)
Recommended Operating Wiper Current ..... ≤ 1 µA

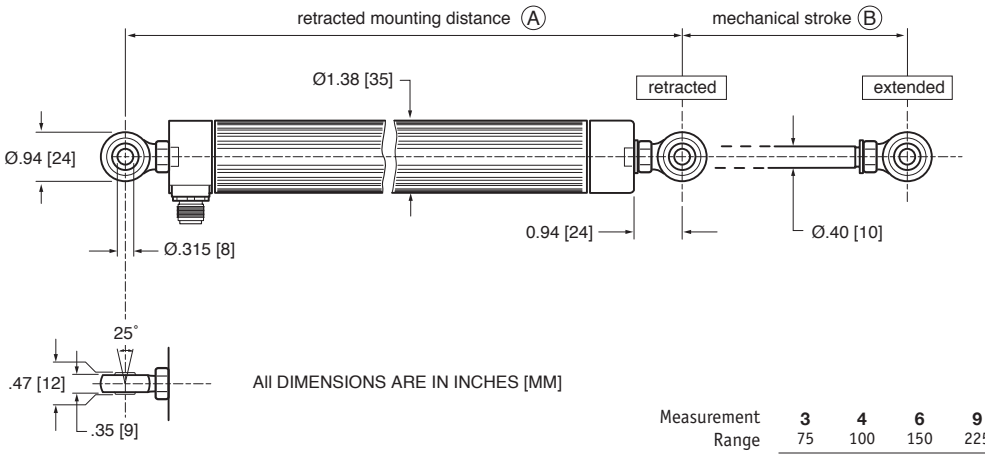
ENVIRONMENTAL

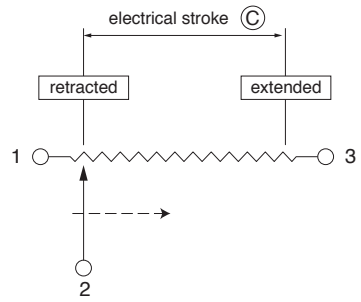
Enclosure Design IP65
Operating Temperature ..... -22º to 212ºF
Vibration ..... up to 10 G's to 2000 Hz maximum

Developed specifically for a wide range of demanding applications, Celesco's CL series position transducers offer unrivalled performance in terms of accuracy, repeatability, life expectancy and ease of mounting. Such applications include industrial automation, automotive and robotics.

The CLWG uses a twin-bearing actuating rod, backlash-free pivot heads and a superior wiper system to provide outstanding linearity and performance.

Outline Drawing





Measurement Range	3	4	6	9	12	14	18	20	24	30	
	75	100	150	225	300	360	450	500	600	750	mm
Ⓐ	9.72	10.75	12.72	15.75	18.74	21.69	26.18	28.74	33.70	40.94	in
	247	273	323	400	476	551	665	730	856	1040	mm
Ⓑ	3.11	4.13	6.10	9.09	12.09	14.49	18.11	20.08	24.09	30.07 ± 0.02	in
	79	105	155	231	307	368	460	510	612	764 ± 2	mm
Ⓒ	2.99	4.01	5.98	8.98	11.97	14.41	17.99	20.00	24.02	30.00	in
	76	102	152	228	304	366	457	508	610	762	mm

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Ordering Information:

Model Number:

CLWG - _____ **-** _____
order code: Ⓡ Ⓐ

Sample Model Number:

CLWG - 75 - NC4

Ⓡ range: 3 inches [75 mm]
Ⓐ electrical connection: 4-pin, 90° M12 cordset

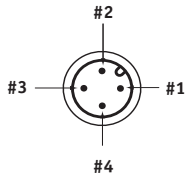
Full Stroke Range:

Ⓡ *order code:*	75	100	150	225	300	360	450	500	600	750
measurement range, in. [mm]:	3[75]	4[100]	6[150]	9[225]	12[300]	14[360]	18[450]	20[500]	24[600]	30[750]
resistance, (±20%):	3K	3K	5K	5K	5K	5K	5K	5K	5K	10K
linearity, %:	0.1%	0.1%	0.08%	0.07%	0.06%	0.05%	0.05%	0.05%	0.05%	0.04%

Electrical Connection:

Ⓐ *order code:*

blank
4-pin M12 connector
(no mating plug supplied)



male receptacle
(contact view)

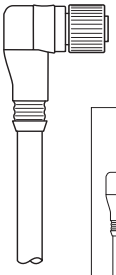
MC4
4-pin M12 connector
w/ mating plug

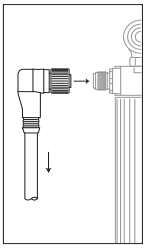
0.13" - 0.20" OD Cable
(4mm - 6mm)

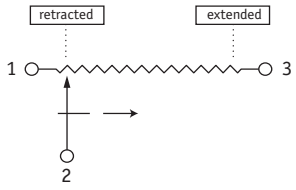
SC4
4-pin M12 connector
and 4 meter length cordset
w/straight mating plug

4-conductor
22 AWG

NC4
4-pin M12 connector
and 4 meter length cordset
w/90° mating plug







Pin#	Cordset Wire Color
1	BROWN
2	WHITE
3	BLUE
4	BLACK

Incremental Encoder Output
Ranges: 0-25 to 0-50 inches
Instrument Grade

DPT250

Specification Summary:

General

Full Stroke Ranges ..... 0-25 to 0-50 inches [0-625 to 0-1250 mm]
Output Signal ..... incremental encoder (quadrature)
Sensor ..... optical encoder
Output Driver Options ..... TTL/CMOS, open collector or line driver
Accuracy ..... *see ordering information*
Repeatability ..... *see ordering information*
Resolution Options ..... 25 to 1250 pulses per inch
Measuring Cable ..... 0.019-in. dia. nylon-coated stainless steel
Enclosure Material ..... powder-painted and anodized aluminum
Weight ..... 2 lbs. max.

Electrical

Input Voltage ..... *see ordering information*

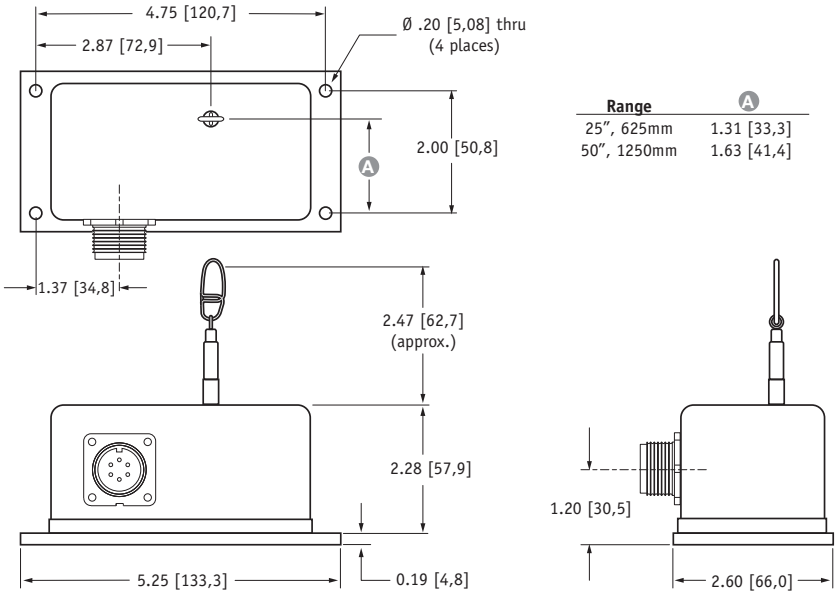
Environmental

Operating Temperature ..... 0ºF to 160ºF [-20ºC to 70ºC]
Humidity ..... 98% RH, no condensation
Vibration ..... up to 10G's to 2000 Hz
Enclosure ..... NEMA 1

The DPT250 Cable-Extension Transducer offers a highly accurate incremental encoder output signal that can provide both position and velocity information. The output is a digital pulse stream that can provide resolution down to less than a thousandth's of an inch!

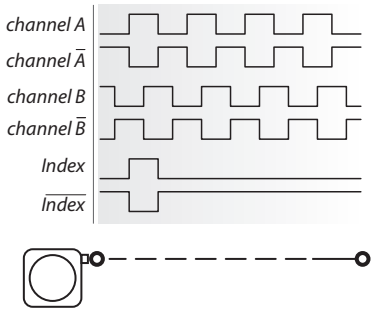
Delivering high accuracy and fine resolution without the need for perfect parallel alignment, this compact device offers the additional benefits of ease of installation and ability to interface to any PLC or controller. These features make the DPT250 the perfect choice for many applications that range from hydraulic cylinder positioning to robotic arm motion feedback.

fig. 1: Top Exit Option



Range	A
25", 625mm	1.31 [33,3]
50", 1250mm	1.63 [41,4]

Electrical Output Signal Options



ALL DIMENSIONS ARE IN INCHES [MM] tolerances are ±0.02 in. [±0,5mm] unless otherwise noted

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Ordering Information:

Model Number:

DPT250 - ____ - ____ **1** ____ - ____ ____ ____ **0**
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:
DPT250 - 0025 - 111 - 1130

Ⓡ	range:	25 inches
Ⓐ	measuring cable tension:	standard - 12 oz.
Ⓒ	cable exit:	top
Ⓓ	sensing circuit/channels:	TTL/CMOS, A,B
Ⓔ	resolution:	500 pulses per inch
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ *order code:*	0025	0050	0625	1250
full stroke range, min:	25 in.	50 in.	625 mm	1250 mm
accuracy:	±0.010 in. (max)	±.020 in. (max)	±0.25 mm (max)	±0.50 mm (max)
repeatability:	±0.005 in. (max)	±.010 in. (max)	±0.12 mm (max)	±0.25 mm (max)
cable tension* (±30%):	13 oz.	6 oz.	3,6 N	1,6 N
cable acceleration, max.:	11 G's	4 G's	11 G's	4 G's
resolution options:	50, 500, 1000, 1250 pulses per inch	25, 250, 500, 625 pulses per inch	2, 20, 40, 50 pulses per mm	1, 10, 20, 25 pulses per mm

**note: increased cable tension options available for re-orders only (see below)*

Measuring Cable Tension:

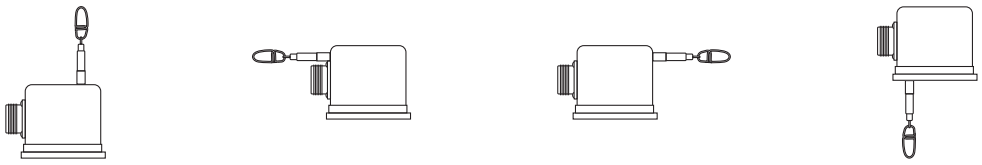
Ⓐ *order code:*	1	H	2**	3**
	standard tension	high tension*		
25 inch range:	13 oz.	65 oz.	44 oz.	73 oz.
50 inch range:	6 oz.	33 oz.	22 oz.	36 oz.
625 mm range:	3,6 N	18,1 N	12 N	20 N
1250 mm range:	1,6 N	9,2 N	6 N	10 N
measuring cable:	.019-in. dia. nylon-coated stainless steel		.024-in. dia. stainless steel	

Reorder Only Reorder Only

–note: spring tension tolerance: ±20%* *–note: outline dimensions for these options not controlled on this datasheet.*

Measuring Cable Exit:

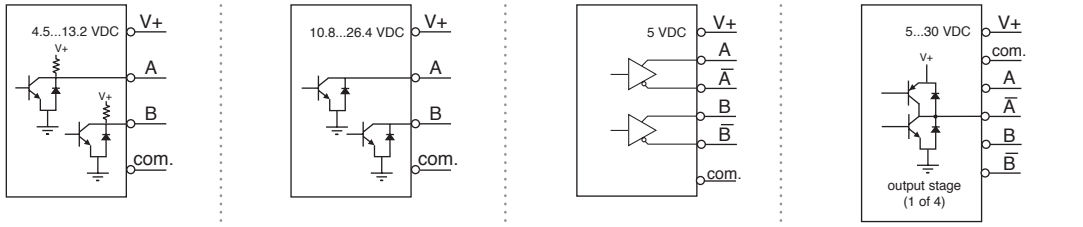
Ⓒ *order code:*	1	2	3	4
	top exit (see fig. 1)	front exit*	rear exit*	bottom exit*



**–note: dimensions for optional cable exits not controlled on this datasheet, please contact factory*

Sensing Circuit / Channels:

Ⓓ *order code:*	1	2	4	6
description:	TTL / CMOS	open collector	line driver	universal line driver
	Input voltage (V+): 4.5...13.2 Vdc Sink current: 20 mA max. Input current: 80 mA max.	Input voltage (V+): 10.8...26.4 Vdc Sink current: 20 mA max. Input current: 80 mA max.	Input voltage (V+): 5 Vdc Sink current: 20 mA max. Input current: 150 mA max.	Input voltage (V+): 5...30 VDC Source/Sink: 20 mA max. Input current: 50 mA max, no load



Ordering Information (cont.):

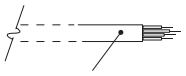
Resolution:

order code:	1	2	3	4
25 in. range:	500 ppi	1000 ppi	1250 ppi	50 ppi
50 in. range:	250 ppi	500 ppi	625 ppi	25 ppi
625 mm range:	20 ppmm	40 ppmm	50 ppmm	2 ppmm
1250 mm range:	10 ppmm	20 ppmm	25 ppmm	1 ppmm

Electrical Connection:

order code: **1**

15-inch, shielded instrumentation cable

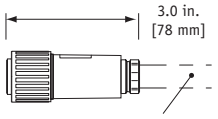


15-inch, multiconductor cable

color	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
red	input voltage	input voltage
black	common	common
green	channel A	channel A
white	channel B	channel B
blue	-	channel A'
brown	-	channel B'
yellow	-	index
orange	-	index'

order code: **3**

6-pin plastic connector with mating plug



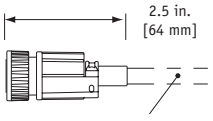
contact view

.30 – .39 in. [8 – 10 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

pin	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
A	input voltage	input voltage
B	common	common
C	channel A	channel A
D	channel B	channel B
E	-	channel A'
F	-	channel B'

order code: **4**

18-pin plastic connector with mating plug



contact view

.26 – .30 in. [6,6 – 7,6 mm] cable dia.
20 – 24 AWG conductor size
connector: Conxall 14282-18PG-300-K
mating plug: Conxall 13282-18SG-326-K

pin	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
1	input voltage	input voltage
2	common	common
3	channel B	channel B
6	channel A	channel A
7	-	index
11	-	channel B'
12	-	channel A'
15	-	index'

Position and Velocity Output Signals
Ranges: 0-2 to 0-100 inches
Instrument Grade

DV301

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-2 to 0-100 inches
Measuring Cable ..... *see ordering information*
Enclosure Material ..... powder-painted and anodized aluminum
Weight ..... 2 lbs. max.

POSITION

Output Signal ..... voltage divider (potentiometer)
Accuracy ..... ± 0.25% to ±0.10% full stroke *see ordering information*
Repeatability ..... ± 0.02% full stroke
Resolution ..... *essentially infinite*
Sensor ..... plastic-hybrid precision potentiometer
Input Resistance Options ..... 500, 1K, 5K or 10K Ω *–see ordering information*
Power Rating, Watts ..... 2.0 at 70ºF derated to 0 at 250º F
Maximum Input Voltage ..... *see ordering information*
Output Signal Change Over Full Stroke Range ..... 94% ±4% of input voltage

VELOCITY

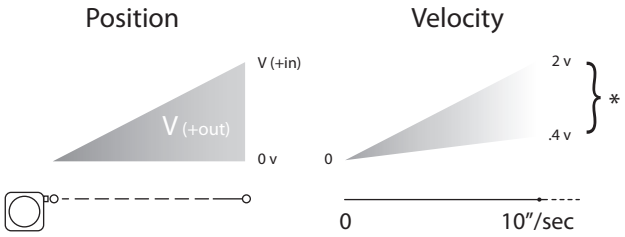
Output Signal ..... DC tachometer output
Linearity ..... better than ±0.10% of output at any velocity
Repeatability ..... ±0.10% of reading
Maximum Velocity • Retraction Acceleration ..... *see ordering information*
Sensor ..... tach generator
Input Voltage ..... none required
Output Voltage @ 100 inches per minute ..... *see ordering information*
Output Impedance ..... 350 ohms ±10%
Output Ripple (when output ≥ 280 mV) ..... ±3% rms

ENVIRONMENTAL

Enclosure ..... NEMA 1
Operating Temperature ..... -40º to 200ºF (-40º to 90ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum

The DV301 is a combination position and velocity transducer for full-scale measurement ranges from 2 to 100 inches. A precision plastic-hybrid potentiometer provides accurate position feedback while a self-generating DC tachometer provides a velocity signal that is proportional to the speed of the traveling stainless-steel measuring cable.

Output Signals



**varies by stroke range – see ordering information*

Ordering Information:

Model Number:

DV301 - ____ Ⓡ - ____ Ⓐ **1** Ⓑ ____ Ⓒ - ____ Ⓓ **1** Ⓔ ____ Ⓕ **0** Ⓖ
order code:

Sample Model Number:
DV301 - 0025 - 111 - 1110

Ⓡ	range:	25 inches
Ⓐ	measuring cable tension:	standard - 5 oz.
Ⓒ	cable exit:	top
Ⓓ	output signals:	500 ohm position / DC tachometer velocity
Ⓕ	electrical connection:	6-pin plastic connector

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Full Stroke Range:

Ⓡ order code:	0002	0005	0010	0015	0020	0025	0030	0040	0050	0060	0075	0100
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.	75 in.	100 in.
position accuracy (% of f.s.):	0.25%	0.25%	0.15%	0.15%	0.10%	0.15%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
potentiometer cycle life*[1]:	2.5×10^6	2.5×10^6	5×10^5	5×10^5	5×10^5	5×10^5	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5
velocity output signal (±3%)*[2]:	322 mV	130 mV	322 mV	217 mV	322 mV*[3]	130 mV	217 mV*[3]	165 mV*[3]	130 mV*[3]	112 mV	91 mV	66 mV

*[1] – 1 cycle is defined as the travel of the measuring cable from full retraction to full extension and back to full retraction *[2]–at the rate of 100 inches per minute
*[3] – output signal is reduced by 50% when ***Measuring Cable Tension*** options ***2*** or ***3*** is selected below

Measuring Cable Tension:

Ⓐ order code:	1	2**	3**
	standard tension* (max. acceleration)	increased tension*	high tension*
2, 10, 20 inch range:	30 oz. (25 G)	60 oz.	120 oz.
5, 25, 50 inch range:	14 oz. (5 G)	28 oz.	56 oz.
15, 30 inch range:	20 oz. (6 G)	40 oz.	80 oz.
40 inch range:	17 oz. (11 G)	34 oz.	68 oz.
60 inch range:	13 oz. (4 G)	26 oz.	52 oz.
75, 80 inch range:	18 oz. (5 G)	36 oz.	72 oz.
100 inch range:	26 oz. (10 G)	52 oz.	104 oz.

*–note: spring tension tolerance: ±20% **–note: dimensions for Options 2, 3 are not controlled on this datasheet.

Measuring Cable Exit:

Ⓒ order code:	1	2	3	4
	top exit (see fig. 1)	front exit*	rear exit*	bottom exit*

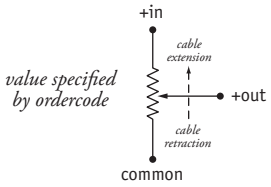
*–note: dimensions for optional cable exits not controlled on this datasheet, please contact factory

Output Signals:

Ⓓ order code:	1	2	3	4
position sensing potentiometer:	500 ohms*	1000 ohms*	5000 ohms*	10,000 ohms*

*–tolerance = ±10%

position sensing circuit



velocity sensing circuit

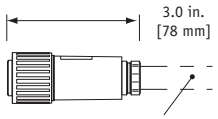
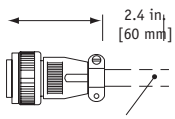
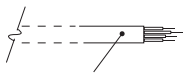
max. input voltage and power rating

	2-inch, 5-inch range	*10-inch to 100-inch range*
500-ohms:	20 V AC/DC (1 W)	30 V AC/DC (2 W)
1K to 10K-ohms:	30 V AC/DC (1 W)	30 V AC/DC (2 W)

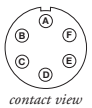
Ordering Information (cont.):

Electrical Connection:

Ⓕ *order code:*

1	3	4
6-pin plastic connector with mating plug	6-pin metal connector with mating plug	25-ft. instrumentation cable 24 AWG, shielded
		
1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

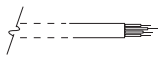
6-pin mating plug:



contact view

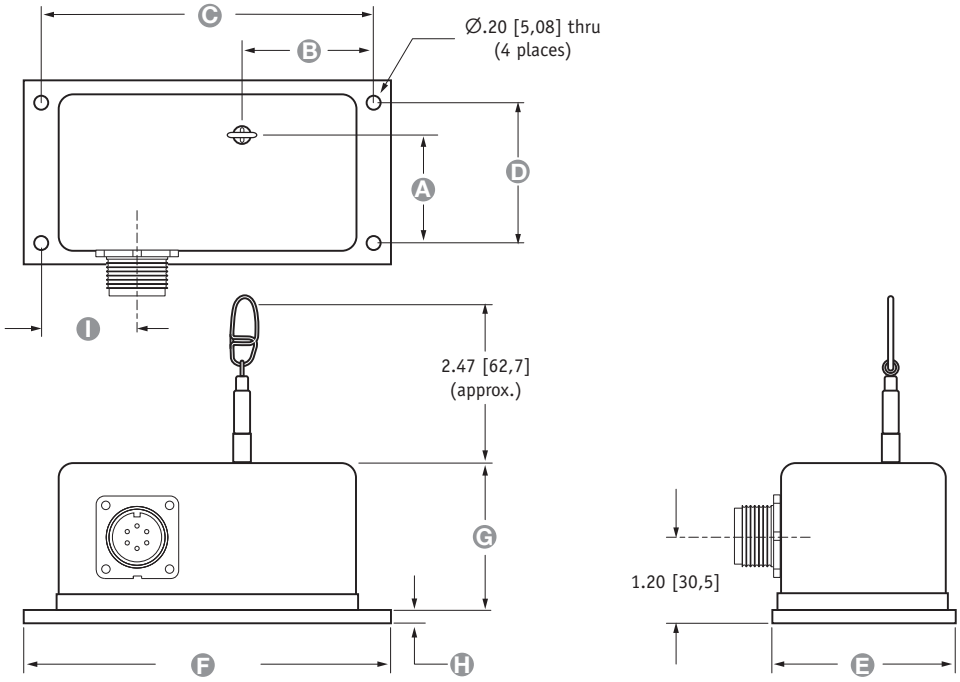
pin	signal	
A	+ in	} *position*
B	common	
C	+ out	
D	-	
E	+ out	} *velocity*
F	- out	

25-ft. instrumentation cable:



color	signal	
red	+ in	} *position*
black	common	
green	+ out	
white	+ out	} *velocity*
brown	- out	

fig. 1: Top Exit Option



Range	A	B	C	D	E	F	G	H	I
2", 10", 20"	1.34 [34,0]	4.00 [101,6]	7.00 [177,8]	2.00 [50,8]	2.63 [66,8]	7.50 [190,5]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
5", 25", 50"	1.85 [47,0]	4.00 [101,6]	7.00 [177,8]	2.00 [50,8]	2.63 [66,8]	7.50 [190,5]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
15", 30"	1.51 [38,4]	4.00 [101,6]	7.00 [177,8]	2.00 [50,8]	2.63 [66,8]	7.50 [190,5]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
40"	1.67 [42,4]	4.00 [101,6]	7.00 [177,8]	2.00 [50,8]	2.63 [66,8]	7.50 [190,5]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
60"	2.19 [55,6]	3.88 [98,5]	7.00 [177,8]	2.37 [60,2]	3.25 [82,5]	7.50 [190,5]	2.60 [66,0]	.19 [4,8]	1.37 [34,8]
75", 80"	2.52 [64,0]	4.38 [111,3]	6.75 [171,4]	2.50 [63,5]	3.63 [92,2]	7.50 [190,5]	2.86 [72,6]	.19 [4,8]	1.37 [34,8]
100"	3.18 [80,7]	5.18 [131,5]	7.38 [187,5]	3.00 [76,2]	4.25 [108,0]	8.00 [203,2]	3.80 [96,5]	.19 [4,8]	3.69 [93,7]

ALL DIMENSIONS ARE IN INCHES [MM] tolerances are ±0.02 in. [±0,5mm] unless otherwise noted

Precision Potentiometric Output
Ranges: 0-105º to 0-240º
Industrial Grade

IT9101

CE

Specification Summary:

GENERAL

Available Full Stroke Ranges ..... 0-105 to 0-240 degrees
Enclosure Material Options ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Electrical Connector MS3102E-14S-6P
Mating Plug (included) MS3106E-14S-6S
Weight, Aluminum (Stainless Steel) Enclosure ..... 5 lbs. (10 lbs.) max.

ELECTRICAL

Output Signal ..... voltage divider (potentiometer)
Input Resistance ..... 1000 Ω (±10%)
Recommended Maximum Input Voltage ..... 30 V (AC/DC)
Output Signal Change Over Measurement Range ..... 92% ± 6% of input voltage

PERFORMANCE

Accuracy* ..... ± 1% full stroke
Accuracy Option ..... ± 0.5% full stroke—please contact factory
Resolution ..... essentially infinite
**—when plane of pendulum motion parallel to plane of rotation within ± 3°*

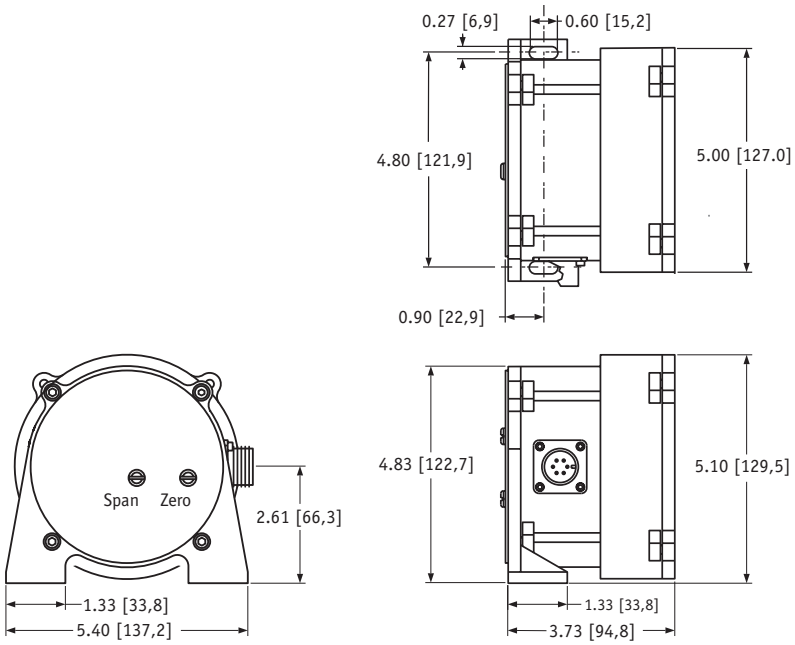
ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... -30º to 200ºF (-34º to 90ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum

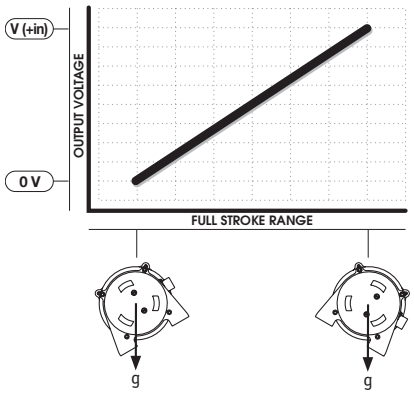
The model IT9101 is a rugged and simple device which provides a voltage divider feedback signal for incline position. The heart of the IT9101 is a magnetically-damped pendulum coupled to a conductive plastic precision potentiometer.

A highly linear relationship between inclination and the output signal is maintained over the full range of the IT9101.

Outline Drawing



Output Signal



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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

Ordering Information:

Model Number:

IT9101 - ____ - ____ - ____ **1** ____ ____ ____

order code: CW CCW Ⓐ Ⓑ Ⓒ Ⓓ

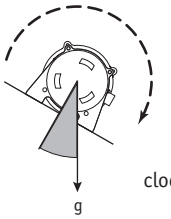
Sample Model Number:

IT9101 - 060 - 120 - 1110

CW	clockwise rotation:	60°	} total rotation = 180°
CCW	counter-clockwise rotation:	120°	
Ⓐ	enclosure:	aluminum	
Ⓒ	electrical connection:	6-pin plastic conncector	
Ⓓ	magnetic dampening:	yes	

Full Clockwise Rotation:

CW *order code:*	000	015	030	045	060	075	090	105	120
	0°	15°	30°	45°	60°	75°	90°	105°	120°

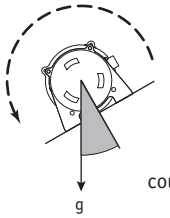


clockwise rotation

Important--
the sum of the Clockwise and Counter-Clockwise Rotations must be in the range of 105° to 240°

Full Counter-Clockwise Rotation:

CCW *order code:*	000	015	030	045	060	075	090	105	120
	0°	15°	30°	45°	60°	75°	90°	105°	120°



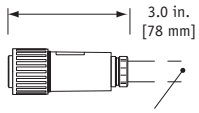
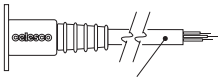
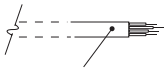
counter-clockwise rotation

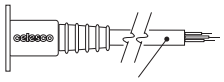
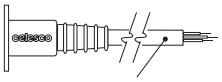
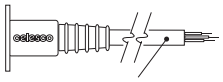
Important--
the sum of the Clockwise and Counter-Clockwise Rotations must be in the range of 105° to 240°

Enclosure Material:

Ⓐ *order code:*	1	2
	powder-painted aluminum	303 stainless steel

Electrical Connection:

C order code:	1	2	4
	6-pin plastic connector w/mating plug **IP 67, NEMA 4X**,6**	10-ft. [3 M] waterproof cable **IP 67, NEMA 4X**, 6**	25-ft. [7.5 M] instrumentation cable **IP 67, NEMA 6**
			
	1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

C order code:	5	6	7
	100-ft. [30 M] waterproof cable **IP 67, NEMA 4X**,6**	10-ft. [3 M] **pressure tested*** waterproof cable **IP 68, NEMA 4X**, 6P**	100-ft. [30 M] **pressure tested*** waterproof cable **IP 68, NEMA 4X**, 6P**
			
	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	signal
A	+ in
B	common
C	+ out
D	-

contact view

Waterproof Cable

color code	signal
WHITE	+ in
BLACK	common
GREEN	+ out

Instrumentation Cable

color code	signal
RED	+ in
BLACK	common
GREEN	+ out
WHITE	-

**–Test pressure: 100 feet [30 meters] H_2O (40 PSID) Test Medium: Air; Duration: 2 hours. **–applies to stainless steel enclosure only.*

Dampening Option:

D order code:	0	1
	with magnetic dampening	without magnetic dampening

RS232 Data Communication
Ranges: 0-105º to 0-240º
Industrial Grade

IT9232

CE

Specification Summary:

GENERAL

Full Stroke Ranges ..... 0-105 to 0-240 degrees
Electrical Interface RS232
Format ..... HEX
Accuracy* ..... ± 1% full stroke
Accuracy option ..... ± 0.5 % full stroke—please consult factory
Resolution ..... ± 0.003% full stroke
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Weight, Aluminum (Stainless Steel) Enclosure ..... 5 lbs. (10 lbs.), max.
**–when plane of pendulum motion parallel to plane of rotation within ± 3°*

ELECTRICAL

Input Voltage ..... 9...22 VDC
Input Current ..... 40 mA, max.
Baud Rate ..... 9600 (programmable to 38.4K)
Update Rate ..... 32 msec

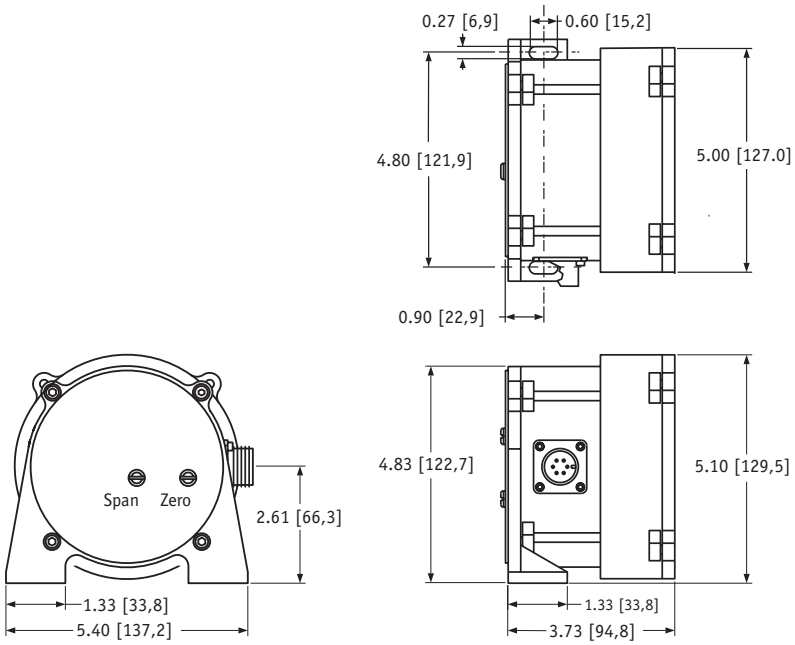
ENVIRONMENTAL

Environmental Suitability ..... NEMA 4X/6, IP 67
Operating Temperature ..... 32º to 176ºF (0º to 80ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum

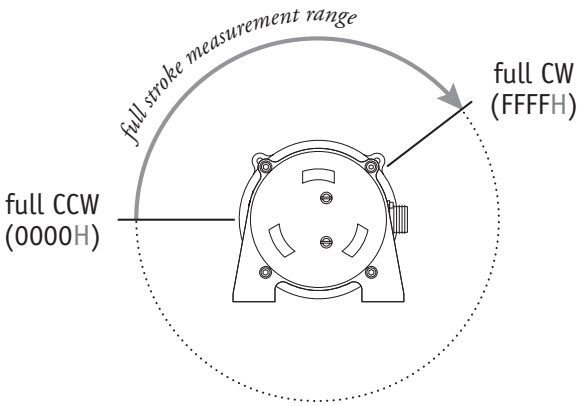
The IT9232 delivers incline position feedback via RS232 serial communication to your data acquisition or controller system. The heart of this inclinometer is a magnetically-damped pendulum coupled to a conductive plastic precision potentiometer.

The IT9232 sends real time data that can be configured to produce engineering units or a raw 16-bit count from 0000H to FFFFH. Additionally this device can be set to continuously send data or send data only when polled.

Outline Drawing



Output Signal



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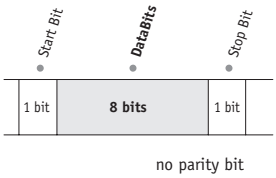
I/O Format:

Data Format



Data Frame

6 byte Hex string:

	STX	CMD	B_0	B_1	B_2	ETX	

STX = 0x02 **CMD** = Command Code* B_0 - B_2 = Data Field* **ETX** = 0x03

** –see below*

Important! All communications to/from the transducer are in **HEX**!

User Commands:

	User Command				*Sensor Response*			
Description	**<CMD>**	**<B_0>**	**<B_1>**	**<B_2>**	**<CMD>**	**<B_0>**	**<B_1>**	**<B_2>**
Get Sensor Info	0x05	0x00	0x00	0x00	0x05	*version*(4)	*date*(5)	*date*(5)
Get Serial Number	0x15	0x00	0x00	0x00	0x15	*serial number*(3)		
Start Continuous Data	0x25	0x00	0x00	0x00	0x25	0x00	0x00	0x00
Stop Continuous Data	0x35	0x00	0x00	0x00	0x35	0x00	0x00	0x00
Get Position Data	0x45	0x00	0x00	0x00	0x45	*CMC*(1)	*CMC*(1)	*status*(2)

(1)CMC - Current Measurement Count (Position)

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 16-bit value that occupies the first two bytes (B_0 and B_1) of the data field. B_0 is the MSB (most significant byte) and B_1 is the LSB (least significant byte).

The CMC starts at 0000H with the inclinometer in the full clockwise (**CW**) position and continues counter clockwise to the full counter-clockwise (**CCW**) position stopping at FFFFH. This holds true for all ranges.

(2)Status

The status byte is used as a flag to indicate the validity of the position signal that the internal electronics receives from the potentiometer.

Flags are as follows:
0x00 = GREEN, 0x55 = YELLOW, 0xAA = RED

A "green" flag shows everything OK. A "yellow" or "red" flag indicates that the sensor has either been extended beyond its range or that there is a problem with the potentiometer.

(3)Serial Number

Each sensor has it's own unique serial number. This information can be retrieved by sending the sensor the "Get Serial Number" command.

The serial number is a 3 byte value from which ranges from 0 to 9999999 (decimal).

(4)Version

This is a single byte value (0-255 decimal) which indicates the currently installed firmware version of the sensor.

(5)Date

This is a 2 byte value showing the date of currently installed firmware. This value ranges from 01011 - 12319 (decimal). Format is MMDDY. While the month and day are expressed as two digit numbers the year is expressed in a single digit only.

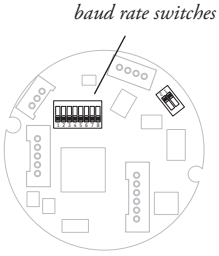
Example: 08054 = August 5, 2004

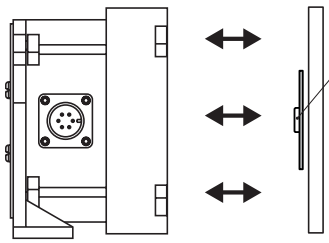
Baud Rate

The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the rs232 controller board located inside the transducer.

DIP-7	DIP-8	baud rate
0	0	9600
1	0	19200
0	1	38400
1	1	9600

RS232 Controller Board and DIP Switch Location





internal dip switches & controller board

to gain access to the controller board, remove four Allen-Head Screws and remove end cover bracket.

Ordering Information:

Model Number:

IT9232 - _____ - _____ - ___ ___ ___
order code: CW CCW Ⓐ Ⓑ Ⓒ

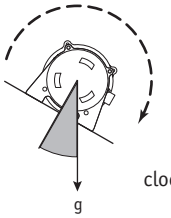
Sample Model Number:

IT9232 - 60 - 120 - AL - D - M6

CW	clockwise rotation:	60˚	} total rotation = 180˚
CCW	counter-clockwise rotation:	120˚	
Ⓐ	enclosure	aluminum	
Ⓑ	magnetic dampening:	yes	
Ⓒ	electrical connection:	6-pin plastic connector	

Full Clockwise Rotation:

CW order code:	0	15	30	45	60	75	90	105	120
	0º	15º	30º	45º	60º	75º	90º	105º	120º

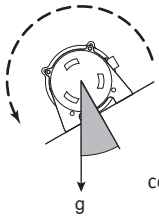


clockwise rotation

Important--
the sum of the Clockwise and Counter-Clockwise Rotations must be in the range of 105º to 240º

Full Counter-Clockwise Rotation:

CCW order code:	0	15	30	45	60	75	90	105	120
	0º	15º	30º	45º	60º	75º	90º	105º	120º



counter-clockwise rotation

Important--
the sum of the Clockwise and Counter-Clockwise Rotations must be in the range of 105º to 240º

Enclosure Material:

Ⓐ order code:	AL	SS
	powder-painted aluminum	303 stainless steel

Dampening Option:

Ⓑ order code:	D	ND
	magnetic dampening	without magnetic dampening

Ordering Information:

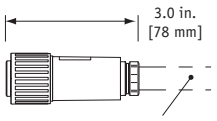
Electrical Connection:

order code:

M6

6-pin plastic connector with mating plug

IP 67, NEMA 6



1/2 - 5/16" [14 - 8 mm] cable dia.
16 AWG max conductor size

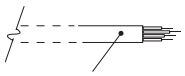
contact view

pin	
A	9...22 VDC
B	common
C	–
D	Transmitted Data
E	Received Data
F	common

C25

25-ft. instrumentation cable 24 AWG, shielded

IP 67, NEMA 6



25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

color code	
Red	9...22 VDC
Black	common
White	–
Green	Transmitted Data
Blue	Received Data
Brown	common

4...20 mA Output • Hazardous Area Certification
Ranges: 0-45º to 0-240º
Industrial Grade

IT9420

The model IT9420 is a rugged yet simple device which provides a 4 to 20 mA current feedback signal for incline position. The heart of the IT9420 is a magnetically-damped pendulum coupled to a conductive plastic precision potentiometer. A highly linear relationship between inclination and a 4 to 20 mA output is maintained over the full range of the IT9420.

The IT9420 is easy to use: simply attach it to the object of measurement and install two wires for the current loop.

Specification Summary:

GENERAL

Available Full Stroke Ranges ..... 0-45 to 0-240 degrees
Weight (aluminum enclosure) ..... 5 lb. typical (aluminum enclosure)
Enclosure Material ..... aluminum (stainless steel available)
Sensor ..... precision potentiometer
Electrical Connector MS3102E-14S-6P
Mating Plug (included) MS3106E-14S-6S

ELECTRICAL

Output Signal ..... 4...20 mA
Input Voltage ..... *see ordering information*
Input Current ..... 20 mA max.
Circuit Protection ..... 38 mA maximum

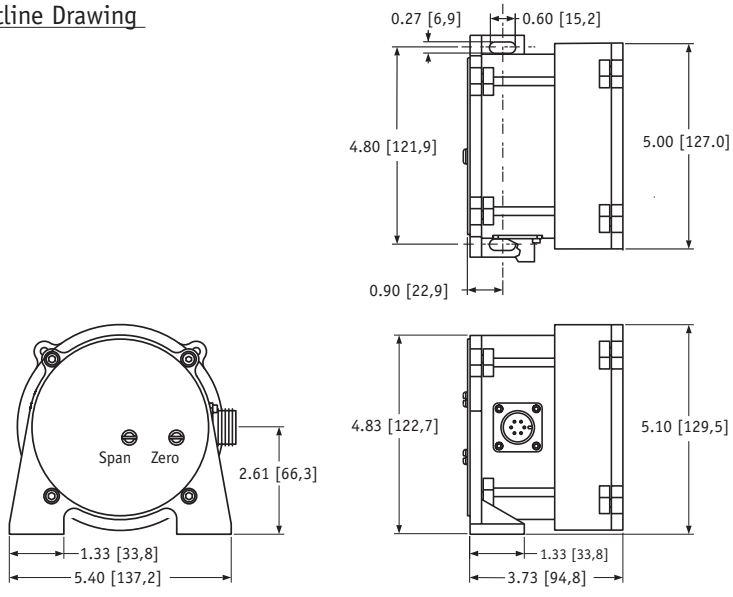
PERFORMANCE

Sensitivity ..... 16 mA/full stroke, ± 0.25%
Accuracy* ..... ± 1% full stroke
Accuracy Option ..... 0.5% full stroke—*please contact factory*
Resolution ..... essentially infinite
Output Signal Adjustment for Full Stroke Ranges of 45º - 105º:
Zero Adjustment ..... from factory set zero to 20% of full stroke range
Span Adjustment ..... to 20% of factory set span
Output Signal Adjustment for Full Stroke Ranges of 120º - 240º:
Zero Adjustment ..... from factory set zero to 40% of full stroke range
Span Adjustment ..... to 40% of factory set span
**—when plane of pendulum motion parallel to plane of rotation within ± 3˚*

ENVIRONMENTAL

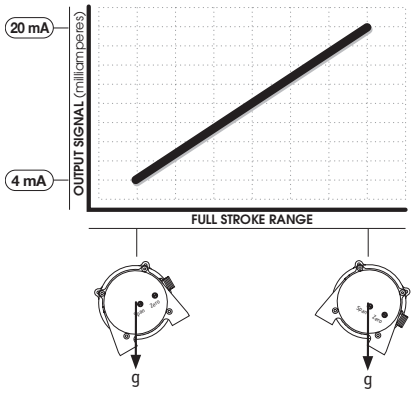
Enclosure ..... NEMA 4/4X/6, IP 67/68
Hazardous Area Certification ..... *see ordering information*
Operating Temperature ..... -30º to 200ºF (-34º to 90ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum

Outline Drawing



DIMENSIONS ARE IN INCHES [MM] tolerances are ±0.02 in. [±0.5 mm] unless otherwise specified

Output Signal



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Ordering Information:

Model Number:

IT9420 - ____ - ____ - ____ ____ ____ ____

order code: CW - CCW - Ⓐ Ⓑ Ⓒ Ⓓ

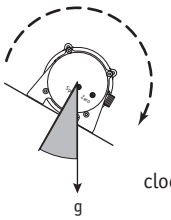
Sample Model Number:

IT9420 - 060 - 120 - 1110

CW	clockwise rotation:	60° } total rotation = 180°
CCW	counter-clockwise rotation:	120° } total rotation = 180°
Ⓐ	enclosure:	aluminum
Ⓑ	output signal:	4 mA @ 120° CCW 20 mA @ 60° CW
Ⓒ	electrical connection:	6-pin plastic conncector
Ⓓ	magnetic dampening:	yes

Full Clockwise Rotation:

CW order code:	000	015	030	045	060	075	090	105	120
	0°	15°	30°	45°	60°	75°	90°	105°	120°

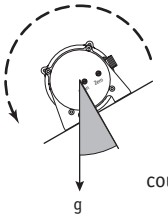


clockwise rotation

Important--
the sum of the Clockwise and Counter-Clockwise Rotations must be in the range of 45° to 240°

Full Counter-Clockwise Rotation:

CCW order code:	000	015	030	045	060	075	090	105	120
	0°	15°	30°	45°	60°	75°	90°	105°	120°



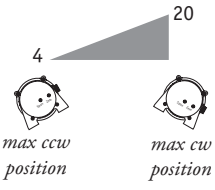
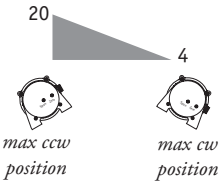
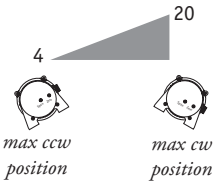
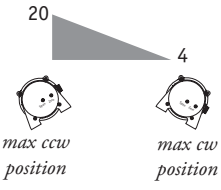
counter-clockwise rotation

Important--
the sum of the Clockwise and Counter-Clockwise Rotations must be in the range of 45° to 240°

Enclosure Material:

Ⓐ order code:	1	2
	powder-painted aluminum	303 stainless steel

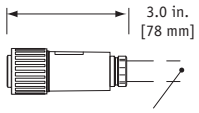
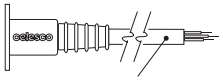
Output Signal:

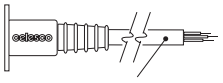
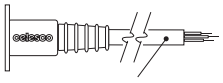
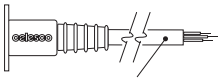
Ⓑ order code:	1	2	5	6
output signal options:	4...20 mA	20...4 mA	4...20 mA	20...4 mA
				
input voltage:	8 – 40 vdc		14 – 32 vdc	
hazardous area certification:	not certified		CSA Standard 22.2 Class 1 Groups A, B, C and D	Cenelec LCIE EEx ia IIc T4

**IMPORTANT: intrinsically safe when powered from a CSA certified zener barrier rated 28 VDC max, 110 mA max per installation drawing#677984*

Ordering Information:

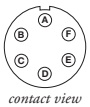
Electrical Connection:

C order code:	1	2	4
	6-pin plastic connector w/mating plug **IP 67, NEMA 4X**,6**	10-ft. [3 M] waterproof cable **IP 67, NEMA 4X**, 6**	25-ft. [7.5 M] instrumentation cable **IP 67, NEMA 6**
			
	1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

C order code:	5	6	7
	100-ft. [30 M] waterproof cable **IP 67, NEMA 4X**,6**	10-ft. [3 M] **pressure tested*** waterproof cable **IP 68, NEMA 4X**, 6P**	100-ft. [30 M] **pressure tested*** waterproof cable **IP 68, NEMA 4X**, 6P**
			
	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	signal
A	8...40 vdc
B	4...20 mA out
C	–
D	case ground



contact view

Waterproof Cable

color code	signal
WHITE	8...40 vdc
BLACK	4...20 mA out
GREEN	case ground

Instrumentation Cable

color code	2-wire
RED	8...40 vdc
BLACK	4...20 mA out
WHITE	n/a
GREEN	case ground

**–Test pressure: 100 feet [30 meters] H_2O (40 PSID) Test Medium: Air; Duration: 2 hours. **–applies to stainless steel enclosure only.*

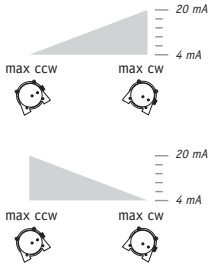
Dampening Option:

D order code:	0	1
	with magnetic dampening	without magnetic dampening

Output Signal Selection:

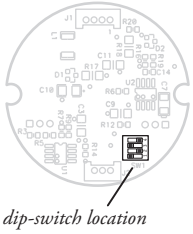
The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match the 4 mA and 20mA signal values to the beginning and end points of the stroke.

output signal



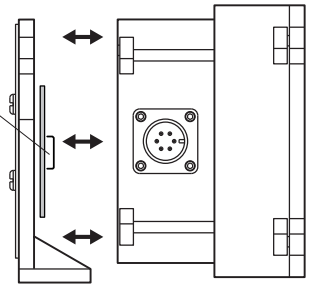
switch setting

signal board


dip-switch location

To gain access to the signal board, remove four Allen-Head Screws and remove end cover bracket.

internal dip switches & signal board

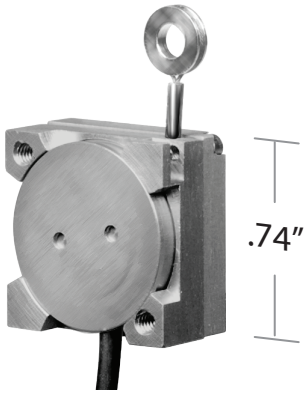


version: **3.0** last updated: **October 17, 2007**

M150

World's Smallest Stringpot
Range: 0-1.5 inches
High-Cycle • Space-Critical Applications

CE



Specification Summary:

GENERAL

Full Stroke Range	0-1.5 inches
Output Signal Options	voltage divider (potentiometer)
Accuracy	± 1% full stroke
Resolution	essentially infinite
Sensitivity	897 – 924 mV/V full stroke
Measuring Cable	.014-inch dia. nylon-coated stainless steel
Measuring Cable Tension	4 oz. ±25%
Enclosure Material	anodized aluminum
Sensor	conductive plastic precision potentiometer
Potentiometer Cycle Life	5 million cycles
Weight	0.5 oz. max.

ELECTRICAL

Input Resistance	5K ±10% ohms
Recommended Output Signal Current	< 1µA
Recommended Maximum Input Voltage	20 VDC

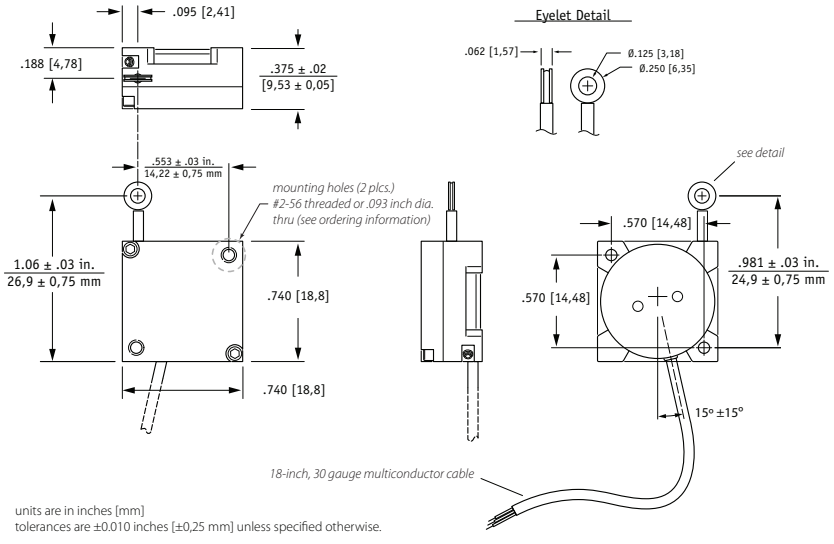
ENVIRONMENTAL

Enclosure	NEMA 12, IP 50
Operating Temperature	-40º to 185ºF (-40º to 85ºC)
Temp. Coefficient of Sensing Element	.0028%/ºF (.005%/ºC)
Vibration	up to 10 G's at 30 to 2000 Hz max.

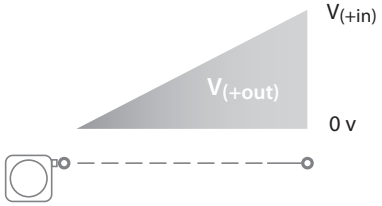
Introducing the world's smallest stringpot. The M150 is smaller than a thumbprint and occupies a tiny space of only .74 x .74 x .38 inches. With a full stroke measurement range of 1.5 inches, the M150 has been designed for many aerospace and automotive space-critical test applications such as throttle position and crash-test instrumentation.

The heart of the M150 is a precision high-cycle conductive plastic potentiometer that delivers a high-linearity voltage position feedback signal. With its rugged all aluminum construction, the M150 has been engineered for reliability and to provide quick, easy and hassle-free installation.

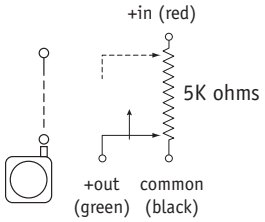
Outline Drawing



Output Signal



Electrical Connection



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Ordering Information:

Model Number:

M150 - 4 - ___ - ___ - 5K - C1

order code: Ⓐ Ⓑ

Sample Model Number:

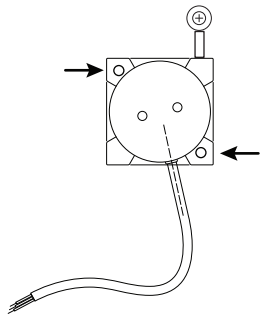
M150 - 4 - H1 - E - 5K - C1

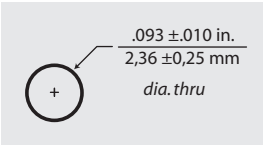
Ⓐ mounting hole style: .093 inch dia. thru
Ⓑ measuring cable termination: eyelet

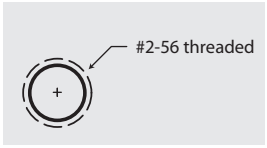
Mounting Hole Style:

Ⓐ order code:

H1	**H2***
.093 thru	threaded





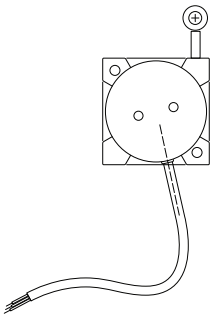


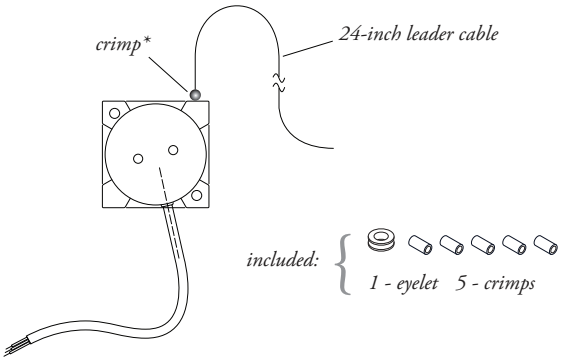
**–includes: 4) #2-56 x 3/8" pan head mounting screws with washers*

Measuring Cable Termination:

Ⓑ order code:

E	**L**
Eyelet	Leader Cable





**note: crimped stop prevents leader cable from retracting into sensor body*

MLP

Miniature • Extended Temperature Range

Ranges: 0-.5 to 0-6 inches [0-12,5 to 0-150 mm]

1.25K – 10K ohms • IP67

Specification Summary:

GENERAL

Full Stroke Ranges ..... 0-0.5 to 0-6 in. (0-12.5 to 0-150 mm)
Output Signal..... voltage divider (potentiometer)
Linearity..... ± 0.5% full stroke
Repeatability .....0.01 mm
Resolution..... essentially infinite
Life Expectancy.....> 25 million cycles
Operating Speed .....400 inches (10 M) per second max.
Enclosure Material .....aluminum
Sensor..... conductive plastic linear potentiometer
Weight ..... 1.6 oz. (46 g) max., *see ordering infomation*

ELECTRICAL

Input Resistance ..... 1.25K to 10K ohms (±20%), *see ordering information*
Recommended Maximum Input Voltage .....42 VDC
Recommended Operating Wiper Current.....< 10µA
Electrical Cable ..... 24 AWG Raychem 55M wire with VITON sleeve
Electrical Cable Length ..... 19 inches (500mm)

ENVIRONMENTAL

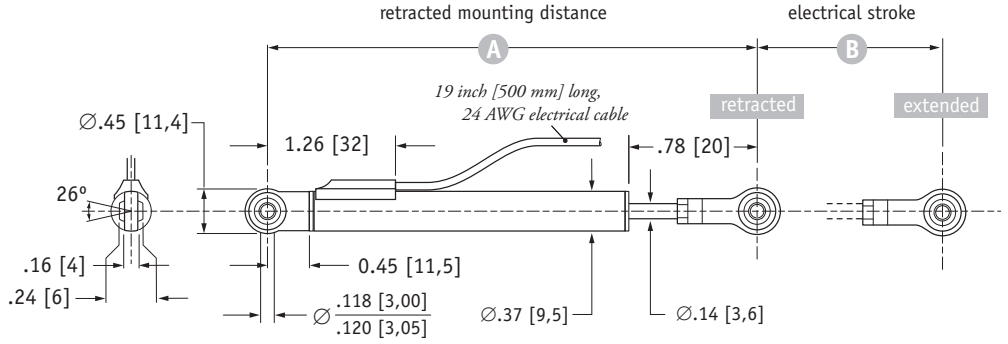
Enclosure Design IP67
Operating Temperature, *Continuous* ..... -22° to 300°F (-30° to 150°C)
Operating Temperature, *Short Term* .....350°F (175°C)
Vibration .....up to 10 G's to 2000 Hz maximum

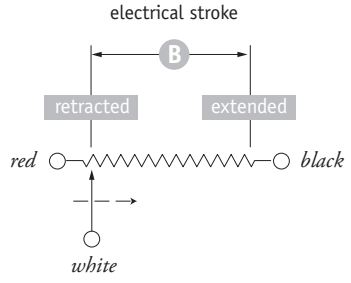
Celesco's miniature MLP series linear potentiometers offer unrivaled performance in an amazingly small size. Though small, the MLP is environmentally robust (IP67), operates over a broad temperature range (-22° to 300°F) and is long lasting (>25 million cycles).

These features make our miniature MLP linear potentiometer the perfect solution for many applications including industrial, medical, automotive and motion control.

Ordering Information:

Item Number:	MLP-12	MLP-25	MLP-50	MLP-75	MLP-100	MLP-125	MLP-150
measurement range, in. [mm]:	0.5 [12.5]	1 [25]	2 [50]	3 [75]	4 [100]	5 [125]	6 [150]
resistance, ohms (±20%):	1.25K	2.5K	5.0K	7.5K	6.5K	8.0K	10.0K
linearity, %:	± 0.5%	± 0.5%	± 0.5%	± 0.5%	± 0.5%	± 0.5%	± 0.5%
weight, oz. [grams]:	.8 [24]	.9 [26]	1 [29]	1.2 [33]	1.3 [37]	1.5 [43]	1.6 [46]





Measurement Range	0.5 12.5	1 25	2 50	3 75	4 100	5 125	6 150	in mm
A	3.3 82.5	3.7 95	4.7 120	5.7 145	7.0 178	8.0 203	9.0 228	± 0.08 in adjustment ± 2 mm adjustment
B	0.49 12.5	0.98 25.0	1.97 50.0	2.95 75.0	3.94 100.0	4.92 125.0	5.91 150.0	in mm

All Dimensions are in INCHES [MM] • Tolerances are 0.03 in. [0.5 mm] unless otherwise noted

version: 1.0 last updated: January 15, 2007

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Precision Potentiometric Output
Ranges: 0-3 and 0-5 inches
Compact Size • Crash Test • Flight Test • OEM

MTA

CE

Specification Summary:

GENERAL

Full Stroke Ranges	0-3 and 0-5 inches, min.
Output Signal	voltage divider (potentiometer)
Accuracy	±0.4 % full stroke
Repeatability	±0.02% full stroke
Resolution	essentially infinite
Potentiometer Cycle Life	50 million cycles*
Measuring Cable	0.024-in. dia. nylon-coated stainless steel
Enclosure Material	anodized aluminum
Sensor	conductive plastic potentiometer
Weight (maximum)	3-inch: 0.10 lbs., 5-inch: 0.26 lbs.

ELECTRICAL

Input Resistance	5K ohms (±10%)
Power Rating, Watts	1.0 at 40° C (derated to 0 @ 110°C)
Recommended Maximum Input Voltage	30V (AC or DC)
Temperature coefficient of voltage dividing ratio	< 2 ppm/°C
Temperature coefficient of resistance	
-50...+75°C	±200 ppm/°C
+75...+100°C	±300 ppm/°C
Output Signal Change Over Measurement Range	94% ±4% of input voltage

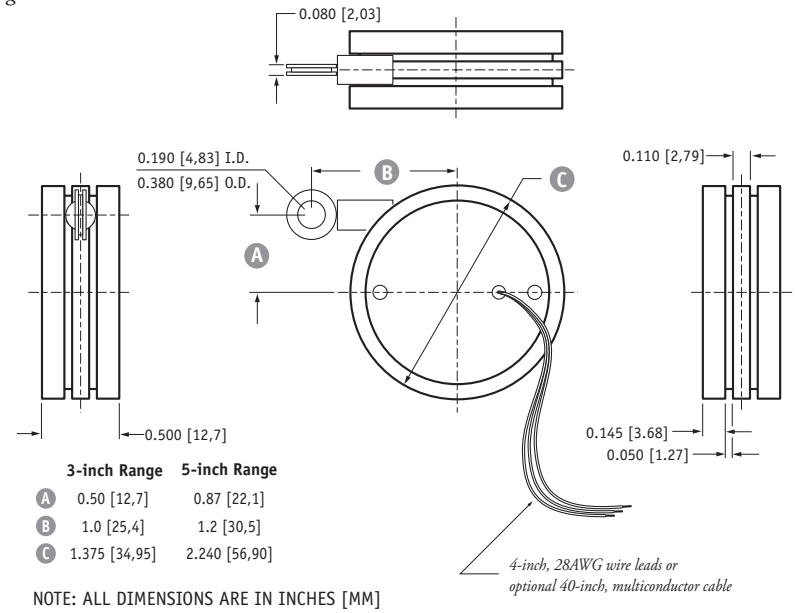
MECHANICAL

Measuring Cable Tension	*see ordering information*

ENVIRONMENTAL

Enclosure Design	NEMA 12, IP55
Operating Temperature	-67° to 212°F (-55° to 100°C)

**note: potentiometer cycle life is defined as the minimum number of times the measuring cable can be fully extended and retracted before any measureable degradation of the output signal occurs.*



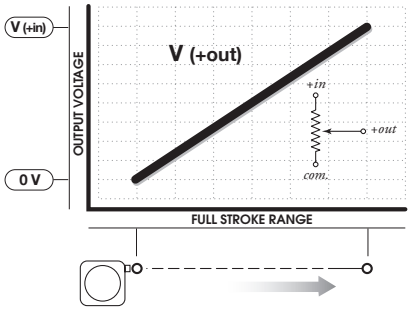
	3-inch Range	5-inch Range
A	0.50 [12,7]	0.87 [22,1]
B	1.0 [25,4]	1.2 [30,5]
C	1.375 [34,95]	2.240 [56,90]

NOTE: ALL DIMENSIONS ARE IN INCHES [MM]

The MTA is part of Celesco's new miniature line of cable-extension position transducers that is perfect for short-ranged testing and control applications where space is at a premium.

This transducer uses a high-cyle conductive plastic potentiometer to provide a precision voltage divider feedback signal for measurement ranges of 3 or 5 inches full stroke. With an accuracy of ±0.4% and a repeatability of ±0.02%, the MTA conveniently mounts using servo-clips for easy rotational adjustment.

Output Signal



Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco.com • info@celesco.com

Ordering Information:

Model Number:

MTA - ___ ___ - 5K ___ - ___

order code: Ⓡ Ⓐ Ⓑ Ⓒ

Sample Model Number:

MTA - 3AE - 5KC - MB

Ⓡ	range/cable tension:	3 inches/4 oz.
Ⓐ	measuring cable termination:	eyelet
Ⓑ	electrical connection:	instrumentation cable, 40-in.
Ⓒ	mounting bracket:	yes

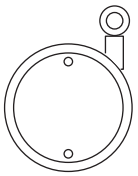
Full Stroke Range:

Ⓡ order code:	3	3A	5	5A
full stroke range, min:	3 inches		5 inches	
std. cable tension (±25%):	2.0 oz.	4.0 oz.	1.2 oz.	2.4 oz.
max. acceleration:	30 G's	60 G's	3 G's	6 G's

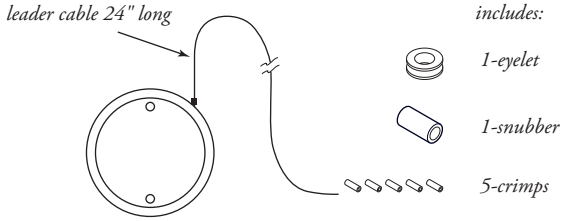
Measuring Cable Termination:

Ⓐ order code:

E — Eyelet



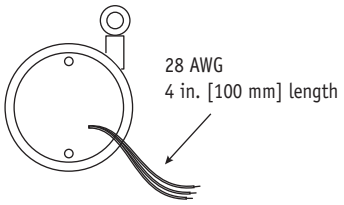
L — Leader Cable



Electrical Connection:

Ⓑ order code:

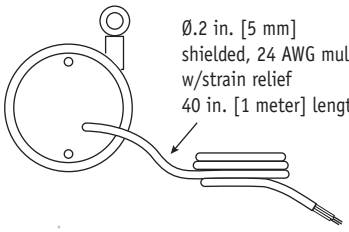
W — 4-inch Wire Leads



wiring connections

+in	=	brown
+out	=	red
com.	=	orange

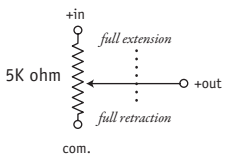
C — 40-inch Instrumentation Cable



wiring connections

+in	=	red
+out	=	green
com.	=	black

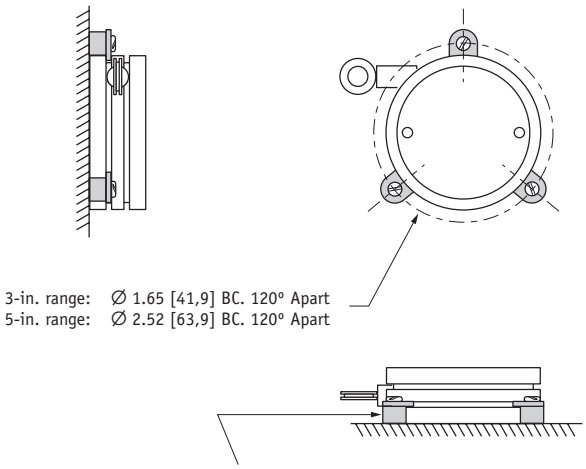
sensing circuit



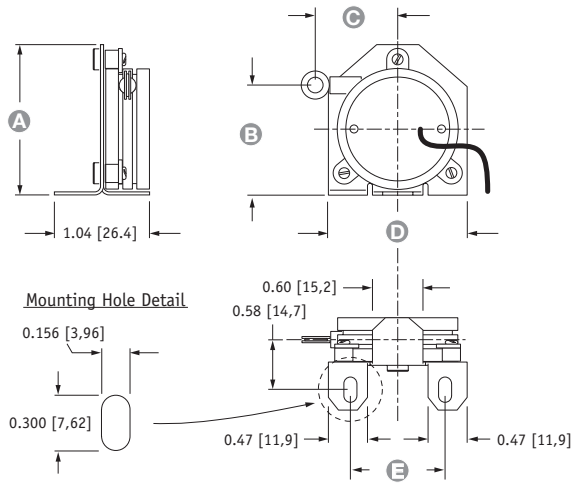
Ordering Information (cont.)

Mounting Options:

order code:	blank	MB
	Servo Clip Mount Option *includes 3) servo-clips and 3) 4-40 screws*	Mounting Bracket Option



use 4-40 or M3 screws and servo-clips to mount sensor.



	3-inch Range	5-inch Range
A	1.8 [46]	3.0 [75]
B	1.3 [33]	2.3 [59]
C	1.0 [25]	1.2 [31]
D	1.7 [42]	2.4 [62]
E	1.13 [28,6]	1.87 [47,6]

INCHES[MM]

Precision Potentiometric Output
Ranges: 0-3, 0-9, 0-15, 0-30 inches
Flight/Crash Test Applications • 360° 2-Axis Mount

CE

MT2A

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-3, 0-9, 0-15, 0-30 inches, min.
Output Signal ..... voltage divider (potentiometer)
Accuracy ..... ± 1% to 0.25% full stroke, *see ordering information*
Repeatability ..... ± 0.02% full stroke
Resolution ..... essentially infinite
Measuring Cable ..... Ø.019-in. nylon-coated stainless steel
Enclosure Material ..... anodized aluminum
Sensor Cover Options ..... aluminum or polycarbonate
Sensor ..... conductive plastic-hybrid potentiometer
Weight ..... 0.5 lb. max.

ELECTRICAL

Input Resistance ..... 10K ohms (± 10%)
Power Rating, Watts ..... 2.0 at 158°F (70° C), derated to 0 @ 255°F (125°C)
Recommended Maximum Input Voltage ..... 30V (AC or DC)
Output Signal Change Over Measurement Range ..... 94% ±4% of input voltage
Mating Plug ..... LEMO FGG.OB.304.CLAD52

MECHANICAL

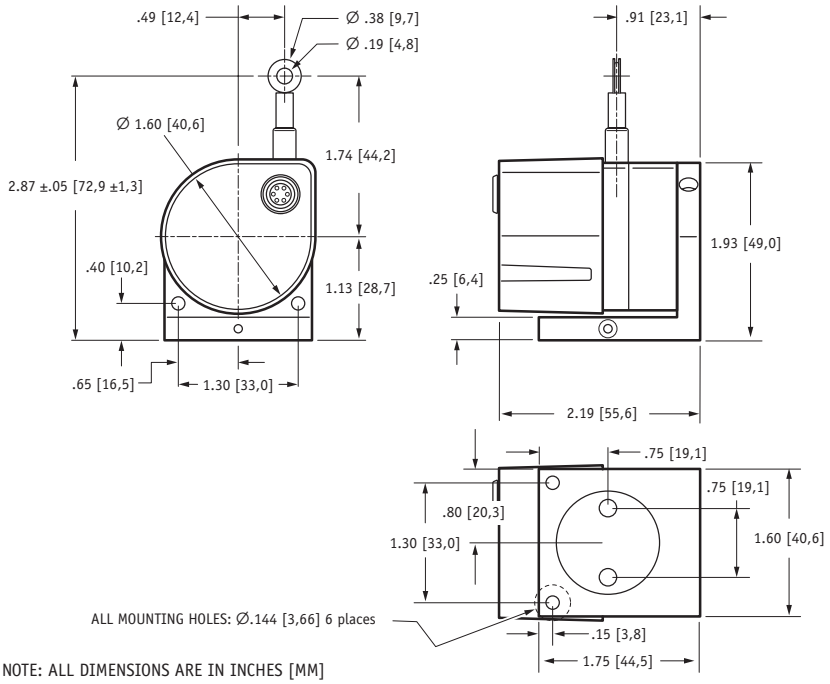
Measuring Cable Tension Options ..... 9, 14 and 33 oz., *see ordering information*
Maximum Measuring Cable Acceleration ..... 136 G's, *see ordering information*

ENVIRONMENTAL

Operating Temperature ..... -65° to 255° F (-55° to 125°C)

GAM EG 13 CERTIFICATION

Specifications ..... *see back page*



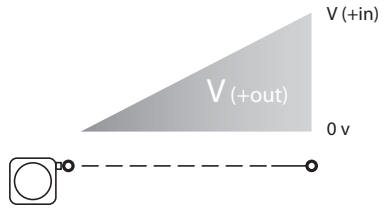
NOTE: ALL DIMENSIONS ARE IN INCHES [MM]

The MT2A is a member of our family of rugged, accurate miniature cable-extension position transducers designed specifically for test applications. One of the major benefits to this sensor its 2-axis 360° rotating mounting bracket to allow for fast and simple installation in any direction.

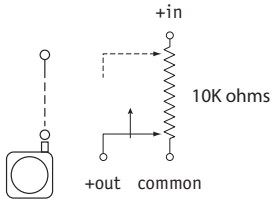
The MT2A comes in 4 different measuring ranges: 0-3", 0-9", 0-15" and 0-30" and features a highly-tensioned heavy-duty measuring cable designed for the high-acceleration demands encountered in flight testing and automotive crash tests.

For extreme impact applications, a new rugged all aluminum sensor cover is now available!

Output Signal



Schematic



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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

Ordering Information

Model Number:

MT2A - ___ ___ - ___ - 10K - ___

order code: Ⓡ Ⓐ Ⓑ Ⓒ

Sample Model Number:

MT2A - 9E - 33 - 10K - M1A

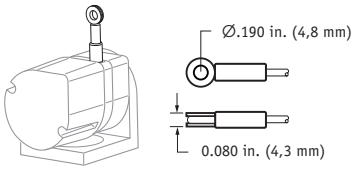
Ⓡ	range:	9 inches
Ⓐ	measuring cable termination:	eyelet
Ⓑ	measuring cable tension:	33 oz. (±6 oz.)
Ⓒ	electrical connection:	end-mounted connector w/ aluminum sensor cover

Full Stroke Range:

Ⓡ order code:	3	9	15	30
full stroke range, min:	3 inches	9 inches	15 inches	30 inches
potentiometer cycle-life:	2.5×10^6	8.3×10^5	5.0×10^5	2.5×10^5
accuracy (% of full stroke):	1 %	.25%	.25%	.25%

Measuring Cable Termination:

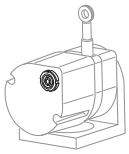
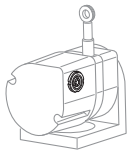
Ⓐ order code: **E** Eyelet | **L** Leader Cable (24 in. long)

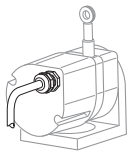
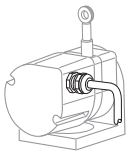
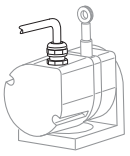
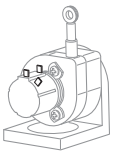


Measuring Cable Tension:

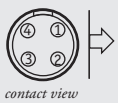
Ⓑ order code:	9	14	33
tension:	9 (±2) oz.	14 (±4) oz.	33 (±6) oz.
max. cable acceleration:	99 G's	136 G's	136 G's

Electrical Connection/ Sensor Cover:

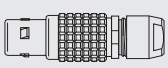
Ⓒ order code:	M1	M1A	M2	M2A	M3	M3A
sensor cover:	polycarbonate	aluminum	polycarbonate	aluminum	polycarbonate	aluminum
electrical connection:		end-mount connector*		side-mount connector*		top-mount connector*

Ⓒ order code:	C1	C1A	C2	C2A	C3	C3A	S
sensor cover:	polycarbonate	aluminum	polycarbonate	aluminum	polycarbonate	aluminum	none**
electrical connection:							
	end-mount, instrumentation cable *(15-ft. long, 24 ga., shielded)*		side-mount, instrumentation cable *(15-ft. long, 24 ga., shielded)*		top-mount, instrumentation cable *(15-ft. long, 24 ga., shielded)*		solder terminals

4-pin mating plug



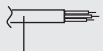
contact view



Lemo FGG.0B.304.CLAD52

pin#	signal
1	+in
2	common
3	+out

Instrumentation Cable



24 ga., shielded

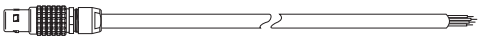
color	signal
Red	+in
Black	common
Green	+out

Solder Terminals

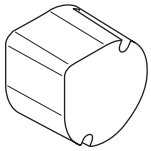
terminal	signal
CW	+in
CCW	common
S	+out

mating plug included **blank cover available, see* ***Accessories* *on next page*

Accessories:



Part Number	Description
9603957-0015	15 ft. long cordset. Includes mating connector with 15 ft., 24 gauge, shielded multiconductor cable



Additional blank sensor covers can be ordered seperately. This cover comes without electrical wiring access holes so customer can drill to their requirements.

Includes screws and gasket.

Part Number	Description
9604197-0000	Aluminum sensor cover
9603958-0000	Polycarbonate sensor cover

GAM EG 13 Certification

QUALIFICATION LEVEL FOR CLIMATIC AND THERMAL ENVIRONMENT

External Overpressure, operating (GAM EG 13 Fasc.21)
- 5 cycles: 1...4.5 Bar in 3 min., 4.5 Bar for 12 hours, 4.5...1 Bar in 1 min.
- 1 cycle: 1...3.2 Bar in 7.5 min., 3.2 Bar for 2 min., 3.2...8 Bar in 5 sec., 8 Bar for 2 hours, 8...1 Bar in 2 Bar/sec.
- 1 cycle: 1...4.5 Bar in 20 msec., 4.5 Bar for 5 sec, 4.5...1 Bar in 20 msec.

Thermal Vacuum Transitory, operating (GAM EG 13 Fasc.10)
Room pressure and temperature (1 Bar A; 20°C ±2°C)
1...10-3 mBar in 100 seconds
Vacuum (10-3 mBar) for 10 min.

Climatic Cycles (GAM EG 13 Fasc.8)
- Dry heat: 24 hours @ 70°C ±2°C Relative Humidity < 50%
- Wet heat: 24 hours @ 70°C ±2°C Relative Humidity = 50%
- Cold: 24 ho urs @ -10°C ±2°C Relative Humidity < 50%
- Wet heat: 24 hours @ 70°C ±2°C Relative Humidity = 100%

Dry Heat (Relative Humidity <50%)
Room temperature to 70°C in 30 mins
70°C for 5 hours, non operating
70°C for 5 hours, operating
70°C to room temperature in 20 minutes

QUALIFICATION LEVEL FOR MECHANICAL ENVIRONMENT

Random Vibrations (GAM EG 13 Fasc.42 mod. Op1)
20...2000 Hz, 3 min. per axis, operating, 34 g.
20...2000 Hz, 20 sec. per axis, operating, 45 g.

Random Vibrations (GAM EG 13 Fasc.41 mod. Op3)
Compensated Levels, short duration
3...300 Hz @ .2 – .002 g2/ Hz.

Reasearch Critical Frequency
Logarithmic Run, 1 octave / min.,1...2000 Hz.

Steady Acceleration, operating (GAM EG 13 Fas.45)
37 g, 3 min. per direction (2 directions per axis)

Sinusoidal Vibrations, operating (Gam EG 13 Fasc.41 mod. Op3)
Logarithmic run, 1 octave/min. on 3 axis
3...50 Hz., 9 hours per axis @0.6...1.25 g

Sinusoidal Vibrations, operating (Gam EG 13 Fasc.41 mod. Op3)
Logarithmic run, 1 octave/min. on 3 axis
5...2 KHz., 3 axis @12...25 g.

Average Shock (GAM EG 13 Fasc.43 Mode Op1)
1 shock, 1/2 sinusoidal, 100g., 6 msec. operating, wlongitudinal and back direction

Free Fall (GAM EG 13 Fasc.43 Mode Op4)
6 consecutive drops on wood table, height = 100mm

Incremental Encoder Output
Ranges: 0-30 inches
Flight/Crash Test Applications • 360° 2-Axis Mount

CE

MT2E

Specification Summary:

GENERAL

Full Stroke Range ..... 0-30 inches, min.
Output Signal ..... incremental encoder (quadrature) signal
Accuracy ..... 0.04% full stroke *contact factory for higher accuracy*
Repeatability ..... ± 0.02% of measurement
Resolution ..... 316 ± 7 pulses per inch (13 ± 1 pulses per mm)
Measuring Cable ..... Ø.019-in. nylon-coated stainless steel
Enclosure Material ..... anodized aluminum
Sensor Cover ..... polycarbonate
Sensor ..... optical incremental encoder
Weight ..... 0.5 lb. max.

ELECTRICAL

Input Voltage ..... 5 - 26 VDC
Input Current ..... 35 mA, no load
Output Driver ..... push-pull, 20 mA source/sink
Output Voltage ..... equal to the input voltage
Mating Plug ..... LEMO FGG.OB.304.CLAD52

MECHANICAL

Measuring Cable Tension Options ..... 9, 14 and 33 oz., *see ordering information*
Maximum Measuring Cable Acceleration ..... 136 G's, *see ordering information*

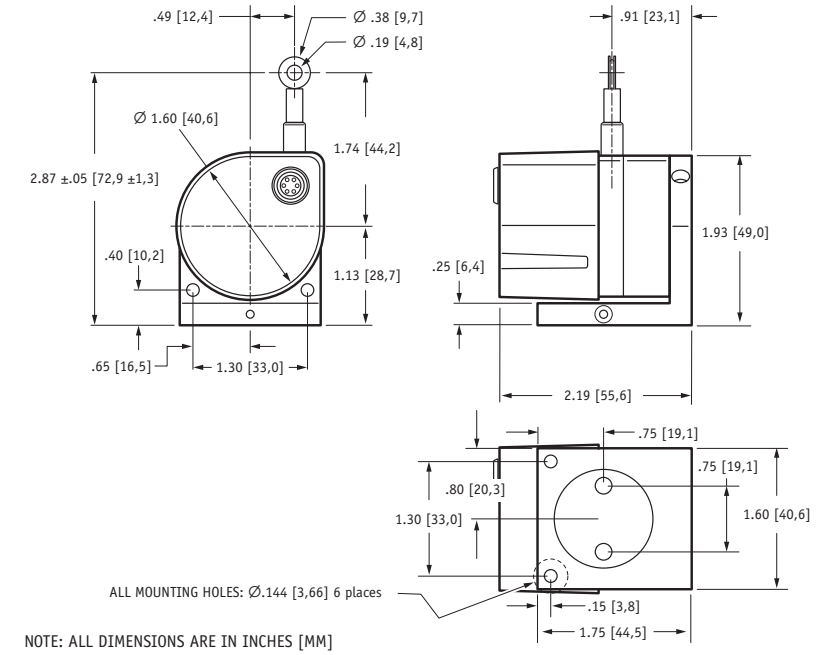
ENVIRONMENTAL

Operating Temperature ..... 0° to 70°C

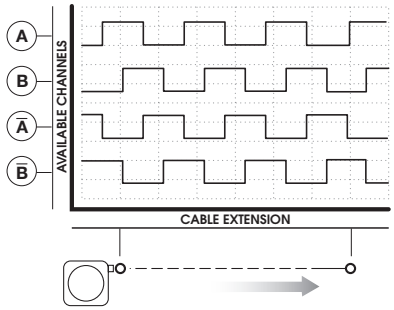
The MT2E is our new encoder-based member to our family of rugged, accurate miniature cable-extension position transducers. The Celesco MT2E features a highly-tensioned heavy-duty measuring cable that was designed for the high-acceleration demands encountered in flight testing and automotive crash tests.

The MT2E was designed with 2-axis 360° rotation in its mounting bracket which allows for fast and simple installation in any direction.

Outline Drawing



Output Signal



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celesco.com • info@celesco.com

Ordering Information:

Model Number:

MT2E - 30 ___ - ___ - 316 - ___
order code: Ⓐ Ⓑ Ⓒ

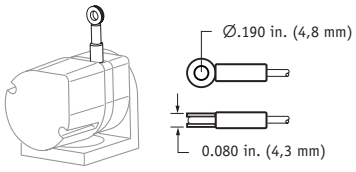
Sample Model Number:

MT2E - 30E - 33 - 316 - M1

Ⓡ	range:	30 inches
Ⓐ	measuring cable termination:	eyelet
Ⓑ	measuring cable tension:	33 oz. (±6 oz.)
Ⓒ	electrical connection:	end-mounted connecto

Measuring Cable Termination:

Ⓐ *order code:*	**E**	**L**
	Eyelet	Leader Cable (24 in. long)

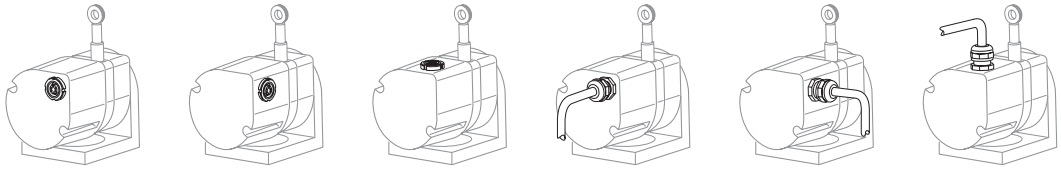


Measuring Cable Tension:

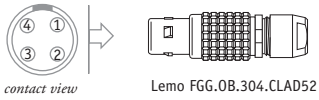
Ⓑ *order code:*	**9**	**14**	**33**
tension:	9 (±2) oz.	14 (±4) oz.	33 (±6) oz.
max. cable acceleration:	99 G's	136 G's	136 G's

Electrical Connection:

Ⓒ *order code:*	**M1**	**M2**	**M3**	**C1**	**C2**	**C3**
connection:	end-mount connector	side-mount connector	top-mount connector	end-mount strain relief	side-mount strain relief	top-mount strain relief
available channels:	A, B	A, B	A, B	A, A′, B, B′	A, A′, B, B′	A, A′, B, B′

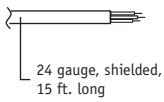


4-pin Connector



pin#	signal
1	input voltage (V+)
2	common (gnd.)
3	channel A
4	channel B

Instrumentation Cable



color	signal
Red	input voltage (V+)
Black	common (gnd.)
Green	channel A
White	channel B
Blue	channel Ā
Brown	channel B̄

Accessories:

Part No.: 9603957-0015
Description: 15 ft. long cordset
includes mating connector and 15 ft., 24 gauge, shielded multiconductor cable

version: **4.0** last updated: **April 7, 2009**

Precision Potentiometric Output
Ranges: 0-3, 0-9, 0-15, 0-30 inches
Test Applications • Wet Environments

MT3A

CE

Specification Summary:

GENERAL

Full Stroke Ranges ..... 0-3, 0-9, 0-15, 0-30 inches, min., *see ordering information*
Output Signal ..... voltage divider (potentiometer)
Accuracy ..... ±1 to 0.25% full stroke, *see ordering information*
Repeatability ..... ± 0.02% full stroke
Resolution ..... essentially infinite
Measuring Cable ..... Ø.019-in. nylon-coated stainless steel
Enclosure Material ..... anodized aluminum
Sensor Cover ..... polycarbonate
Sensor ..... conductive plastic-hybrid potentiometer
Weight ..... 0.5 lb. max.

ELECTRICAL

Input Resistance ..... 10K ohms (± 10%)
Power Rating, Watts ..... 2.0 at 70° C (derated to 0 @ 125°C)
Recommended Maximum Input Voltage ..... 30V (AC or DC)
Output Signal Change Over Measurement Range ..... 94% ±4% of input voltage

MECHANICAL

Measuring Cable Tension Options ..... *see ordering information*
Maximum Measuring Cable Acceleration ..... *see ordering information*

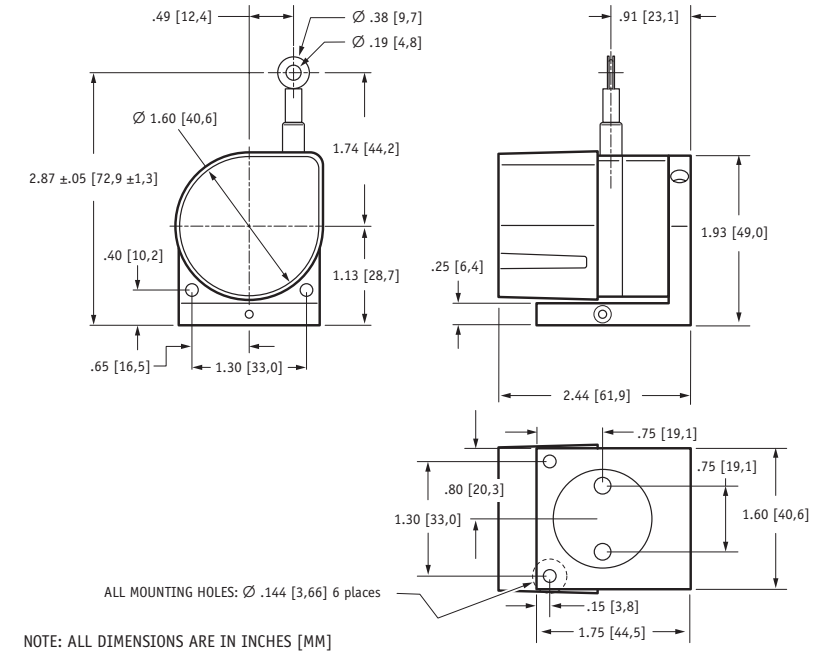
ENVIRONMENTAL

Enclosure ..... NEMA 4 / IP67
Operating Temperature ..... -40° to 250°F (-40° to 125°C)

The MT3A is the solution for high-acceleration test applications in potentially wet environments. Just like the MT2A, the MT3A comes in 4 different full-stroke ranges, has a high-tension heavy-duty measuring cable designed for the demands of flight and automotive crash tests and comes with an easy to use 2-axis 360° rotation mounting bracket for installation in hard to fit areas.

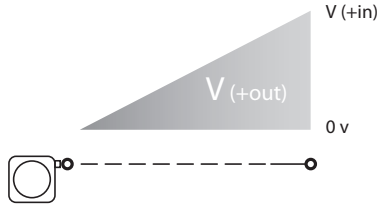
For extreme high impact applications, the MT3A is now available with a rugged all aluminum sensor cover!

Outline Drawing

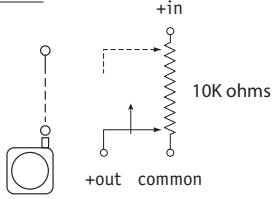


NOTE: ALL DIMENSIONS ARE IN INCHES [MM]

Output Signal



Schematic



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Ordering Information:

Model Number:

MT3A - ____ ___ - ___ - 10K - ___

order code: Ⓡ Ⓐ Ⓑ Ⓒ

Sample Model Number:

MT3A - 9E - 33 - 10K - C1A

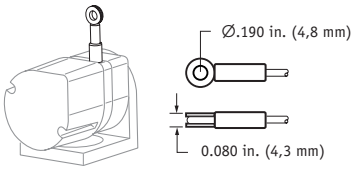
Ⓡ	range:	9 inches
Ⓐ	measuring cable termination:	eyelet
Ⓑ	measuring cable tension:	33 oz. (±6 oz.)
Ⓒ	electrical connection:	15-ft cable w/end-mounted strain relief/aluminum cover

Full Stroke Range:

Ⓡ order code:	3	9	15	30
full stroke range, min:	3 inches	9 inches	15 inches	30 inches
potentiometer cycle-life:	2.5×10^6	8.3×10^5	5.0×10^5	2.5×10^5
accuracy (% of full stroke):	1 %	.25%	.25%	.25%

Measuring Cable Termination:

Ⓐ order code: **E** Eyelet



Ⓐ order code: **L** Leader Cable (24 in. long)

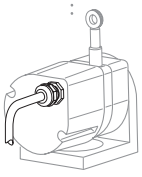
Measuring Cable Tension:

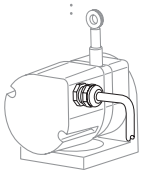
Ⓑ order code:	9	14	33
tension:	9 (±2) oz.	14 (±4) oz.	33 (±6) oz.
max. cable acceleration:	17 G's	50 G's	90 G's

Electrical Connection/ Sensor Cover:

Ⓒ order code:	C1	C1A	C4	C4A	C2	C2A	C5	C5A
sensor cover:	polycarbonate	aluminum	polycarbonate	aluminum	polycarbonate	aluminum	polycarbonate	aluminum
electrical cable length:	15 ft (4.5 m)		30 ft (9 m)		15 ft (4.5 m)		30 ft (9 m)	

end-mount strain relief

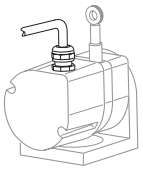




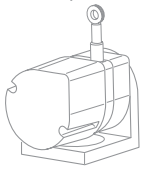
side-mount strain relief

Ⓒ order code:	C3	C3A	C6	C6A	BC	BCA
sensor cover:	polycarbonate	aluminum	polycarbonate	aluminum	polycarbonate	aluminum
electrical cable length:	15 ft (4.5 m)		30 ft (9 m)		n/a	n/a

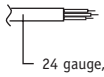
top-mount strain relief



blank cover*



Signal Connection Color Code



24 gauge, shielded

color	signal
Red	+in
Black	common
Green	+out

** **blank cover** option is for customers who want to provide their own connector or strain relief. This cover comes without electrical wiring access holes so customer can drill to their requirements.*

Position/Velocity Panel Meter Systems

PT8420 shown for illustration,
Systems available for ALL Celesco Transducers

Systems Configured to Customer Requirements

Shipped with Record of Calibration

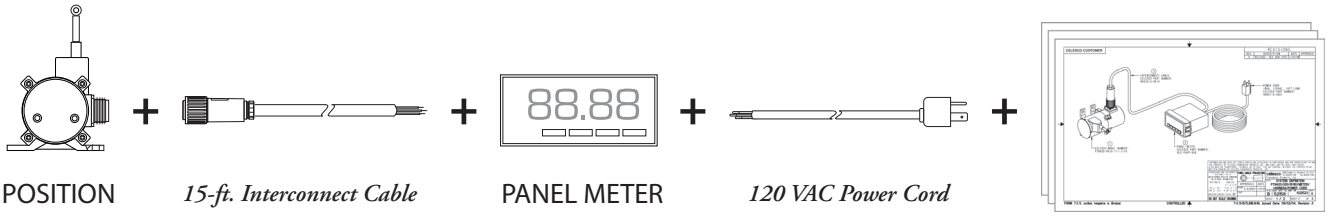
Ideal for ISO9000 environments!

Celesco provides a completely configured and tested panel meter system programmed and calibrated to your exact requirements. Each system includes panel meter, position or velocity transducer, 15-ft. interconnect cable and 120 VAC power cord to power the meter.

Optional contact closures (setpoints) and separate analog outputs to drive additional control equipment are available. Contact Celesco for system quote and complete information!

System Overview:

COMPLETE PANEL METER SYSTEM



POSITION TRANSDUCER + *15-ft. Interconnect Cable* + PANEL METER (DISPLAY) + *120 VAC Power Cord* + SYSTEM DOCUMENTATION

Position Transducer - Select from our full line of linear or rotary position and velocity transducers. Let our application engineers help you select the model to fit your requirement.

15-ft Interconnect Cable - This multiconductor cable provides all electrical connections between the transducer and the panel meter. Custom lengths beyond 15 feet available.

Panel Meter - Celesco will provide panel meters from only the best manufacturers. Because we have a long history of providing panel meter systems to our customers, you can be assured we will only deliver systems that will fit your specific requirement.

120 VAC Power Cord - Shipped with all systems. Provides AC power directly to panel meter.

System Documentation - Celesco will provide complete system documents that clearly define all shipped components including specific panel meter programming parameters. Upon receipt of order, Celesco will require customer approval of all documents before final assembly and shipment of your order. *See next page for more info.*

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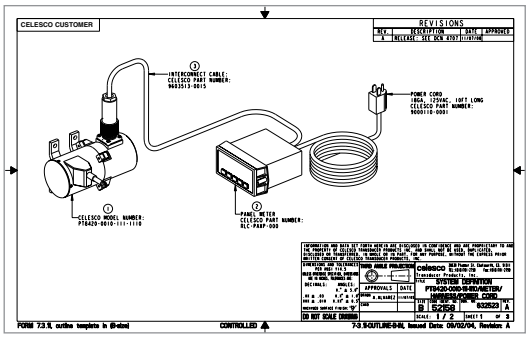
System Documentation (defined):

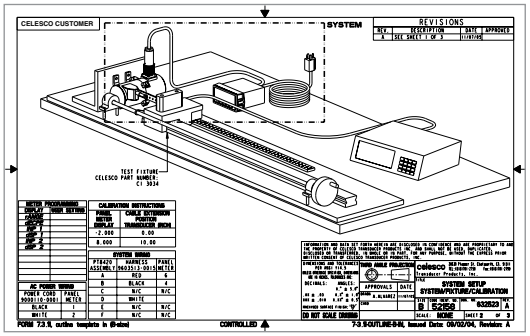
Celesco will provide the following documents with each system:

System Definition Drawing



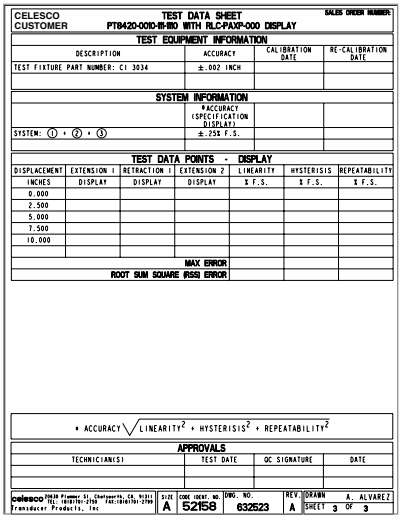
description	*benefit*
Identifies all specific components delivered to the customer.	Clearly defines the entire system in a controlled manner.

Test Set-Up and Programming Drawing



description	*benefit*
Identifies all test fixtures and electronic equipment used to verify system performance. Also details specific values used to program display.	Provides controlled record of system programming.

Calibration Data



description	*benefit*
Provides formal record of calibration data including statement of accuracy.	For ISO9000 environments, provides detailed calibration procedures.

System Worksheet:

Please use this worksheet to help define your specifice display requirements. An example is shown below.

You may submit this worksheet with your order.

For Position:

Units of Measurement:	☐ inch ☐ mm. ☐ feet ☐ %
Decimal Point Location:	☐ none ☐ x.x ☐ x.xx ☐ x.xxx
Display at Full Extension:	
Display at Full Retraction:	

For Velocity:

Units of Measurement:	☐ inch ☐ mm. ☐ feet ☐ %
Units of Time:	☐ secs. ☐ min. ☐ hrs.
Decimal Point Location:	☐ none ☐ x.x ☐ x.xx ☐ x.xxx
Minimum Velocity:	
Maximum Velocity:	
Display at Minimum Velocity:	
Display at Maximum Velocity:	

For Analog Output:

Display	Output Signal
	= ☐ 4 mA ☐ 0 VDC
	= ☐ 20 mA ☐ 5 VDC ☐ 10 VDC

For Setpoints:

Display	Setpoint
	= Setpoint 1
	= Setpoint 2

Example:

For Position:

Units of Measurement:	☒ inch ☐ mm. ☐ feet ☐ %
Decimal Point Location:	☐ none ☐ x.x ☒ x.xx ☐ x.xxx
Display at Full Extension:	9000
Display at Full Retraction:	0000

For Analog Output:

Display	Output Signal
9000	= ☒ 4 mA ☐ 0 VDC
0000	= ☒ 20 mA ☐ 5 VDC ☐ 10 VDC

Position Display:

Units of measurement	*INCHES*
Display reading when cable is fully retracted:	*00.00*
Display reading whe cable is fully extended:	*90.00*

Analog Output:

When the display reads 00.00 inches, the output should be:	*4 mA*
When the display reads 90.00 inches, the output should be:	*20 mA*

Precision Potentiometric Output
Ranges: 0-2 to 0-100 inches
Instrument Grade

PT101

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-2 to 0-100 inches
Output Signal Options ..... voltage divider (potentiometer)
Accuracy ..... *see ordering information*
Repeatability ..... ± 0.02% full stroke
Resolution ..... essentially infinite
Measuring Cable ..... *see ordering information*
Enclosure Material ..... powder-painted and anodized aluminum
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight ..... 2 lbs. max.

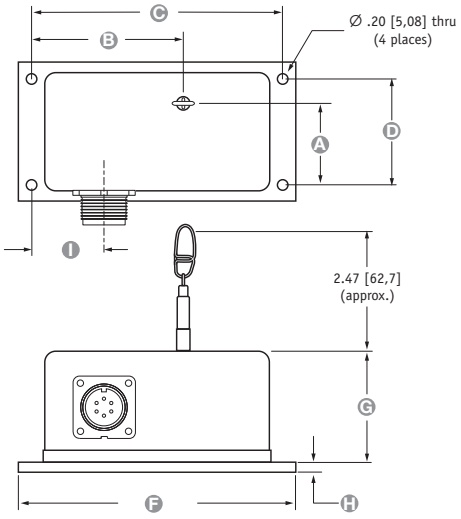
ELECTRICAL

Input Resistance Options ..... 500, 1K, 5K, 10K or bridge
Maximum Input Voltage ..... *see ordering information*
Power Rating ..... *see ordering information*
Output Signal Change Over Full Stroke Range ..... 94% ±4% of input voltage

ENVIRONMENTAL

Enclosure ..... NEMA 1
Temperature Coefficient of Sensing Element ..... 88 PPM/°F
Humidity ..... 100% RH @ 90°F (32° C)
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration ..... up to 10 G's to 2000 Hz maximum

fig. 1: Top Exit Option



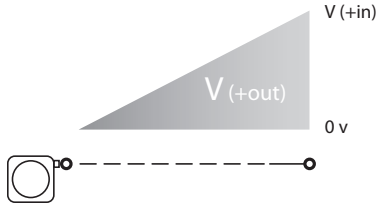
Range	A	B	C	D	E	F	G	H	I
2", 10", 20"	1.34 [34,0]	2.88 [73,1]	4.75 [120,6]	2.00 [50,8]	2.63 [66,8]	5.25 [133,4]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
5", 25", 50"	1.83 [46,5]	2.88 [73,1]	4.75 [120,6]	2.00 [50,8]	2.63 [66,8]	5.25 [133,4]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
15", 30"	1.56 [39,6]	2.88 [73,1]	4.75 [120,6]	2.00 [50,8]	2.63 [66,8]	5.25 [133,4]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
40"	1.64 [41,6]	2.88 [73,1]	4.75 [120,6]	2.00 [50,8]	2.63 [66,8]	5.25 [133,4]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
60"	2.16 [54,9]	2.88 [73,1]	6.75 [171,4]	2.37 [60,2]	3.25 [82,5]	7.50 [190,5]	2.60 [66,0]	.19 [4,8]	1.37 [34,8]
75", 80"	2.45 [62,2]	2.38 [60,4]	6.75 [171,4]	2.50 [63,5]	3.63 [92,2]	7.50 [190,5]	2.86 [72,6]	.19 [4,8]	1.37 [34,8]
100"	3.10 [78,7]	2.47 [62,8]	7.38 [187,5]	3.00 [76,2]	4.25 [108,0]	8.00 [203,2]	3.79 [96,3]	.19 [4,8]	3.69 [93,7]

ALL DIMENSIONS ARE IN INCHES [MM] tolerances are ±0.02 in. [±0,5mm] unless otherwise noted

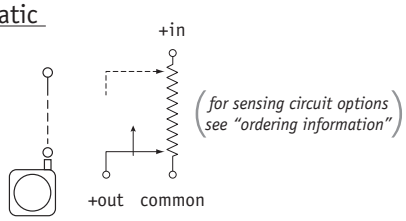
Based on Celesco's original string pot design dating back to the late 1960's, the PT101 has become a standard throughout the years for literally thousands of applications including aircraft structural testing, hydraulic cylinder control, valve stem opening, and factory automation.

Available in full stroke ranges up to 100-inches, the PT101 provides a voltage feedback signal linearly proportional to the position of its traveling stainless steel measuring cable. Additionally the PT101 installs in minutes and doesn't require perfect parallel alignment. Simply secure the base to a fixed surface and attach the measuring cable to your moving object.

Electrical Output Signal



Schematic



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Ordering Information:

Model Number:

PT101 - ____ - ____ **1** ____ - ____ **1** ____ **0**
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:
PT101 - 0025 - 111 - 1110

Ⓡ	range:	25 inches
Ⓐ	measuring cable tension:	standard - 5 oz.
Ⓒ	cable exit:	top
Ⓓ	sensing circuit:	500 ohms
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ order code:	0002	0005	0010	0015	0020	0025	0030	0040	0050	0060	0075	0080	0100
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.	75 in.	80 in.	100 in.
accuracy (% of f.s.):	0.25%		0.15%		0.10%	0.15%				0.10%			
potentiometer cycle life*:	2.5 x 10^6		5 x 10^5		2.5 x 10^5	5 x 10^5				2.5 x 10^5			

**–1 cycle is defined as the travel of the measuring cable from full retraction to full extension and back to full retraction*

Measuring Cable Tension:

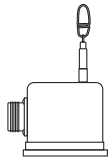
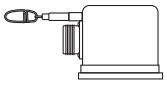
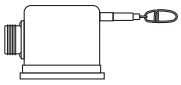
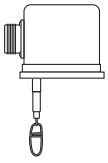
Ⓐ order code:	1	H	2**	3**
	standard tension*/ acceleration	high tension*/ acceleration		
2, 10, 20 inch range:	12 oz. / 11 G	65 oz. / 53 G	72 oz.	144 oz.
5, 25, 50 inch range:	5 oz. / 2 G	26 oz. / 11 G	30 oz.	60 oz.
15, 30 inch range:	8 oz. / 3 G	43 oz. / 23 G	48 oz.	96 oz.
40 inch range:	6 oz. / 4 G	33 oz. / 16 G	36 oz.	72 oz.
60 inch range:	13 oz. / 4 G	22 oz. / 8 G	26 oz.	52 oz.
75, 80 inch range:	10 oz. / 3 G	40 oz. / 12 G	20 oz.	40 oz.
100 inch range:	13 oz. / 5 G	52 oz. / 20 G	26 oz.	52 oz.
measuring cable:	.019-in. dia. nylon-coated stainless steel		.024-in. dia. stainless steel	

Reorder Only Reorder Only

**–note: spring tension tolerance: ±20% **–note: outline dimensions for these options not controlled on this datasheet.*

Measuring Cable Exit:

Ⓒ order code:	1	2	3	4
	top exit (see fig. 1)	front exit (see fig. 3)	rear exit (see fig. 3)	bottom exit (see fig. 2)

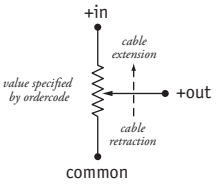
Sensing Circuit:

Ⓓ order code:	1	2	3	4	5	6
	500 ohm*	1000 ohm*	5000 ohm*	10,000 ohm* *tolerance ±10%*	fixed bridge (2 mV/V)	adjustable bridge (0...30 mV/V)

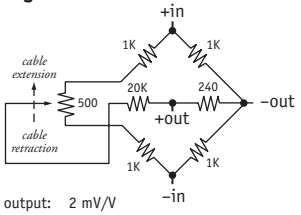
max. input voltage and power rating, options 1-4

	2-inch, 5-inch range	*10-inch to 100-inch range*
500-ohms:	20 V AC/DC (1 W)	30 V AC/DC (2 W)
1K to 10K-ohms:	30 V AC/DC (1 W)	30 V AC/DC (2 W)

circuit, options 1-4

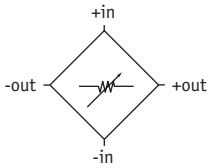


fixed bridge circuit



full scale output: 2 mV/V
zero adjust: not available

adjustable bridge cicuit



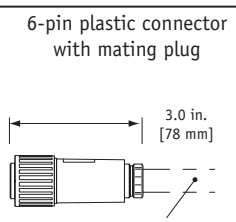
full scale output: adjustable from 0 to 30mV/V
zero adjust: from factory set zero to 50% of full stroke

Ordering Information (cont.):

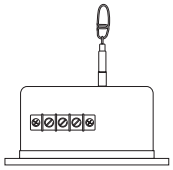
Electrical Connection:

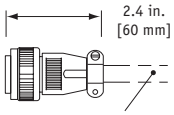
Ⓕ *order code:*

1	2	3	4
6-pin plastic connector with mating plug	terminal strip	6-pin metal connector with mating plug	25-ft. instrumentation cable 24 AWG, shielded

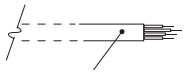


1/2 - 5/16" [14 - 8 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S





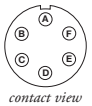
3/8-in. [9 mm] max cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S



25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

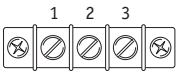
6-pin mating plug:

pin	standard	bridge
A	+ in	+ in
B	common	– in
C	+ out	– out
D	-	+ out



contact view

Terminal Strip:

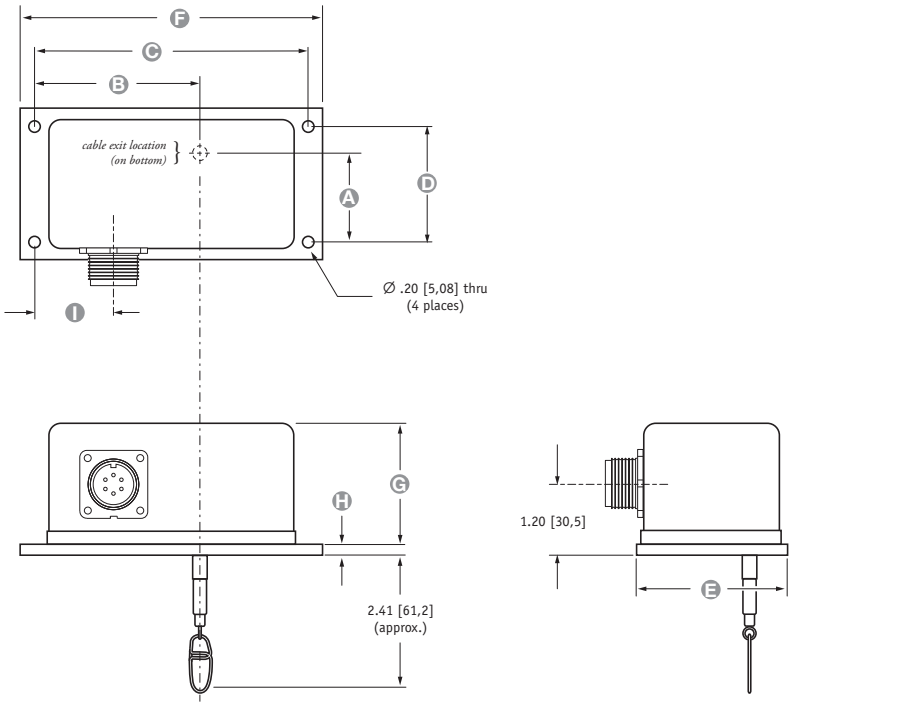


terminal	signals
1	+ in
2	common
3	+ out

25-ft. instrumentation cable:

color code	standard	bridge
RED	+ in	+ in
BLACK	common	– in
GREEN	+ out	+ out
WHITE	-	– out

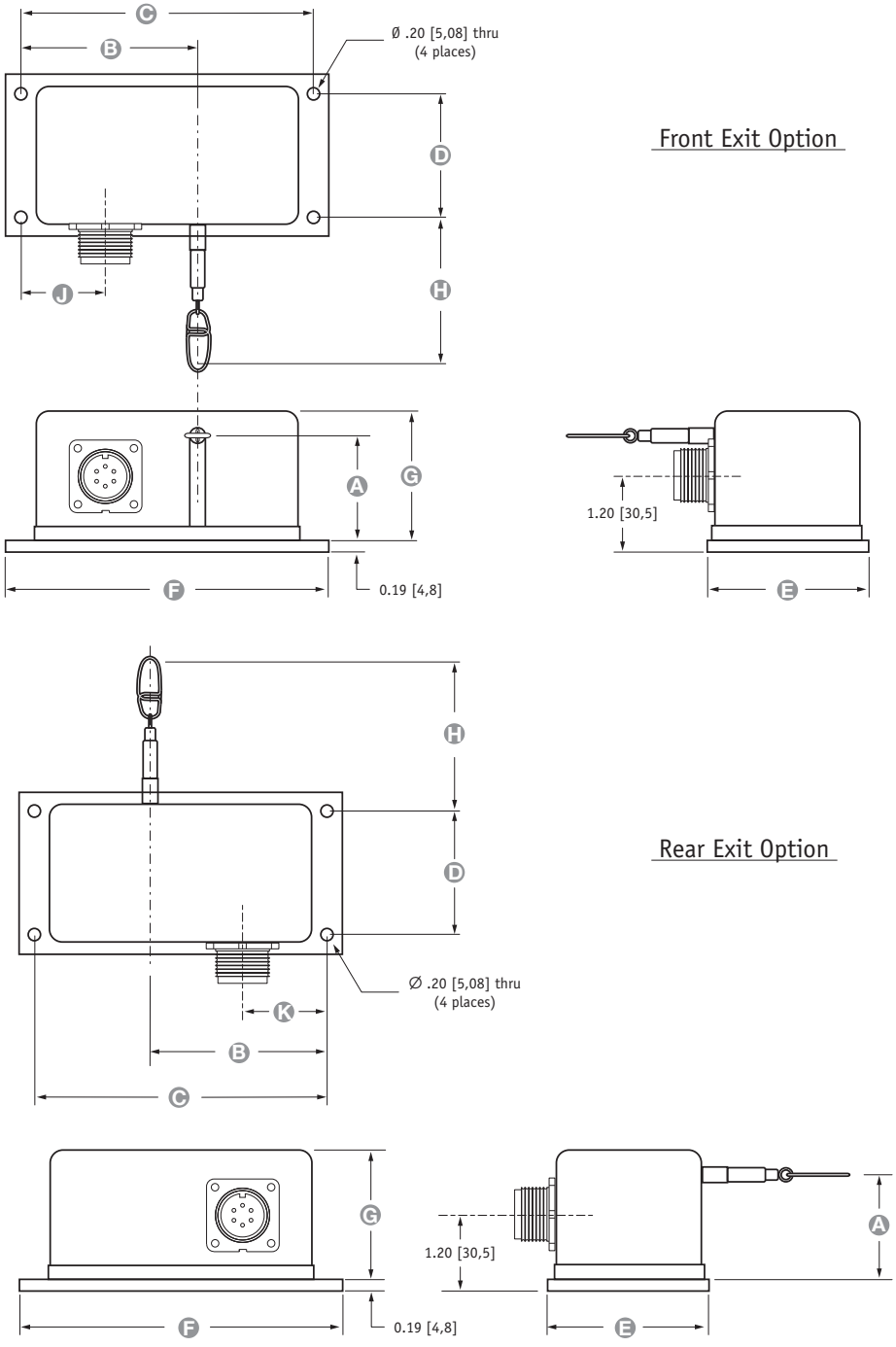
fig. 2: Bottom Exit Option



Range	A	B	C	D	E	F	G	H	I
2", 10", 20"	1.34 [34,0]	2.88 [73,1]	4.75 [120,6]	2.00 [50,8]	2.63 [66,8]	5.25 [133,4]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
5", 25", 50"	1.83 [46,5]	2.88 [73,1]	4.75 [120,6]	2.00 [50,8]	2.63 [66,8]	5.25 [133,4]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
15", 30"	1.56 [39,6]	2.88 [73,1]	4.75 [120,6]	2.00 [50,8]	2.63 [66,8]	5.25 [133,4]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
40"	1.64 [41,6]	2.88 [73,1]	4.75 [120,6]	2.00 [50,8]	2.63 [66,8]	5.25 [133,4]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
60"	2.16 [54,9]	2.88 [73,1]	6.75 [171,4]	2.37 [60,2]	3.25 [82,5]	7.50 [190,5]	2.60 [66,0]	.19 [4,8]	1.37 [34,8]
75", 80"	2.45 [62,2]	2.38 [60,4]	6.75 [171,4]	2.50 [63,5]	3.63 [92,2]	7.50 [190,5]	2.86 [72,6]	.19 [4,8]	1.37 [34,8]
100"	3.10 [78,7]	2.47 [62,8]	7.38 [187,5]	3.00 [76,2]	4.25 [108,0]	8.00 [203,2]	3.79 [96,3]	.19 [4,8]	3.69 [93,7]

ALL DIMENSIONS ARE IN INCHES [MM] tolerances are ±0.02 in. [±0,5mm] unless otherwise noted

fig. 3: Front and Rear Exit Options



Range	A	B	C	D	E	F	G	H	I	J	K
2″, 10″, 20″	1.34 [34,0]	2.87 [72,9]	4.75 [120,6]	2.00 [50,8]	2.63 [66,8]	5.25 [133,4]	2.10 [53,3]	2.57 [65,3]	.16 [4,1]	1.37 [34,8]	1.37 [34,8]
5″, 25″, 50″	1.83 [46,5]	2.87 [72,9]	4.75 [120,6]	2.00 [50,8]	2.63 [66,8]	5.25 [133,4]	2.10 [53,3]	2.57 [65,3]	.16 [4,1]	1.37 [34,8]	1.37 [34,8]
15″, 30″	1.56 [39,6]	2.87 [72,9]	4.75 [120,6]	2.00 [50,8]	2.63 [66,8]	5.25 [133,4]	2.10 [53,3]	2.57 [65,3]	.16 [4,1]	1.37 [34,8]	1.37 [34,8]
40″	1.64 [41,6]	2.87 [72,9]	4.75 [120,6]	2.00 [50,8]	2.63 [66,8]	5.25 [133,4]	2.10 [53,3]	2.57 [65,3]	.16 [4,1]	1.37 [34,8]	1.37 [34,8]
60″	2.16 [54,9]	2.88 [73,1]	6.75 [171,4]	2.37 [60,2]	3.25 [82,5]	7.50 [190,5]	2.60 [66,0]	2.63 [66,8]	.19 [4,8]	1.37 [34,8]	5.38 [136,7]
75″, 80″	2.45 [62,2]	2.38 [60,4]	6.75 [171,4]	2.50 [63,5]	3.63 [92,2]	7.50 [190,5]	2.86 [72,6]	2.69 [68,3]	.19 [4,8]	5.38 [136,7]	5.38 [136,7]
100″	3.10 [78,7]	2.47 [62,8]	7.38 [187,5]	3.00 [76,2]	4.25 [108,0]	8.00 [203,2]	3.79 [96,3]	2.90 [73,7]	.19 [4,8]	3.69 [93,7]	3.69 [93,7]

ALL DIMENSIONS ARE IN INCHES [MM] tolerances are ±0.02 in. [±0,5mm] unless otherwise noted

0/4...20 mA Output
Ranges: 0-2 to 0-100 inches
Instrument Grade

PT420

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-2 to 0-100 inches
Output Signal Options..... 4...20 mA (2-wire) and 0...20 mA (3-wire)
Accuracy..... *see ordering information*
Repeatability..... ± 0.05% full stroke
Resolution ..... essentially infinite
Enclosure Material..... powder-painted and anodized aluminuml
Sensor ..... plastic-hybrid precision potentiometer
Weight..... 2 lbs. max.

ELECTRICAL

Input Voltage ..... *see ordering information*
Input Current..... 20 mA max.
Maximum Loop Resitance (Load) ..... (loop supply voltage - 8)/0.020
Circuit Protection ..... 38 mA max.
Impedence..... 100M ohms@100 VDC, min.
Output Signal Adjustment
Zero Adjustment ..... from factory set zero to 50% of full stroke range
Span Adjustment..... to 50% of factory set span
Thermal Effects
Zero ..... 0.01% f.s./°F, max.
Span ..... 0.01% f.s./°F, max.

ENVIRONMENTAL

Enclosure ..... NEMA 1
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration..... up to 10 G's to 2000 Hz maximum

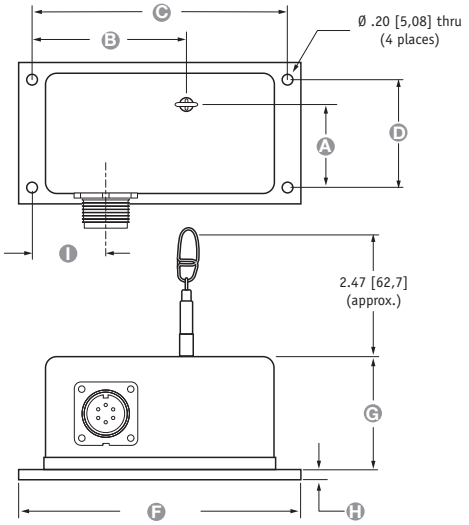


fig. 1: Top Exit Option

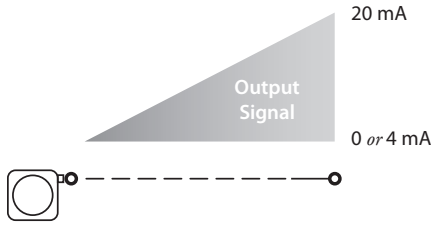
Range	A	B	C	D	E	F	G	H	I
2", 10", 20"	1.34 [34,0]	4.00 [101,6]	7.00 [177,8]	2.00 [50,8]	2.63 [66,8]	7.50 [190,5]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
5", 25", 50"	1.83 [46,5]	4.00 [101,6]	7.00 [177,8]	2.00 [50,8]	2.63 [66,8]	7.50 [190,5]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
15", 30"	1.56 [39,6]	4.00 [101,6]	7.00 [177,8]	2.00 [50,8]	2.63 [66,8]	7.50 [190,5]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
40"	1.64 [41,6]	4.00 [101,6]	7.00 [177,8]	2.00 [50,8]	2.63 [66,8]	7.50 [190,5]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
60"	2.16 [54,9]	4.19 [106,4]	7.00 [177,8]	2.37 [60,2]	3.25 [82,5]	7.50 [190,5]	2.60 [66,0]	.19 [4,8]	1.37 [34,8]
75", 80"	2.45 [62,2]	4.38 [111,3]	6.75 [171,4]	2.50 [63,5]	3.63 [92,2]	7.50 [190,5]	2.86 [72,6]	.19 [4,8]	1.37 [34,8]
100"	3.10 [78,7]	4.19 [106,4]	7.38 [187,5]	3.00 [76,2]	4.25 [108,0]	8.00 [203,2]	3.79 [96,3]	.19 [4,8]	3.69 [93,7]

ALL DIMENSIONS ARE IN INCHES [MM] tolerances are ±0.02 in. [±0.5mm] unless otherwise noted

The PT420 is available with full-scale measurement ranges from 2 to 100 inches, providing a 0/4-20 mA feedback signal that is linearly proportional to the position of a traveling stainless-steel extension cable. Use the PT420 to provide position feedback on hydraulic cylinders in factories and utilities, gate position in fresh or wastewater distribution systems, or valve opening in process-related applications.

The PT420 installs in minutes by mounting its base to a fixed surface and attaching its cable to the movable object. The PT420 works without perfect parallel alignment, and when its stainless steel cable is retracted, its height is less than 5".

Electrical Output Signal



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

Ordering Information:

Model Number:

PT420 - ____ - ____ **1** ____ - **1** ____ ____ **0**
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:
PT420 - 0025 - 111 - 1110

Ⓡ	range:	25 inches
Ⓐ	measuring cable tension:	standard - 5 oz.
Ⓒ	cable exit:	top
Ⓔ	output signal:	4...20 mA
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ order code:	0002	0005	0010	0015	0020	0025	0030	0040	0050	0060	0075	0100
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.	75 in.	100 in.
accuracy (% of f.s.):	0.28%	0.28%	0.18%	0.18%	0.15%	0.18%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	5×10^5	5×10^5	5×10^5	5×10^5	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

**–1 cycle is defined as the travel of the measuring cable from full retraction to full extension and back to full retraction*

Measuring Cable Tension:

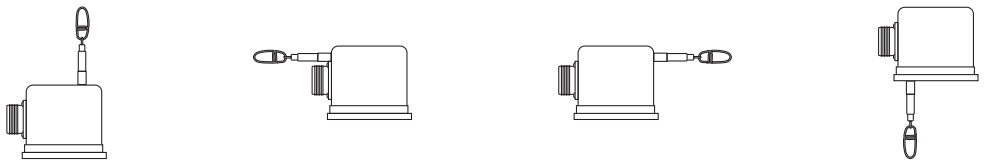
Ⓐ order code:	1	H	2**	3**
	standard tension*/ acceleration	high tension*/ acceleration		
2, 10, 20 inch range:	12 oz. / 11 G	65 oz. / 53 G	72 oz.	144 oz.
5, 25, 50 inch range:	5 oz. / 2 G	26 oz. / 11 G	30 oz.	60 oz.
15, 30 inch range:	8 oz. / 3 G	43 oz. / 23 G	48 oz.	96 oz.
40 inch range:	6 oz. / 4 G	33 oz. / 16 G	36 oz.	72 oz.
60 inch range:	13 oz. / 4 G	22 oz. / 8 G	26 oz.	52 oz.
75, 80 inch range:	10 oz. / 3 G	40 oz. / 12 G	20 oz.	40 oz.
100 inch range:	13 oz. / 5 G	52 oz. / 20 G	26 oz.	52 oz.
measuring cable:	.019-in. dia. nylon-coated stainless steel		.024-in. dia. stainless steel	

Reorder Only Reorder Only

**–note: spring tension tolerance: ±20% **–note: outline dimensions for these options not controlled on this datasheet.*

Measuring Cable Exit:

Ⓒ order code:	1	2	3	4
	top exit (see fig. 1)	front exit*	rear exit*	bottom exit*



**–note: dimensions for optional cable exits not controlled on this datasheet, please contact factory*

Sensing Circuit:

Ⓔ order code:	1	2	3	4
output signal options:	4...20 mA	20...4 mA	0...20 mA	20...0 mA
	4 → 20	20 → 4	0 → 20	20 → 0
sensitivity:	16 mA/full stroke ±0.25%		20 mA/full stroke ±0.25%	
wiring configuration:	2 – wire		3 – wire	
input voltage:	8 – 40 VDC		14 – 29 VDC	

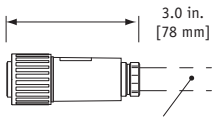
Example:

ordercode = **1** = 4...20 mA { = 4 mA = 20 mA

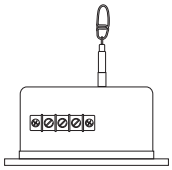
Ordering Information (cont.):

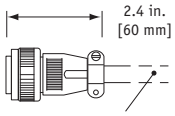
Electrical Connection:

Ⓕ *order code:*	1	2	3	4
	6-pin plastic connector with mating plug	terminal strip	6-pin metal connector with mating plug	25-ft. instrumentation cable 24 AWG, shielded

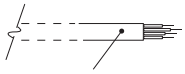


1/2 - 5/16" [14 - 8 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S





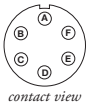
3/8-in. [9 mm] max cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S



25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

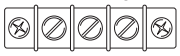
6-pin mating plug:

pin	2-wire	3-wire
A	8...40 vdc	14...29 vdc
B	4...20 mA out	common
C	–	0...20 mA out
D	case ground	–



contact view

Terminal Strip:



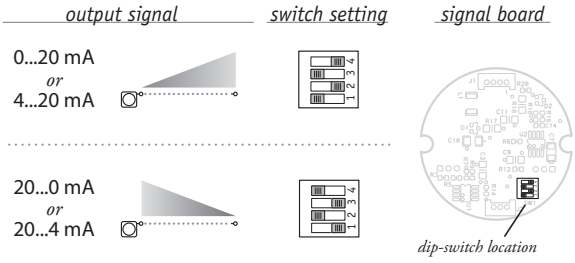
terminal	2-wire	3-wire
1	8...40 vdc	14...29 vdc
2	4...20 mA out	common
3	case ground	0...20 mA out

25-ft. instrumentation cable:

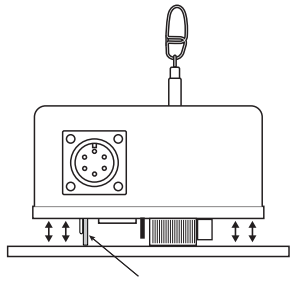
color code	2-wire	3-wire
RED	8...40 vdc	14...29 vdc
BLACK	4...20 mA out	common
WHITE	n/a	n/a
GREEN	case ground	0...20 mA out

Output Signal Selection:

The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.



dip-switch location



internal dip switches & signal board

To gain access to the signal board, remove the two 4-40 screws on top and lift up cover.

version: **5.0** last updated: **May 12, 2010**

0...5, 0...10 VDC Output Options
Ranges: 0-2 to 0-100 inches
Instrument Grade

PT510

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-2 to 0-100 inches
Output Signal Options ..... 0...5, 0...10 VDC
Accuracy ..... ± 0.28% to ±0.15% full stroke *see ordering information*
Repeatability ..... ± 0.05% full stroke
Resolution ..... essentially infinite
Measuring Cable ..... *see ordering information*
Enclosure Material ..... powder-painted and anodized aluminum
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight ..... 2 lbs. max.

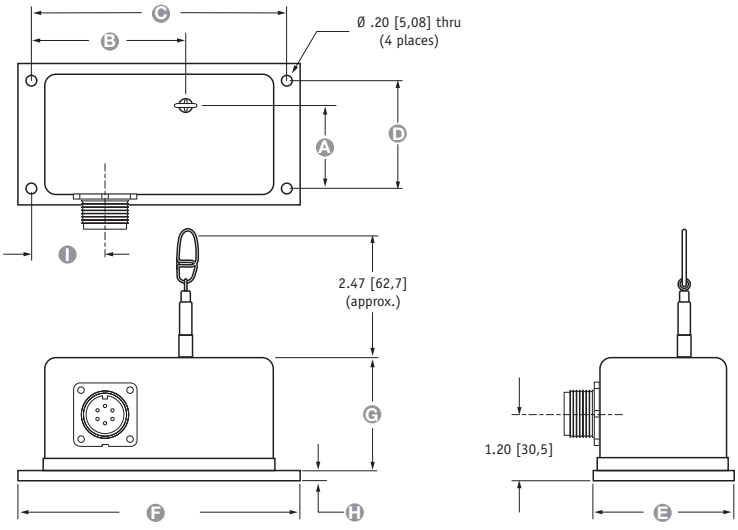
ELECTRICAL

Input ..... *see ordering information*
Input Current ..... 10 mA maximum
Output Impedence ..... 1000 ohms
Maximum Load ..... 5000 ohms
Zero Adjustment ..... from factory set zero to 50% of full stroke range
Span Adjustment ..... to 50% of factory set span

ENVIRONMENTAL

Enclosure ..... NEMA 1
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration ..... up to 10 G's to 2000 Hz maximum

fig. 1: Top Exit Option



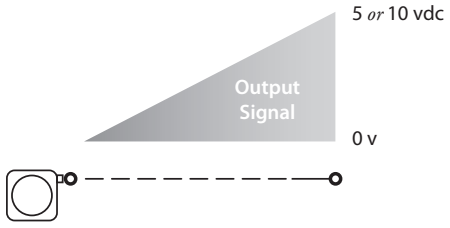
Range	A	B	C	D	E	F	G	H	I
2", 10", 20"	1.34 [34,0]	4.00 [101,6]	7.00 [177,8]	2.00 [50,8]	2.63 [66,8]	7.50 [190,5]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
5", 25", 50"	1.83 [46,5]	4.00 [101,6]	7.00 [177,8]	2.00 [50,8]	2.63 [66,8]	7.50 [190,5]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
15", 30"	1.56 [39,6]	4.00 [101,6]	7.00 [177,8]	2.00 [50,8]	2.63 [66,8]	7.50 [190,5]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
40"	1.64 [41,6]	4.00 [101,6]	7.00 [177,8]	2.00 [50,8]	2.63 [66,8]	7.50 [190,5]	2.10 [53,3]	.16 [4,1]	1.37 [34,8]
60"	2.16 [54,9]	4.19 [106,4]	7.00 [177,8]	2.37 [60,2]	3.25 [82,5]	7.50 [190,5]	2.60 [66,0]	.19 [4,8]	1.37 [34,8]
75", 80"	2.45 [62,2]	4.38 [111,3]	6.75 [171,4]	2.50 [63,5]	3.63 [92,2]	7.50 [190,5]	2.86 [72,6]	.19 [4,8]	1.37 [34,8]
100"	3.10 [78,7]	4.19 [106,4]	7.38 [187,5]	3.00 [76,2]	4.25 [108,0]	8.00 [203,2]	3.79 [96,3]	.19 [4,8]	3.69 [93,7]

ALL DIMENSIONS ARE IN INCHES [MM] tolerances are ±0.02 in. [±0,5mm] unless otherwise noted

Based on Celesco's original string pot design dating back to the late 1960's, the PT510 has become a standard throughout the years for literally thousands of applications including aircraft structural testing, hydraulic cylinder control, valve stem opening, and factory automation.

Available in full stroke ranges up to 100-inches, the PT510 provides a regulated voltage feedback signal linearly proportional to the position of its traveling stainless steel measuring cable. Output signal options include 0-5 and 0-10 vdc.

Electrical Output Signal



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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco.com • info@celesco.com

Ordering Information:

Model Number:

PT510 - ____ - ____ **1** ____ - **1** ____ ____ **0**
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:
PT510 - 0025 - 111 - 1110

Ⓡ	range:	25 inches
Ⓐ	measuring cable tension:	standard - 5 oz.
Ⓒ	cable exit:	top
Ⓑ	output signal:	0...10 VDC
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ order code:	0002	0005	0010	0015	0020	0025	0030	0040	0050	0060	0075	0100
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.	75 in.	100 in.
accuracy (% of f.s.):	0.28%	0.28%	0.18%	0.18%	0.15%	0.18%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	5×10^5	5×10^5	5×10^5	5×10^5	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

**–1 cycle is defined as the travel of the measuring cable from full retraction to full extension and back to full retraction*

Measuring Cable Tension:

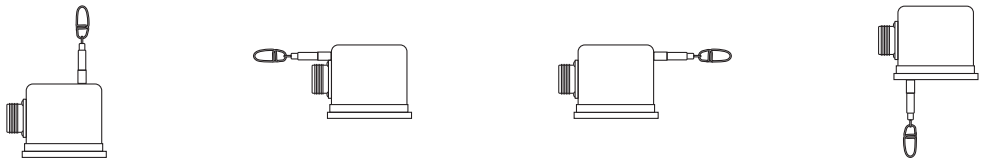
Ⓐ order code:	1	H	2**	3**
	standard tension*/ acceleration	high tension*/ acceleration		
2, 10, 20 inch range:	12 oz. / 11 G	65 oz. / 53 G	72 oz.	144 oz.
5, 25, 50 inch range:	5 oz. / 2 G	26 oz. / 11 G	30 oz.	60 oz.
15, 30 inch range:	8 oz. / 3 G	43 oz. / 23 G	48 oz.	96 oz.
40 inch range:	6 oz. / 4 G	33 oz. / 16 G	36 oz.	72 oz.
60 inch range:	13 oz. / 4 G	22 oz. / 8 G	26 oz.	52 oz.
75, 80 inch range:	10 oz. / 3 G	40 oz. / 12 G	20 oz.	40 oz.
100 inch range:	13 oz. / 5 G	52 oz. / 20 G	26 oz.	52 oz.
measuring cable:	.019-in. dia. nylon-coated stainless steel		.024-in. dia. stainless steel	

Reorder Only Reorder Only

**–note: spring tension tolerance: ±20% **–note: outline dimensions for these options not controlled on this datasheet.*

Measuring Cable Exit:

Ⓒ order code:	1	2	3	4
	top exit (see fig. 1)	front exit*	rear exit*	bottom exit*



**–note: dimensions for optional cable exits not controlled on this datasheet, please contact factory*

Sensing Circuit:

Ⓑ order code:	1	2	3	4
output signal options:	0...10 VDC	0...5 VDC	10...0 VDC	5...0 VDC
	0 → 10	0 → 5	10 → 0	5 → 0
input voltage:	14.5 - 40 vdc	10.5 - 40 vdc	14.5 - 40 vdc	10.5 - 40 vdc

Example:

ordercode = **1** = 0...10 vdc

Ordering Information (cont.):

Electrical Connection:

Ⓕ order code:	1	2	3	4
	6-pin plastic connector with mating plug	terminal strip	6-pin metal connector with mating plug	25-ft. instrumentation cable 24 AWG, shielded

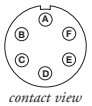
1/2 - 5/16" [14 - 8 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

3/8-in. [9 mm] max cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

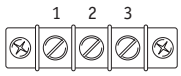
6-pin mating plug:

pin	signals
A	input voltage
B	output signal
C	common



contact view

Terminal Strip:



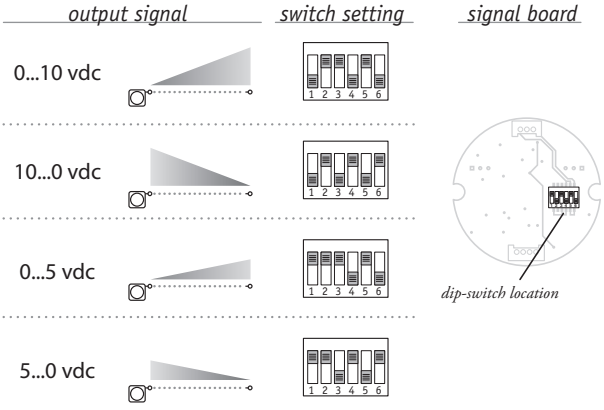
terminal	signals
1	input voltage
2	output signal
3	common

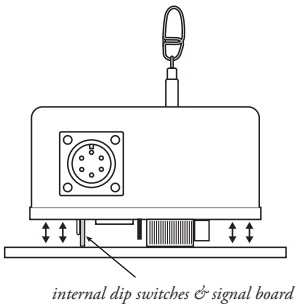
25-ft. instrumentation cable:

color code	signals
RED	input voltage
BLACK	common
GREEN	output signal

Output Signal Selection:

The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.





internal dip switches & signal board

To gain access to the signal board, remove the two 4-40 screws on top and lift up cover.

version: **4.1** last updated: **April 06, 2009**

Precision Potentiometric Output
Ranges: 0-2 to 0-50 inches
Compact Size • OEM Applications

PT1A

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-2 to 0-50 inches
Output Signal Options..... voltage divider (potentiometer)
Accuracy .....± 0.25% to ±0.10% full stroke *see ordering information*
Repeatability..... ± 0.02% full stroke
Resolution .....essentially infinite
Measuring Cable ..... .019-in. dia. nylon-coated stainless steel
Enclosure Material..... glass-filled polycarbonate and black anodized aluminum
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life .....*see ordering information*
Maximum Retraction Acceleration .....*see ordering information*
Weight..... 1 lb. max.

ELECTRICAL

Input Resistance Options .....500, 1K, 5K, 10K or bridge, *see ordering information*
Power Rating, Watt .....*see ordering information*
Recommended Maximum Input Voltage .....*see ordering information*
Output Signal Change Over Full Stroke Range.....94% ±4% of input voltage

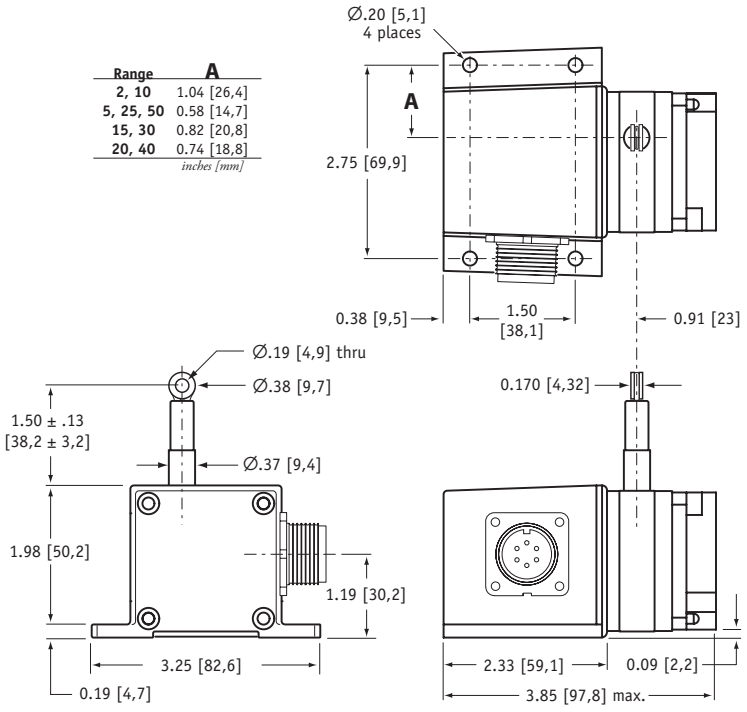
ENVIRONMENTAL

Enclosure ..... NEMA 4, IP 65
Operating Temperature .....0° to 200°F (-17° to 90°C)
Vibration..... up to 10 G's to 2000 Hz maximum

The PT1A is perfect where space and money are limited. The PT1A is part of Celesco's compact line of cable-extension transducers. Using a high cycle plastic-hybrid potentiometer, the PT1A provides a precision voltage divider position feedback signal for full-scale measurement ranges from 2 to 50 inches.

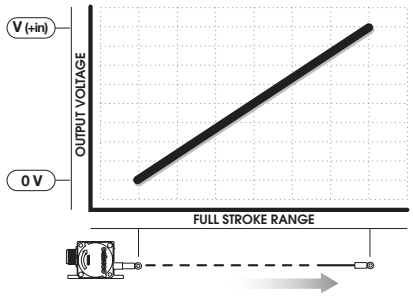
The PT1A has many features to offer including 500 to 10K ohm potentiometer selection, adjustable bridge circuit and multiple measuring cable exit options.

Outline Drawing



dimensions are in inches [mm], tolerances are 0.03 inches [0,8 mm]

Output Signal



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

Ordering Information:

Model Number:

PT1A - _____ - _____ - _____ - _____ - _____
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ

Sample Model Number:

PT1A - 30 - UP - 500 - MC4 - SG

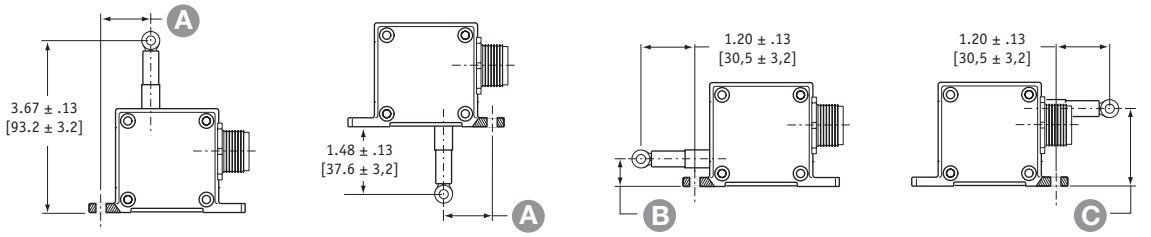
Ⓡ	range:	30 inches
Ⓐ	measuring cable exit:	up
Ⓑ	output signal:	500-ohm pot.
Ⓒ	electrical connection:	4-pin micro connector
Ⓓ	cable guide:	spring-loaded guide

Full Stroke Range:

Ⓡ order code:	2	5	10	15	20	25	30	40	50
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.
accuracy (% of f.s.):	0.25%		0.15%				0.10%		
potentiometer cycle life:	2,500,000 cycles		500,000 cycles				250,000 cycles		
cable tension (20%):	12 oz.	5 oz.	12 oz.	9 oz.	6 oz.	5 oz.	9 oz.	6 oz.	5 oz.
maximum cable acceleration:	11 G's	3 G's	11 G's	5 G's	4 G's	3 G's	5 G's	4 G's	3 G's

Cable Exit:

Ⓐ order code:	UP	DN	FR	BK
direction:	up	down	front	back



measurement range —	2	5	10	15	20	25	30	40	50
Ⓐ	1.04 in. 26,4 mm	0.58 in. 14,7 mm	1.04 in. 26,4 mm	0.82 in. 20,8 mm	0.74 in. 18,8 mm	0.58 in. 14,7 mm	0.82 in. 20,8 mm	0.74 in. 18,8 mm	0.58 in. 14,7 mm
Ⓑ	0.75 in. 19,1 mm	0.29 in. 6,1 mm	0.75 in. 19,1 mm	0.53 in. 13,5 mm	0.45 in. 11,5 mm	0.29 in. 6,1 mm	0.53 in. 13,5 mm	0.45 in. 11,5 mm	0.29 in. 6,1 mm
Ⓒ	1.43 in. 36,3 mm	1.89 in. 48,0 mm	1.43 in. 36,3 mm	1.65 in. 41,9 mm	1.73 in. 43,9 mm	1.89 in. 48,0 mm	1.65 in. 41,9 mm	1.73 in. 43,9 mm	1.89 in. 48,0 mm

Output Signals:

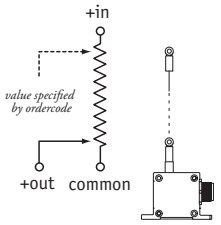
Ⓑ order code:	500	1K	5K	10K	AB
	500 ohm*	1000 ohm*	5000 ohm*	10,000 ohm*	adjustable bridge (0...30 mV/V)

**tolerance = ±10%*

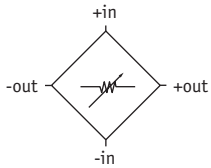
max. input voltage and power rating, options: 500, 1K, 5K, 10K

	2-inch, 5-inch range	*10-inch to 50-inch range*
500-ohms:	20 V AC/DC (1 W)	30 V AC/DC (2 W)
1K to 10K-ohms:	30 V AC/DC (1 W)	30 V AC/DC (2 W)

circuit options: 500, 1K, 5K, 10K



circuit option: AB (adjustable bridge)



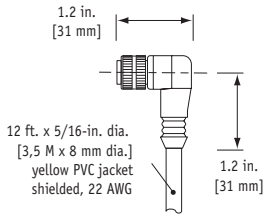
full scale output: adjustable from 0 to 30mV/V
zero adjust: from factory set zero to 50% of full stroke

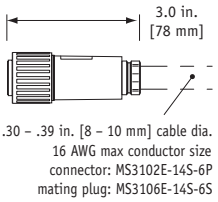
Ordering Information (cont.)

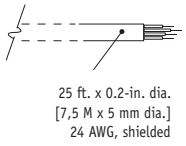
Electrical Connection:

Ⓒ order code:

MC4	M6	C25
4-pin micro-connector with 12 ft [3.5 M] cordset	6-pin plastic connector with mating plug	25-ft. instrumentation cable 24 AWG, shielded







4-pin mating plug and cord set:

contact view

pin	color code	standard	bridge
1	RED-BLK TR.	+IN	+IN
2	RED-WHT TR.	COMMON	-IN
3	RED	+OUT	+OUT
4	GREEN	-	-OUT

6-pin mating plug:

contact view

pin	standard	bridge
A	+IN	+IN
B	COMMON	-IN
C	+OUT	-OUT
D	-	+OUT

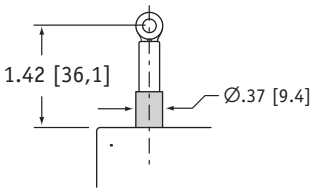
25-ft. cable:

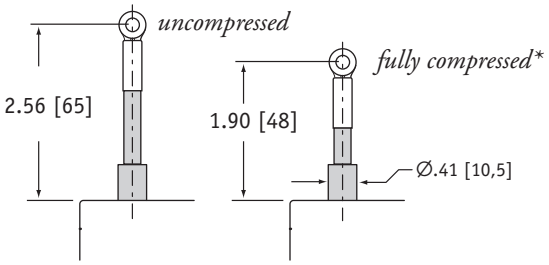
color code	standard	bridge
RED	+IN	+IN
BLACK	COMMON	-IN
GREEN	+OUT	+OUT
WHITE	-	-OUT

Cable Guide:

Ⓓ order code:

blank	SG
standard cable guide	spring-loaded guide
	cable-guide cushions impact from accidental free release





**note: start of full stroke range begins at full compression point (except 2-inch and 5-inch ranges).*

0...5, 0...10, –5...+5, –10...+10 VDC Output Options
Ranges: 0-2 to 0-50 inches
Compact Size • OEM Applications

PT1DC

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-2 to 0-50 inches
Output Signal Options..... 0...5, 0...10, -5...+5, -10...+10 VDC
Accuracy..... ± 0.28% to ±0.15% full stroke *see ordering information*
Repeatability..... ± 0.05% full stroke
Resolution ..... essentially infinite
Measuring Cable ..... .019-in. dia. nylon-coated stainless steel
Enclosure Material..... glass-filled polycarbonate and black anodized aluminum
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Retraction Acceleration..... *see ordering information*
Weight..... 1 lb. max.

ELECTRICAL

Input ..... 14.5-40 VDC (10.5-40 VDC for 0...5 and -5...+5 volt output)
Input Current..... 10 mA maximum
Output Impedence..... 1000 ohms
Maximum Load ..... 5000 ohms
Zero and Span Adjustment ..... *see ordering information*

ENVIRONMENTAL

Enclosure ..... NEMA 4, IP 65
Operating Temperature ..... 0º to 200ºF (-17º to 90ºC)
Vibration..... up to 10 G's to 2000 Hz maximum

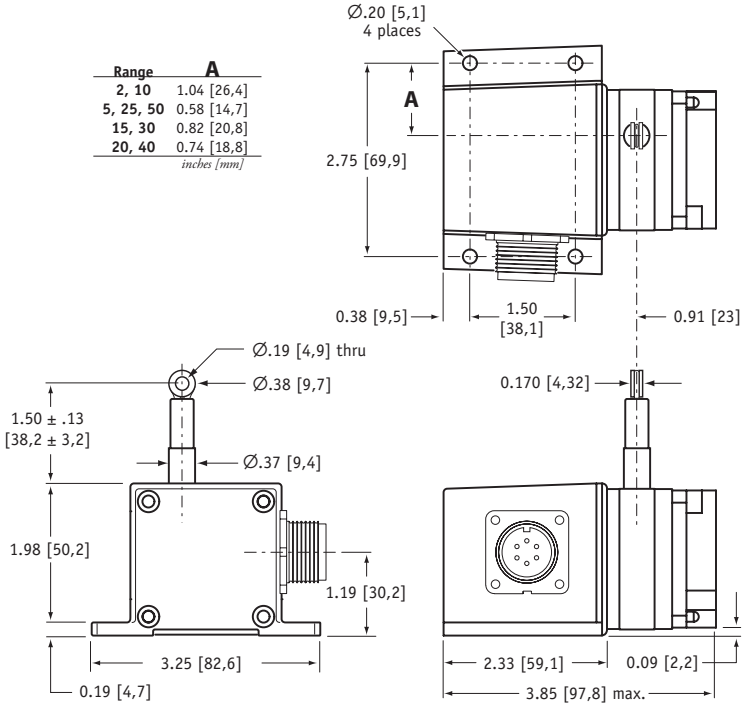
EMC COMPLIENCE PER DIRECTIVE 89/336/EEC

Emission/Immunity ..... EN50081-2 / EN50082-2

The PT1DC can operate from an unregulated 14.5 to 40 VDC power supply while providing an output signal that is proportional to the linear movement of it's measuring cable. The PT1DC has a maximum measurement range up to 50" and has 4 output signal options to choose from: 0...10, 0...5, -10...+10 and -5...+5 Vdc.

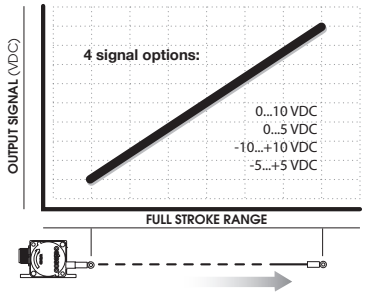
Just like the rest of the PT1 series, the PT1DC also offers several options including forward and reverse output signals, zero and span adjustments and alternate measuring cable exits.

Outline Drawing



dimensions are in inches [mm], tolerances are 0.03 inches [0,8 mm]

Output Signal



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Ordering Information:

Model Number:

PT1DC - _____ - _____ - _____ - _____ - _____

order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ

Sample Model Number:

PT1DC - 30 - UP - Z10 - MC4 - SC

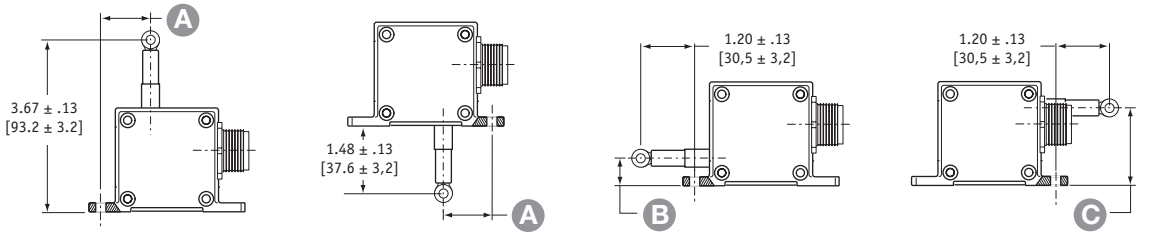
Ⓡ	range:	30 inches
Ⓐ	measuring cable exit:	up
Ⓑ	output signal:	0...10 VDC
Ⓒ	electrical connection:	4-pin micro connector
Ⓓ	cable guide:	spring-loaded guide

Full Stroke Range:

Ⓡ order code:	2	5	10	15	20	25	30	40	50
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.
accuracy (% of f.s.):	0.28%		0.18%				0.15%		
potentiometer cycle life:	2,500,000 cycles		500,000 cycles				250,000 cycles		
cable tension (20%):	12 oz.	5 oz.	12 oz.	9 oz.	6 oz.	5 oz.	9 oz.	6 oz.	5 oz.
maximum cable acceleration:	11 G's	3 G's	11 G's	5 G's	4 G's	3 G's	5 G's	4 G's	3 G's

Cable Exit:

Ⓐ order code:	UP	DN	FR	BK
direction:	up	down	front	back



measurement range —	2	5	10	15	20	25	30	40	50
Ⓐ	1.04 in. 26,4 mm	0.58 in. 14,7 mm	1.04 in. 26,4 mm	0.82 in. 20,8 mm	0.74 in. 18,8 mm	0.58 in. 14,7 mm	0.82 in. 20,8 mm	0.74 in. 18,8 mm	0.58 in. 14,7 mm
Ⓑ	0.75 in. 19,1 mm	0.29 in. 6,1 mm	0.75 in. 19,1 mm	0.53 in. 13,5 mm	0.45 in. 11,5 mm	0.29 in. 6,1 mm	0.53 in. 13,5 mm	0.45 in. 11,5 mm	0.29 in. 6,1 mm
Ⓒ	1.43 in. 36,3 mm	1.89 in. 48,0 mm	1.43 in. 36,3 mm	1.65 in. 41,9 mm	1.73 in. 43,9 mm	1.89 in. 48,0 mm	1.65 in. 41,9 mm	1.73 in. 43,9 mm	1.89 in. 48,0 mm

Output Signals:

Ⓑ order code:	Z10	10Z	Z5	5Z	M0P0	P0M0	M5P5	P5M5
output signal options:	0...10 VDC	10...0 VDC	0...5 VDC	5...0 VDC	-10...+10 VDC	+10...-10 VDC	-5...+5 VDC	+5...-5 VDC
input voltage:	14.5 – 40 vdc		10.5 – 40 vdc		14.5 – 40 vdc		10.5 – 40 vdc	
span adjustment:	from 100% to 50% of full stroke range				from 100% to 75% of full stroke range			
zero adjustment:	from factory set zero to 50% of full stroke range				from factory set zero to 25% of full stroke range			

example:

ordercode = **Z10** = 0...10 VDC

0 vdc =

10 vdc =

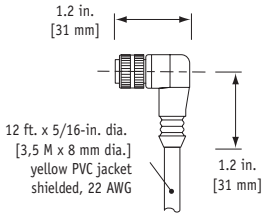
Ordering Information (cont.)

Electrical Connection:

order code:

MC4

4-pin micro-connector
with 12 ft [3.5 M] cordset



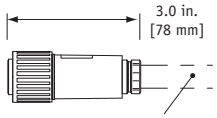
4-pin mating plug and cord set:

contact view

pin	color code	signals
1	RED-BLK TR.	input voltage
2	RED-WHT TR.	output signal
3	RED	common

M6

6-pin plastic connector
with mating plug



.30 – .39 in. [8 – 10 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

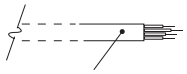
6-pin mating plug:

contact view

pin	signals
A	input voltage
B	output signal
C	common

C25

25-ft. instrumentation cable
24 AWG, shielded



25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

25-ft. cable:

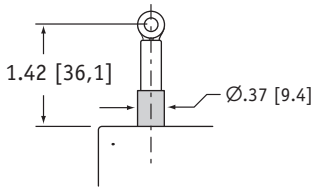
color code	standard
RED	input voltage
BLACK	common
GREEN	output signal

Cable Guide:

order code:

blank

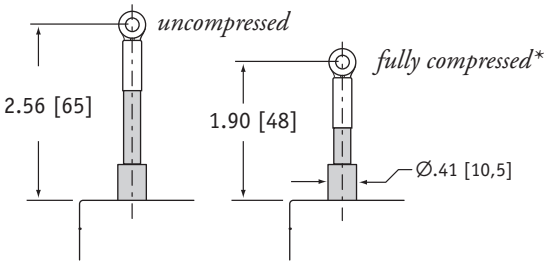
standard cable guide



SG

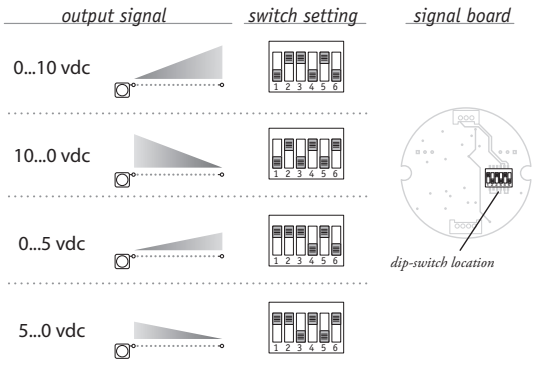
spring-loaded guide

cable-guide cushions impact from accidental free release

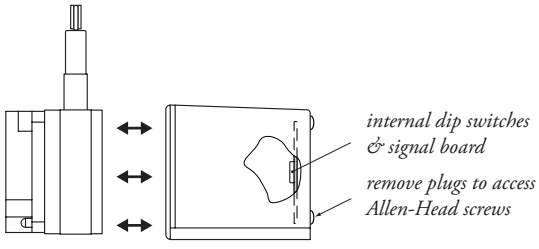


**note: start of full stroke range begins at full compression point (except 2-inch and 5-inch ranges).*

Output Signal Selection (does not apply to -5...+5 & -10...+10 vdc options)



The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.



to gain access to the signal board, remove the two Allen-Head Screws and remove rear cover.

DeviceNET®
Ranges: 0-2 to 0-50 inches
Compact Size • OEM Applications

PT1DN

Specification Summary:

GENERAL

Full Stroke Ranges ..... 0-2 to 0-50 inches
Electrical Interface ..... CANbus ISO 11898
Protocol ..... DeviceNET version 2.0
Accuracy ..... ± 0.25% to ± 0.10% full stroke
Repeatability ..... ± 0.02% full stroke
Resolution ..... ± 0.003% full stroke
Measuring Cable ..... .019-in. dia. nylon-coated stainless steel
Enclosure Material ..... glass-filled polycarbonate and black anodized aluminum
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight ..... 1 lb. max.

ELECTRICAL

Input Voltage ..... bus powered
Input Current ..... 40 mA
Address Setting/Node ID ..... 0...63 set via DIP switches –*default setting: 63*
Baud Rate ..... 125K, 250K or 500K set via DIP switches
EDS File ..... available @ http://www.celeso.com/download

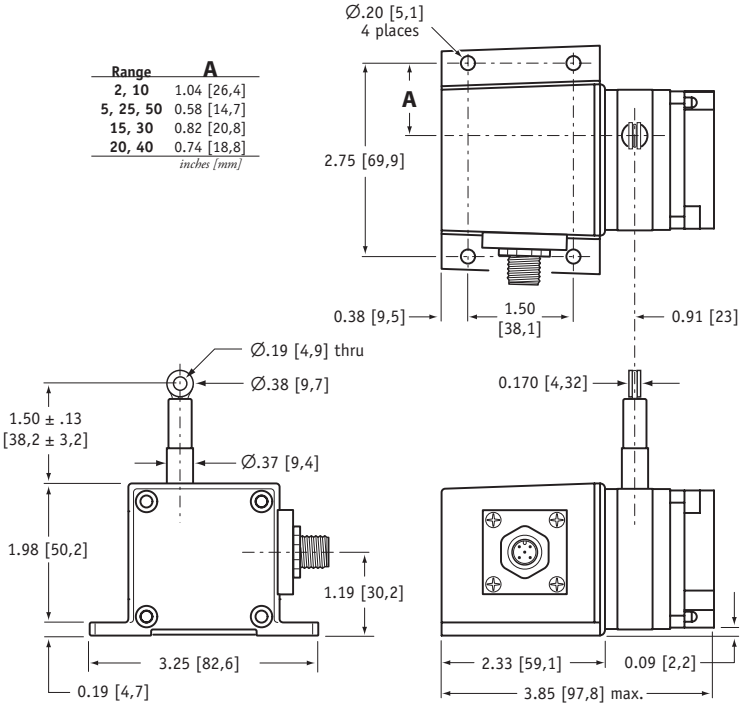
ENVIRONMENTAL

Environmental Suitability ..... NEMA 4, IP 67
Operating Temperature ..... 0º to 185ºF (-17º to 85ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum

The PT1DN communicates to your PLC over DeviceNET® and provides a precision position feedback signal for full-scale measurement ranges from 2 to 50 inches. Because the PT1DN uses a potentiometer as it's sensing element, the position signal is "absolute" and does not have to be reset to a "home" position upon startup.

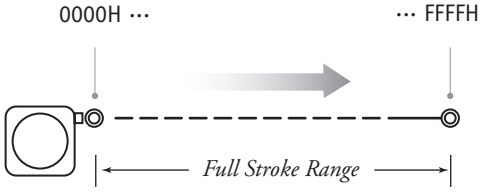
The PT1DN is part of Celesco's compact line of cable-extension transducers and is perfect where space is limited.

Outline Drawing



dimensions are in inches [mm], tolerances are 0.03 inches [0,8 mm]

Output Signal



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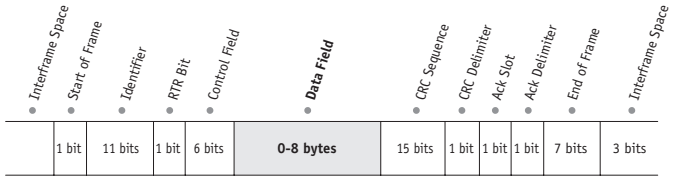
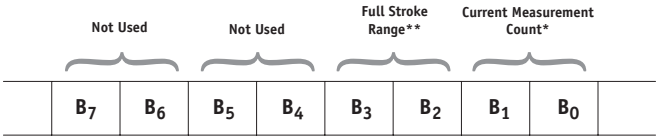
I/O Format

Data Frame



Data Field



B_0 = LSB current measurement byte
B_1 = MSB current measurement byte
B_2 = LSB full stroke range byte
B_3 = MSB full stroke range byte
B_4 - B_7 = not used

***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 16-bit value that occupies the first two 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 0000H with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at FFFFH. This holds true for all ranges.

****Full Stroke Range**

The **F**ull **S**troke **R**ange **(FSR)** is a 16-bit value in the data field that expresses the full range of the sensor in inches. This value can be used to convert the actual count to units of measurement should the application require it.

The full stroke measurement range occupies the second two bytes (B_2 and B_3) of the data field.

B_2 is the LSB (least significant byte) and B_3 is the MSB (most significant byte).

This value is expressed in inches.

Example:

Hex Value	*Decimal Equivalent*	*Full Stroke Range*
001E	30	30 inches

Converting CMC to Inches

If required, the CMC can easily be converted to a linear measurement expressed in inches instead of just counts.

This is accomplished by first dividing the CMC by 65,535 (total counts over the range) and then multiplying that value by the FSR:

$$\left(\frac{\text{CMC}}{65{,}535}\right) \text{X FSR}$$

Example:

If the full stroke range is **30 inches** and the current position is **OFF2 Hex** (4082 Decimal) then,

$$\left(\frac{4082}{65{,}535}\right) \text{X } 30.00 \text{ inches} = 1.87 \text{ inches}$$

Address Setting (Node ID), Baud Rate and Bus Termination Settings

Address Setting (Node ID)

The Address Setting (Node ID) is set via 6 switches located on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
…	…	…	…	…	…	…
1	1	1	1	1	1	63

Baud Rate

The transmission baud rate may be either factory preset at the time of order or set manually at the time of installation.

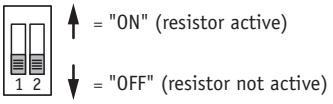
The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

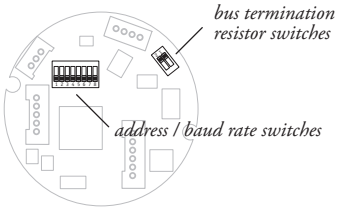
Bus Termination

The setting of the internal bus termination resistor may be specified upon order or manually changed by the end user at the time of installation.

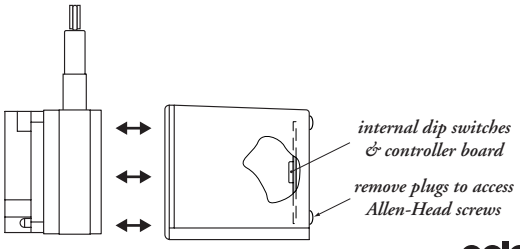
The bus termination resistor is activated setting switches **1** & **2** on the 2-pole DIP switch (located on the internal DeviceNET controller board) to the "ON" position.



DeviceNET Controller Board and DIP Switch Location



to gain access to the controller board, remove four Allen-Head Screws and remove rear cover.



Ordering Information:

Model Number:

PT1DN - _____ Ⓡ - ___ Ⓐ - ___ Ⓑ - ___ Ⓒ - ___ Ⓓ - ___ Ⓔ
order code:

Sample Model Number:

PT1DN - 30 - UP - SG - 500 - TR - SC5

Ⓡ	range:	30 inches
Ⓐ	measuring cable exit:	up
Ⓑ	cable guide:	spring-loaded guide
Ⓒ	baud rate:	500 k bits/sec.
Ⓓ	terminating resistor:	yes
Ⓔ	electrical connection:	5 meter cordset with straight plug

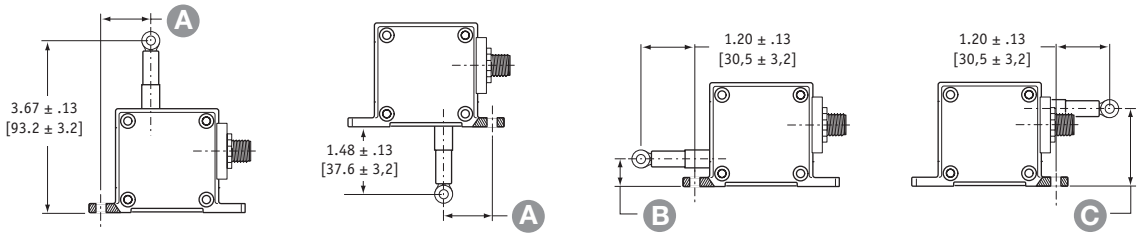
Full Stroke Range:

Ⓡ *order code:*	2	5	10	15	20	25	30	40	50
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.
accuracy (% of f.s.):	0.25%		0.15%				0.10%		
potentiometer cycle life:	2,500,000 cycles		500,000 cycles				250,000 cycles		
cable tension (20%):	12 oz.	5 oz.	12 oz.	9 oz.	6 oz.	5 oz.	9 oz.	6 oz.	5 oz.
maximum cable acceleration:	11 G's	3 G's	11 G's	5 G's	4 G's	3 G's	5 G's	4 G's	3 G's

Cable Exit:

Ⓐ *order code:* **UP** **DN** **FR** **BK**

direction: up down front back

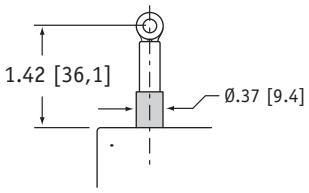


measurement range —	2	5	10	15	20	25	30	40	50
A	1.04 in. 26,4 mm	0.58 in. 14,7 mm	1.04 in. 26,4 mm	0.82 in. 20,8 mm	0.74 in. 18,8 mm	0.58 in. 14,7 mm	0.82 in. 20,8 mm	0.74 in. 18,8 mm	0.58 in. 14,7 mm
B	0.75 in. 19,1 mm	0.29 in. 6,1 mm	0.75 in. 19,1 mm	0.53 in. 13,5 mm	0.45 in. 11,5 mm	0.29 in. 6,1 mm	0.53 in. 13,5 mm	0.45 in. 11,5 mm	0.29 in. 6,1 mm
C	1.43 in. 36,3 mm	1.89 in. 48,0 mm	1.43 in. 36,3 mm	1.65 in. 41,9 mm	1.73 in. 43,9 mm	1.89 in. 48,0 mm	1.65 in. 41,9 mm	1.73 in. 43,9 mm	1.89 in. 48,0 mm

Cable Guide:

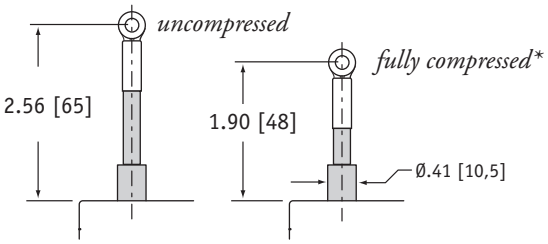
Ⓑ *order code:* **blank** **SG**

blank: standard cable guide



SG: spring-loaded guide

cushions impact from accidental free release



**note: start of full stroke range begins at full compression point (except 2-inch and 5-inch ranges).*

Ordering Information (cont.)

Baud Rate:

Ⓒ order code:	125	250	500
	125 kbaud	250 kbaud	500 kbaud

Terminating Resistor:

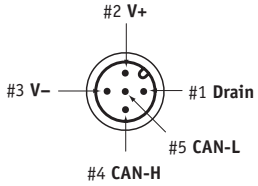
Ⓓ order code:	TR	NR
	terminating resistor	no terminating resistor

Electrical Connection:

Ⓔ order code:

blank

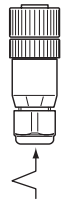
5-pin micro-connector
(no mating plug supplied)



connector
(contact view)

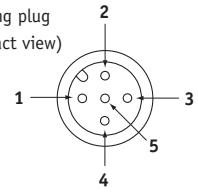
MC5

5-pin micro-connector
w/ mating plug



0.16" - 0.32" OD Cable (THIN)

mating plug
(contact view)



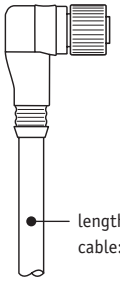
SC5

5-pin micro-connector
and 5 meter length cordset
w/straight mating plug

length: 16ft [5M]
cable: Thin

NC5

5-pin micro-connector
and 5 meter length cordset
w/90° mating plug



length: 16ft [5M]
cable: Thin

pin	signal	wire color
1	drain	brown
2	V+	white
3	V-	blue
4	Can-H	black
5	Can-L	grey

Incremental Encoder Output
Ranges: 0-25, 0-50 in. • 0-625, 0-1250 mm
Compact Size • OEM Applications

PT1E

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-25 to 0-50 inches
Output Signal ..... incremental encoder (quadrature)
Accuracy ..... 0.04% full stroke *contact factory for higher accuracy*
Repeatability ..... ± 0.02% full stroke
Resolution Options ..... 25 to 1250 pulses per inch
Measuring Cable Options ..... .019-in. dia. nylon-coated stainless steel
Enclosure Material ..... glass-filled polycarbonate and black anodized aluminum
Sensor ..... optical encoder
Maximum Retraction Acceleration ..... *see ordering information*
Weight ..... 1 lb. max.

ELECTRICAL

Input Voltage ..... *see ordering information*
Input Current ..... *see ordering information*

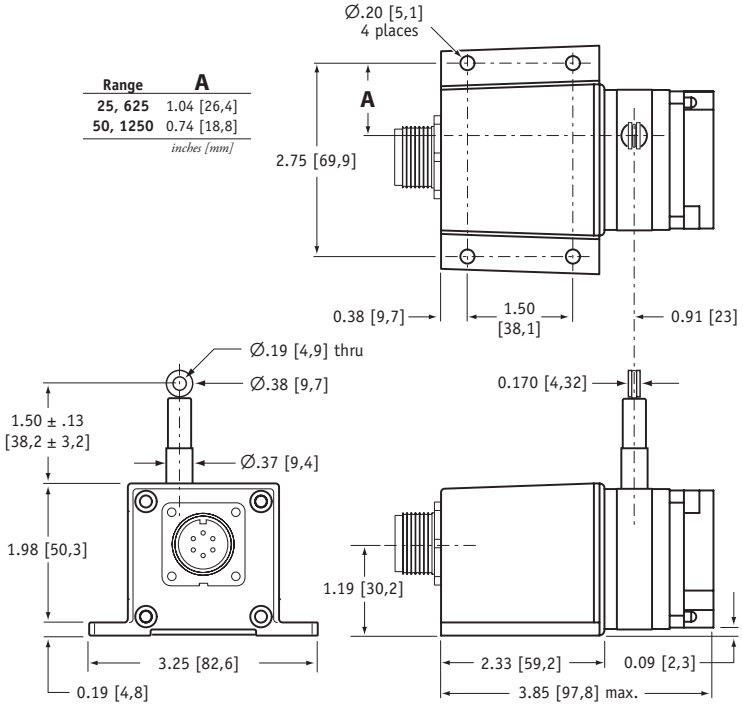
ENVIRONMENTAL

Enclosure ..... NEMA 4, IP 65
Operating Temperature ..... 0º to 160ºF (-17º to 71ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum

The heart of the PT1E is an incremental optical encoder which delivers a quadrature formated digital pulse train. This compact transducer is available with several resolution options for a wide variety of applications from high accuracy position feedback to slow velocity feedback requirements.

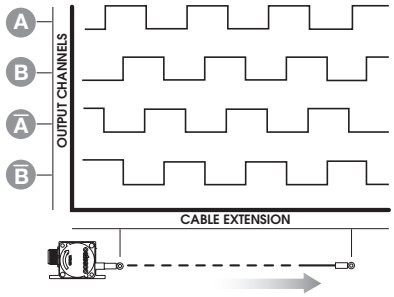
The PT1E has many options available including full stroke measurement ranges from 0-2 inches up to 0-50 inches, different output drivers and alternate measuring cable exits.

Outline Drawing



dimensions are in inches [mm], tolerances are ±0.03 inches [0,8 mm]

Output Signal



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Ordering Information:

Model Number:

PT1E - ____ - ____ - ____ - ____ - ____ - ____
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

Sample Model Number:

PT1E - 25 - UP - 50 - AB-TTL - MC4 - SG

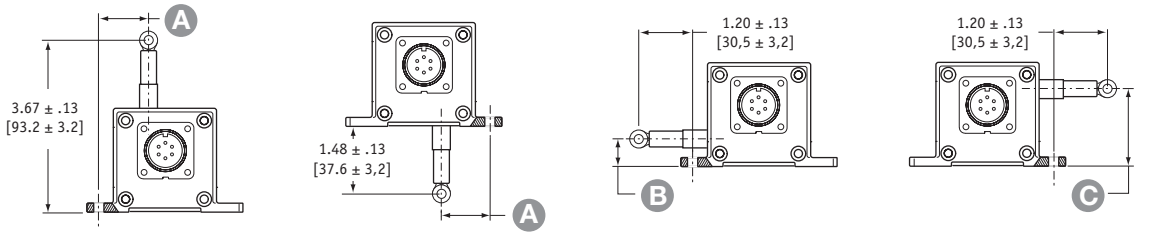
Ⓡ	range:	25 inches
Ⓐ	measuring cable exit:	up
Ⓑ	resolution:	50 pulses per inch
Ⓒ	electrical connection:	4-pin micro connector
Ⓓ	output signal:	TTL/CMOS driver, Channels A,B
Ⓔ	cable guide:	spring-loaded guide

Full Stroke Range:

Ⓡ order code:	25	50	625	1250
full stroke range, min:	25 in.	50 in.	625 mm	1250 mm
cable tension (±20%):	12 oz.	6 oz.	3,3 N	1,6 N
cable acceleration, max.:	11 G's	4 G's	11 G's	4 G's
resolution options:	50, 500, 1000, 1250 pulses per inch	25, 250, 500, 625 pulses per inch	2, 20, 40, 50 pulses per mm	1, 10, 20, 25 pulses per mm

Cable Exit:

Ⓐ order code:	UP	DN	FR	BK
direction:	up	down	front	back



measurement range	25	50	625	1250
A	1.04 in. 26,4 mm	0.74 in. 18,8 mm	1.04 in. 26,4 mm	0.74 in. 18,8 mm
B	0.75 in. 19,1 mm	0.45 in. 11,4 mm	0.75 in. 19,1 mm	0.45 in. 11,4 mm
C	1.43 in. 36,3 mm	1.73 in. 43,9 mm	1.43 in. 36,3 mm	1.73 in. 43,9 mm

Resolution:

Ⓑ order code:	50	500	1000	1250
25-inch full stroke range:	50 ±1 pulses per inch	500 ±10 pulses per inch	1000 ±20 pulses per inch	1250 ±24 pulses per inch

Ⓑ order code:	25	250	500	625
50-inch full stroke range:	25 ±0.5 pulses per inch	250 ±5 pulses per inch	500 ±10 pulses per inch	625 ±12 pulses per inch

Ⓑ order code:	2	20	40	50
625 mm full stroke range:	2 ±0,04 pulses per mm	20 ±0,4 pulses per mm	40 ±0,8 pulses per mm	50 ±1 pulses per mm

Ⓑ order code:	1	10	20	25
1250 mm full stroke range:	1 ±0,02 pulses per mm	10 ±0,2 pulses per mm	20 ±0,4 pulses per mm	25 ±0,5 pulses per mm

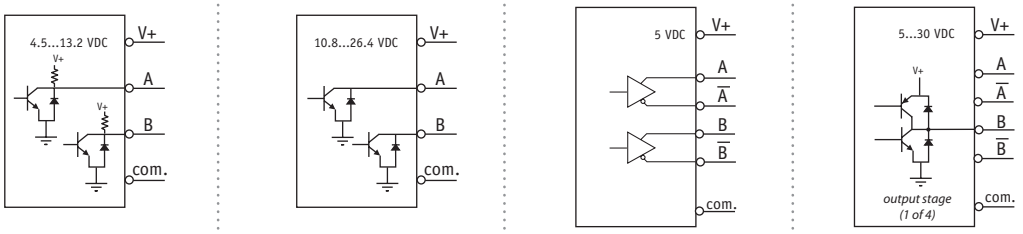
Ordering Information (cont.)

Output Signals:

❻ *order code:*

output driver:

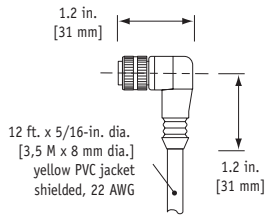
AB-TTL	AB-OC	ABC-LD	ABC-UD
TTL - CMOS	Open Collector	5 V - Line Driver	Universal Line Driver
Input voltage (V+): 4.5...13.2 Vdc Sink current: 20 mA max. Input current: 80 mA max.	Input voltage (V+): 10.8...26.4 Vdc Sink current: 20 mA max. Input current: 80 mA max.	Input voltage (V+): 5 Vdc Sink current: 20 mA max. Input current: 150 mA max.	Input voltage (V+): 5...30 VDC Source/Sink: 20 mA max. Input current: 100 mA max, no load

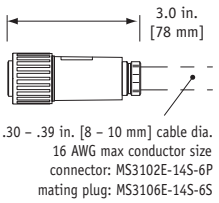


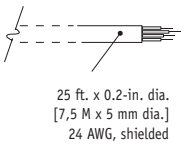
Electrical Connection:

❹ *order code:*

MC4	M6	C25
4-pin micro-connector with 12 ft [3.5 M] cordset	6-pin plastic connector with mating plug	25-ft. instrumentation cable 24 AWG, shielded







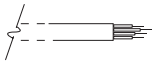
4-pin mating plug and cordset

pin	color code	TTL/CMOS Open Collector
1	RED-BLK TR.	input voltage
2	RED-WHT TR.	channel A
3	RED	channel B
4	GREEN	common

6-pin mating plug

pin	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
A	input voltage	input voltage
B	common	common
C	channel A	channel A
D	channel B	channel B
E	-	channel A'
F	-	channel B'

25-ft. cable

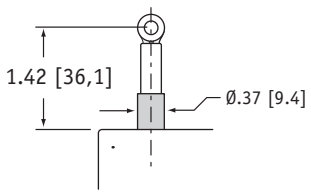


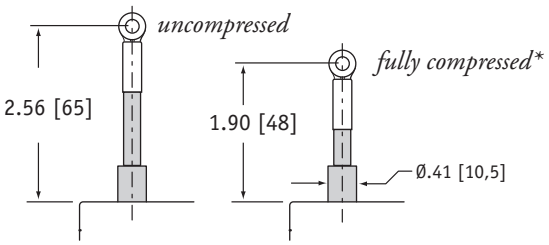
color	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
red	input voltage	input voltage
black	common	common
green	channel A	channel A
white	channel B	channel B
blue	-	channel A'
brown	-	channel B'

Cable Guide:

❽ *order code:*

blank	SG
standard cable guide	spring-loaded guide
	cushions impact from accidental free release





note: start of full stroke range begins at **full compression point*

version: **4.0** last updated: **April 28, 2010**

0/4...20 mA Output
Ranges: 0-2 to 0-50 inches
Compact Size • OEM Applications

PT1MA

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-2 to 0-50 inches
Output Signal Options..... 4...20 mA (2-wire) and 0...20 mA (3-wire)
Accuracy..... ± 0.28% to ±0.15% full stroke *see ordering information*
Repeatability..... ± 0.05% full stroke
Resolution ..... essentially infinite
Measuring Cable ..... .019-in. dia. nylon-coated stainless steel
Enclosure Material..... glass-filled polycarbonate and black anodized aluminum
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Retraction Acceleration..... *see ordering information*
Weight..... 1 lb. max.

ELECTRICAL

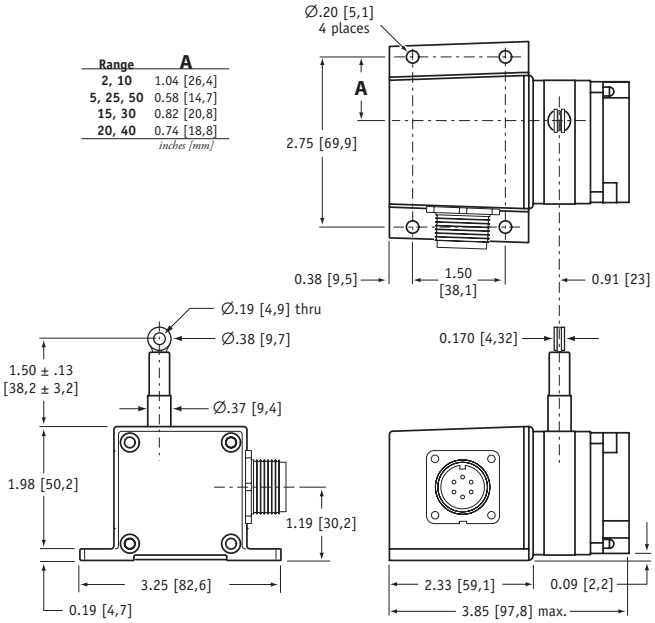
Input Voltage ..... *see ordering information*
Input Current..... 20 mA max.
Maximum Loop Resistance (Load) ..... (loop supply voltage - 8)/0.020
Circuit Protection ..... 38 mA max.
Impedance..... 100M ohms@100 VDC, min.
Output Signal Adjustment
Zero Adjustment..... from factory set zero to 50% of full stroke range
Span Adjustment..... to 50% of factory set span
Thermal Effects
Zero ..... 0.01% f.s./°F, max.
Span ..... 0.01% f.s./°F, max.

ENVIRONMENTAL

Enclosure ..... NEMA 4, IP 65
Operating Temperature ..... 0° to 200°F (-17° to 90°C)
Vibration..... up to 10 G's to 2000 Hz maximum

EMC COMPLIANCE PER DIRECTIVE 89/336/EEC

Emission/Immunity EN50081-2/EN50082-2

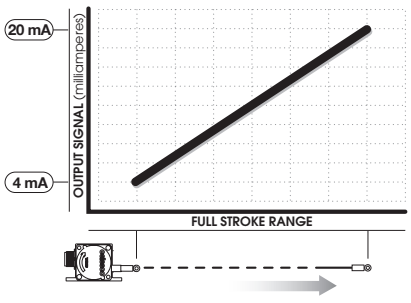


dimensions are in inches [mm], tolerances are 0.03 inches [0,8 mm]

The PT1MA adds 4...20 mA position feedback signal to Celesco's compact line of cable-extension transducers. The PT1MA is available with full stroke ranges from as little as 2 inches on up to 50 inches with adjustable zero and span settings to precisely match the full scale output to your exact measurement range.

The PT1MA offers several options including forward and reverse 0...20 and 4...20 mA output signals, alternate measuring cable exits and a couple different electrical connection options.

Output Signal



Celesco Transducer Products, Inc.
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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco
celesco.com • info@celesco.com

Ordering Information:

Model Number:

PT1MA - _____ - _____ - _____ - _____ - _____

order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ

Sample Model Number:

PT1MA - 30 - UP - 420E - MC4 - SG

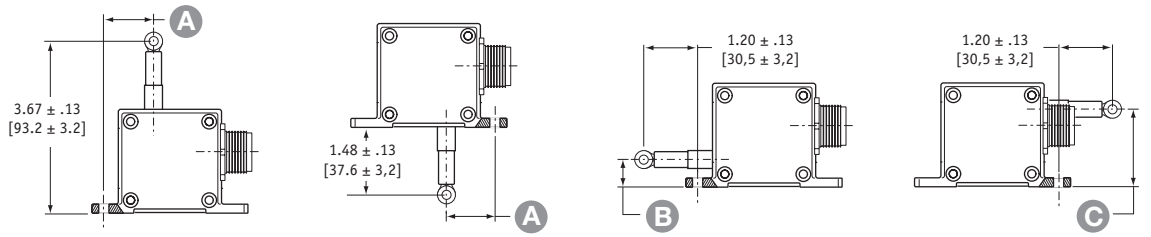
Ⓡ	range:	30 inches
Ⓐ	measuring cable exit:	up
Ⓑ	output signal:	4...20mA
Ⓒ	electrical connection:	4-pin micro connector
Ⓓ	cable guide:	spring-loaded guide

Full Stroke Range:

Ⓡ order code:	2	5	10	15	20	25	30	40	50
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.
accuracy (% of f.s.):	0.28%		0.18%				0.15%		
potentiometer cycle life:	2,500,000 cycles		500,000 cycles				250,000 cycles		
cable tension (20%):	12 oz.	5 oz.	12 oz.	9 oz.	6 oz.	5 oz.	9 oz.	6 oz.	5 oz.
maximum cable acceleration:	11 G's	3 G's	11 G's	5 G's	4 G's	3 G's	5 G's	4 G's	3 G's

Cable Exit:

Ⓐ order code:	UP	DN	FR	BK
direction:	up	down	front	back



measurement range —	2	5	10	15	20	25	30	40	50
Ⓐ	1.04 in. 26,4 mm	0.58 in. 14,7 mm	1.04 in. 26,4 mm	0.82 in. 20,8 mm	0.74 in. 18,8 mm	0.58 in. 14,7 mm	0.82 in. 20,8 mm	0.74 in. 18,8 mm	0.58 in. 14,7 mm
Ⓑ	0.75 in. 19,1 mm	0.29 in. 6,1 mm	0.75 in. 19,1 mm	0.53 in. 13,5 mm	0.45 in. 11,5 mm	0.29 in. 6,1 mm	0.53 in. 13,5 mm	0.45 in. 11,5 mm	0.29 in. 6,1 mm
Ⓒ	1.43 in. 36,3 mm	1.89 in. 48,0 mm	1.43 in. 36,3 mm	1.65 in. 41,9 mm	1.73 in. 43,9 mm	1.89 in. 48,0 mm	1.65 in. 41,9 mm	1.73 in. 43,9 mm	1.89 in. 48,0 mm

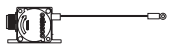
Output Signals:

Ⓑ order code:	420E	420R	020E	020R
output signal options:	4...20 mA	20...4 mA	0...20 mA	20...0 mA
sensitivity:	16 mA/full stroke ±0.25%		20 mA/full stroke ±0.25%	
wiring configuration:	2 – wire		3 – wire	
input voltage:	8 – 40 vdc		14 – 29 vdc	

example:

ordercode = **420E** = 4...20 mA

4 mA = 

20 mA = 

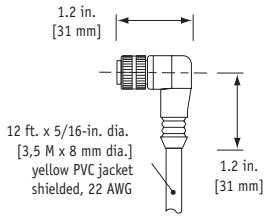
Ordering Information (cont.)

Electrical Connection:

order code:

MC4

4-pin micro-connector
with 12 ft [3.5 M] cordset



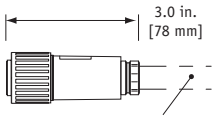
4-pin mating plug and cordset:

contact view

pin	color code	2-wire	3-wire
1	RED-BLK TR.	8...40 vdc	14...29 vdc
2	RED-WHT TR.	4...20 mA	common
3	RED	-	0...20 mA
4	GREEN	-	-

M6

6-pin plastic connector
with mating plug



.30 – .39 in. [8 – 10 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

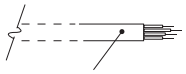
6-pin mating plug:

contact view

pin	2-wire	3-wire
A	8...40 vdc	14...29 vdc
B	4...20 mA	common
C	-	0...20 mA
D	-	-

C25

25-ft. instrumentation cable
24 AWG, shielded



25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

25-ft. cable:

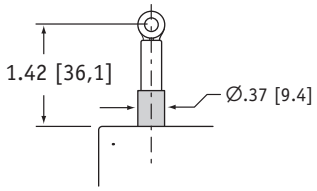
color code	2-wire	3-wire
RED	8...40 vdc	14...29 vdc
BLACK	4...20 mA	common
WHITE	-	-
GREEN	-	0...20 mA

Cable Guide:

order code:

blank

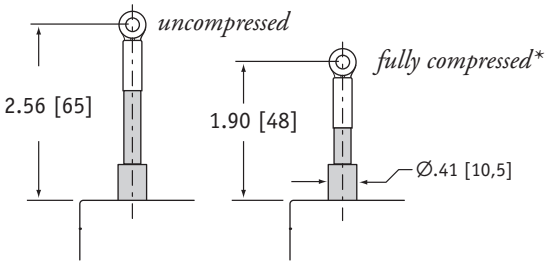
standard cable guide



SG

spring-loaded guide

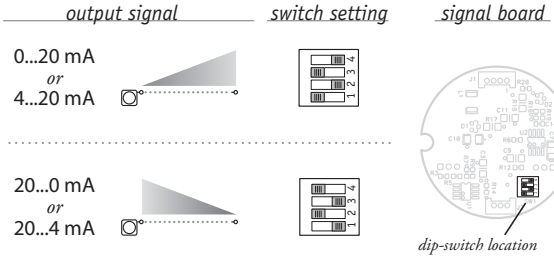
cable-guide cushions impact from accidental free release

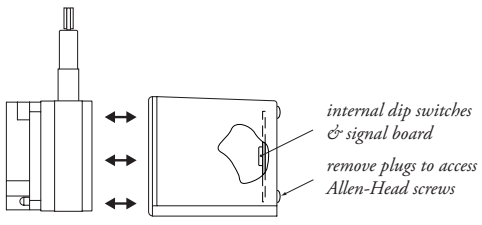


**note: start of full stroke range begins at full compression point (except 2-inch and 5-inch ranges).*

Output Signal Selection:

The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.





to gain access to the signal board, remove the two Allen-Head Screws and remove rear cover.

RS232 Data Communication
Ranges: 0-2 to 0-50 inches
Compact Size • OEM Applications

PT1232

The PT1232, part of our compact line of cable extension transducers, delivers position feedback via RS232 serial communication to your data acquisition or controller system. The PT1232 sends a raw 16-bit position count from 0000 to FFFF (hex). Additionally this device can be set to continuously send data or send data only when polled.

As the internal position sensing element is a precision potentiometer, this transducer maintains current accurate position even during power loss and does not need to be reset to a "home" position.

Specification Summary:

GENERAL

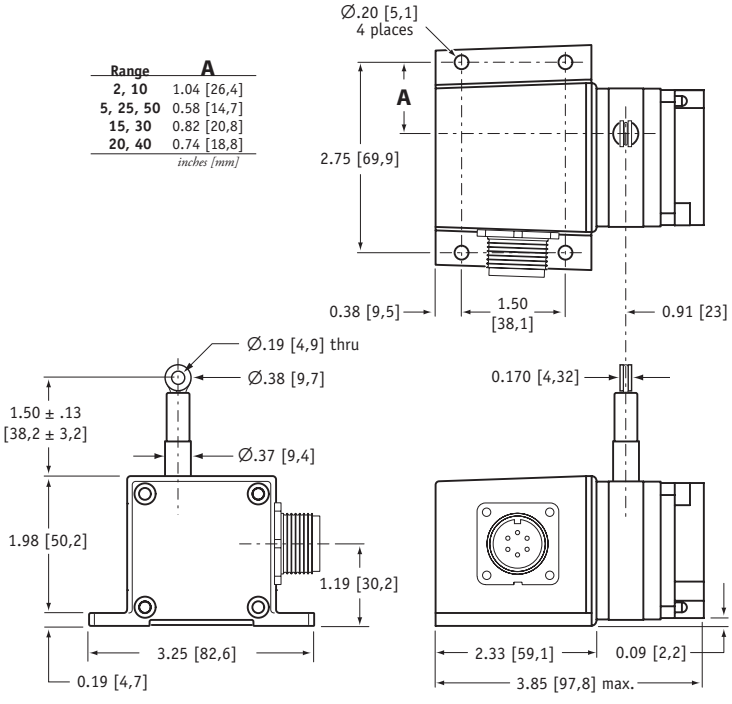
Full Stroke Ranges	0-2 to 0-50 inches
Electrical Interface	RS232
Format	Hex
Accuracy	± 0.25 to 0.10% full stroke
Repeatability	± 0.02% full stroke
Resolution	± 0.003% full stroke
Measuring Cable	0.019-in. dia. nylon-coated stainless steel
Enclosure Material	glass-filled polycarbonate and anodized aluminum
Sensor	plastic-hybrid precision potentiometer
Potentiometer Cycle Life	*see ordering information*
Maximum Retraction Acceleration	*see ordering information*
Weight	1 lb., max.

ELECTRICAL

Input Voltage	9...22 VDC
Input Current	40 mA
Baud Rate	9600 (selectable to 38.4K)
Update Rate	32 msec

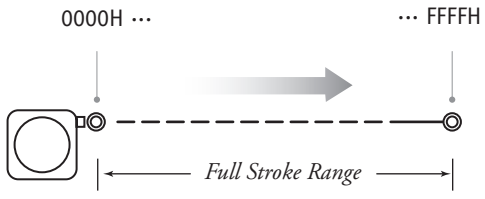
ENVIRONMENTAL

Environmental Suitability	NEMA 4, IP 65
Operating Temperature	0º to 185ºF (-17º to 85ºC)
Vibration	up to 10 G's to 2000 Hz maximum



dimensions are in inches [mm], tolerances are 0.03 inches [0,8 mm]

Output Signal



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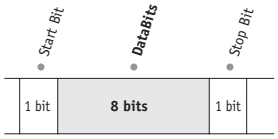
I/O Format:

Data Format



no parity bit

Data Frame

6 byte Hex string:

STX	CMD	B_0	B_1	B_2	ETX

STX = 0x02 **CMD** = Command Code* B_0 - B_2 = Data Field* **ETX** = 0x03

** –see below*

Important! All communications to/from the transducer are in **HEX**!

User Commands:

	User Command				Sensor Response			
Description	**<CMD>**	**<B_0>**	**<B_1>**	**<B_2>**	**<CMD>**	**<B_0>**	**<B_1>**	**<B_2>**
Get Sensor Info	0x05	0x00	0x00	0x00	0x05	version(4)	date(5)	date(5)
Get Serial Number	0x15	0x00	0x00	0x00	0x15	serial number(3)		
Start Continuous Data	0x25	0x00	0x00	0x00	0x25	0x00	0x00	0x00
Stop Continuous Data	0x35	0x00	0x00	0x00	0x35	0x00	0x00	0x00
Get Position Data	0x45	0x00	0x00	0x00	0x45	CMC(1)	CMC(1)	status(2)

(1)CMC - Current Measurement Count (Position)

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 16-bit value that occupies the first two bytes (B_0 and B_1) of the data field. B_0 is the MSB (most significant byte) and B_1 is the LSB (least significant byte).

The CMC starts at 0000H with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at FFFFH. This holds true for all ranges.

(2)Status

The status byte is used as a flag to indicate the validity of the position signal that the internal electronics receives from the potentiometer.

Flags are as follows:
0x00 = GREEN, 0x55 = YELLOW, 0xAA = RED

A "green" flag shows everything OK. A "yellow" or "red" flag indicates that the sensor has either been extended beyond its range or that there is a problem with the potentiometer.

(3)Serial Number

Each sensor has it's own unique serial number. This information can be retrieved by sending the sensor the "Get Serial Number" command.

The serial number is a 3 byte value from which ranges from 0 to 9999999 (decimal).

(4)Version

This is a single byte value (0-255 decimal) which indicates the currently installed firmware version of the sensor.

(5)Date

This is a 2 byte value showing the date of currently installed firmware. This value ranges from 01011 - 12319 (decimal). Format is MMDDY. While the month and day are expressed as two digit numbers the year is expressed in a single digit only.

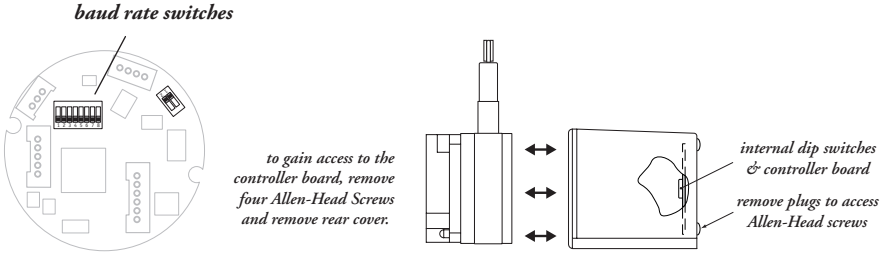
Example: 08054 = August 5, 2004

Baud Rate

The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the rs232 controller board located inside the transducer.

DIP-7	DIP-8	baud rate
0	0	9600
1	0	19200
0	1	38400
1	1	9600

RS232 Controller Board and DIP Switch Location



Ordering Information:

Model Number:

PT1232 - ____ - ____ - ____ - ____
order code: Ⓡ Ⓐ Ⓑ Ⓒ

Sample Model Number:

PT1232 - 50 - UP - M6 - SG

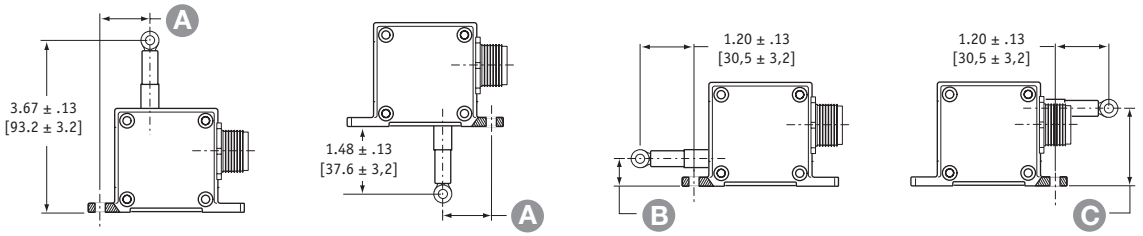
Ⓡ	range:	50 inches
Ⓐ	measuring cable exit:	up (top exit)
Ⓑ	electrical connection:	6-pin plastic connector
Ⓒ	cable guide	spring loaded

Full Stroke Range:

Ⓡ order code:	2	5	10	15	20	25	30	40	50
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.
accuracy (% of f.s.):	0.25%		0.15%				0.10%		
potentiometer cycle life:	2,500,000 cycles		500,000 cycles				250,000 cycles		
cable tension (20%):	12 oz.	5 oz.	12 oz.	9 oz.	6 oz.	5 oz.	9 oz.	6 oz.	5 oz.
maximum cable acceleration:	11 G's	3 G's	11 G's	5 G's	4 G's	3 G's	5 G's	4 G's	3 G's

Cable Exit:

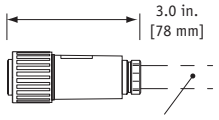
Ⓐ order code:	UP	DN	FR	BK
direction:	up	down	front	back



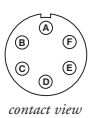
measurement range —	2	5	10	15	20	25	30	40	50
Ⓐ	1.04 in. 26,4 mm	0.58 in. 14,7 mm	1.04 in. 26,4 mm	0.82 in. 20,8 mm	0.74 in. 18,8 mm	0.58 in. 14,7 mm	0.82 in. 20,8 mm	0.74 in. 18,8 mm	0.58 in. 14,7 mm
Ⓑ	0.75 in. 19,1 mm	0.29 in. 6,1 mm	0.75 in. 19,1 mm	0.53 in. 13,5 mm	0.45 in. 11,5 mm	0.29 in. 6,1 mm	0.53 in. 13,5 mm	0.45 in. 11,5 mm	0.29 in. 6,1 mm
Ⓒ	1.43 in. 36,3 mm	1.89 in. 48,0 mm	1.43 in. 36,3 mm	1.65 in. 41,9 mm	1.73 in. 43,9 mm	1.89 in. 48,0 mm	1.65 in. 41,9 mm	1.73 in. 43,9 mm	1.89 in. 48,0 mm

Electrical Connection:

Ⓑ order code:	M6	C25
	6-pin plastic connector with mating plug	25-ft. instrumentation cable 24 AWG, shielded

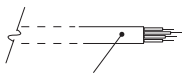


.30 – .39 in. [8 – 10 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S



contact view

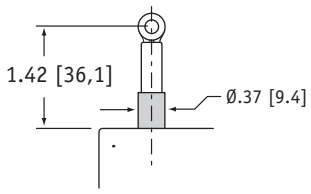
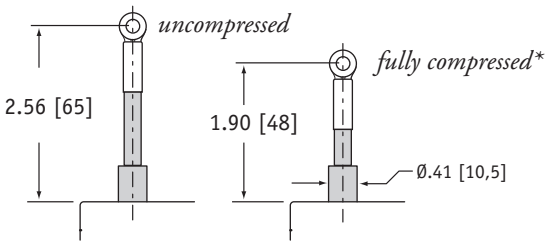
pin	signal
A	9...22 VDC
B	common
C	–
D	Transmitted Data
E	Received Data
F	common



25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

color code	signal
Red	9...22 VDC
Black	common
White	–
Green	Transmitted Data
Blue	Received Data
Brown	common

Cable Guide:

order code:	**blank**	**SG**
	standard cable guide	spring-loaded guide
		cushions impact from accidental free release
		

**note: start of full stroke range begins at full compression point (except 2-inch and 5-inch ranges).*

Precision Potentiometric Output
Ranges: 0-10 to 0-250 inches
Industrial Grade • High Cycle Applications

PT5A

CE

Specification Summary:

GENERAL

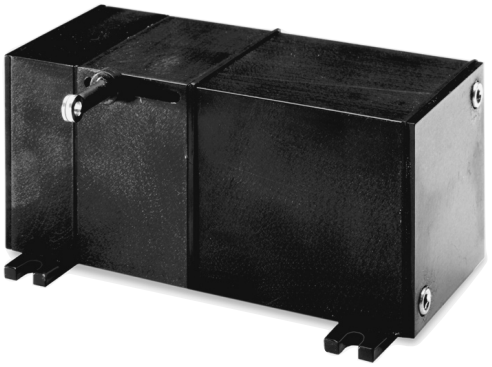
Full Stroke Range Options ..... 0-10 to 0-250 inches
Output Signal Options ..... voltage divider (potentiometer)
Accuracy ..... ± 0.75% to ±0.18% full stroke *see ordering information*
Repeatability ..... *see ordering information*
Resolution ..... essentially infinite
Measuring Cable Options ..... stainless steel or thermoplastic
Enclosure Material ..... hard anodized aluminum
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Measuring Cable Velocity ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight ..... 5 lbs. max.

ELECTRICAL

Input Resistance Options ..... 500, 1K, 5K, 10K or bridge, *see ordering information*
Power Rating, Watt ..... *see ordering information*
Recommended Maximum Input Voltage ..... *see ordering information*
Output Signal Change Over Full Stroke Range ..... 94% ±4% of input voltage

ENVIRONMENTAL

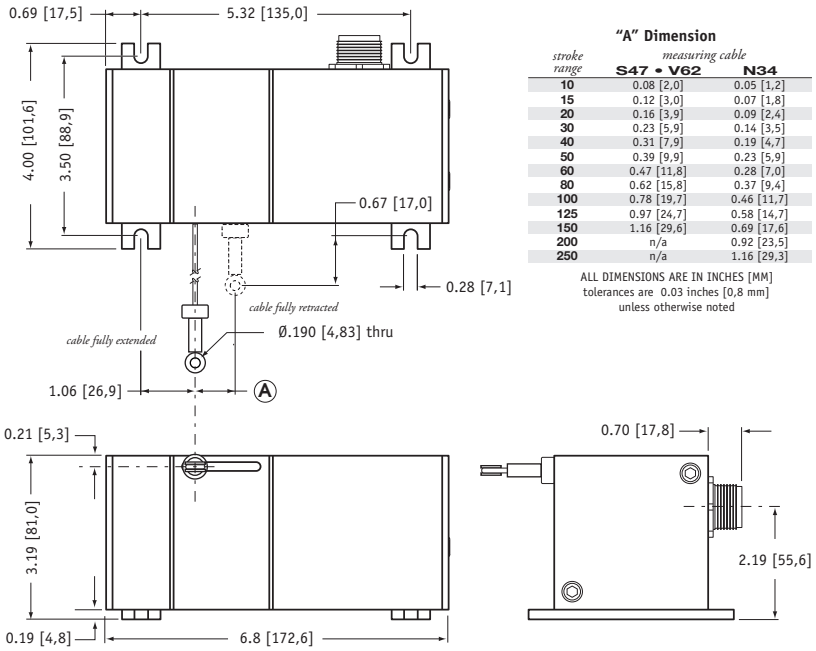
Enclosure ..... NEMA 4/6, IP 65/67
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration ..... up to 10 G's to 2000 Hz maximum



The PT5A potentiometric cable-extension transducer uses a unique thermoplastic cable that has virtually an infinite fatigue life. This cable, known as V62, has properties that are superior for high cycle and rugged applications.

Like Celesco's other transducers, the PT5A installs in minutes, functions properly without perfectly parallel alignment, and fits easily into small areas. The PT5A offers additional installation flexibility since its cable exit can be rotated relative to the mounting surface, providing four different cable exit orientations.

Outline Drawing

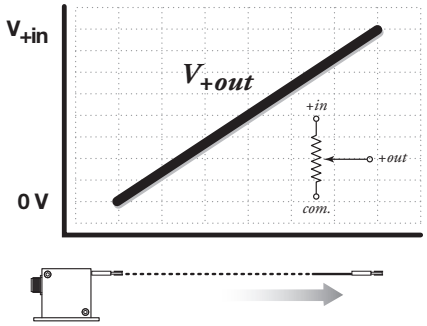


"A" Dimension

stroke range	measuring cable S47 • V62	measuring cable N34
10	0.08 [2,0]	0.05 [1,2]
15	0.12 [3,0]	0.07 [1,8]
20	0.16 [3,9]	0.09 [2,4]
30	0.23 [5,9]	0.14 [3,5]
40	0.31 [7,9]	0.19 [4,7]
50	0.39 [9,9]	0.23 [5,9]
60	0.47 [11,8]	0.28 [7,0]
80	0.62 [15,8]	0.37 [9,4]
100	0.78 [19,7]	0.46 [11,7]
125	0.97 [24,7]	0.58 [14,7]
150	1.16 [29,6]	0.69 [17,6]
200	n/a	0.92 [23,5]
250	n/a	1.16 [29,3]

ALL DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 inches [0,8 mm]
unless otherwise noted

Output Signal



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Ordering Information:

Model Number:

PT5A - _____ - ___ - ___ - ___ - ___
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ

Sample Model Number:

PT5A - 100 - N34 - FR - 500 - M6

Ⓡ	range:	100 inches
Ⓐ	measuring cable:	.034 nylon-coated stainless
Ⓑ	cable exit:	front
Ⓒ	output signal:	500 ohm potentiometer
Ⓓ	electrical connection:	6-pin plastic connector

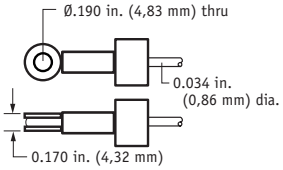
Full Stroke Range:

Ⓡ order code:	10	15	20	25	30	40	50	60	80	100	125	150	200	250
full stroke range, min:	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.	80 in.	100 in.	125 in.	150 in.	200 in.	250 in.
accuracy (±% of f.s.):	.75%	.6%	.5%	.5%	.5%	.3%	.3%	.25%	.25%	.25%	.25%	.18%	.18%	.18%
repeatability (±% of f.s.):	.1%	.1%	.05%	.05%	.05%	.05%	.05%	.02%	.02%	.02%	.02%	.02%	.02%	.02%
potentiometer cycle life:	2,500,000 cycles					500,000 cycles						250,000 cycles		
cable tension (20%):	41 ounces												21 ounces	
max. cable velocity/acceleration:	300 in./sec • 5 G's												120 in./sec • 2 G's	

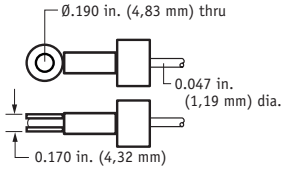
Measuring Cable:

Ⓐ order code:

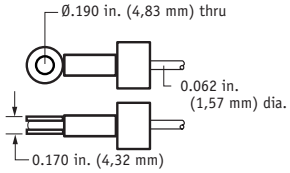
N34
.034 nylon-coated stainless steel
available in all ranges



S47
.047 stainless steel
all ranges up to 150 inches



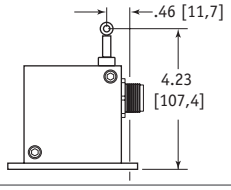
V62
.062 thermoplastic
all ranges up to 150 inches



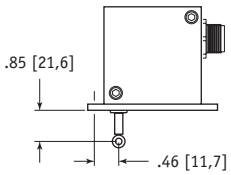
Cable Exit:

Ⓑ order code:

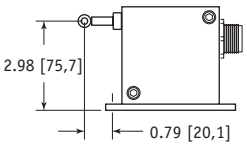
UP
up



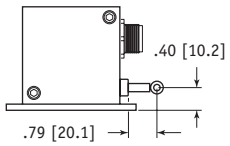
DN
down



FR
front



BK
back

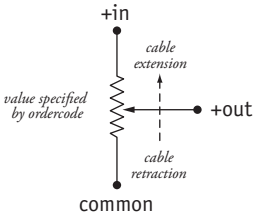


inches [mm]

Output Signals:

Ⓒ order code:

500
500 ohm*



1K
1000 ohm*

5K
5000 ohm*

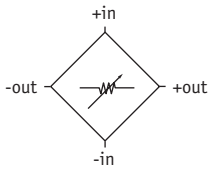
10K
10,000 ohm*

**tolerance = ±10%*

max. input voltage and power rating

	10 to 30-inch range	40 to 250-inch range
500-ohms:	20 V AC/DC (1 W)	30 V AC/DC (2 W)
1K to 10K-ohms:	30 V AC/DC (1 W)	30 V AC/DC (2 W)

B
adjustable bridge
(0...30 mV/V)



full scale output: adjustable from 0 to 30mV/V
zero adjust: from factory set zero to 50% of full stroke

Ordering Information (cont.)

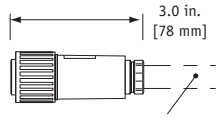
Electrical Connection:

Ⓓ *order code:*

M6

6-pin plastic connector with mating plug

IP 67, NEMA 6

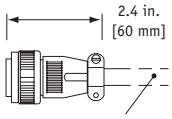


.30 – .39 in. [8 – 10 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

M6M

6-pin metal connector with mating plug

IP 65, NEMA 4

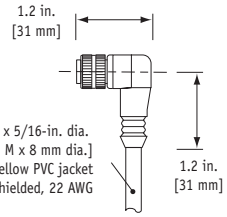


.375 in. [9 mm] max cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

MC4

4-pin micro-connector with 12 ft [3.5 M] cordset

IP 67, NEMA 6

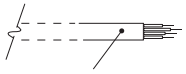


12 ft. x 5/16-in. dia.
[3,5 M x 8 mm dia.]
yellow PVC jacket
shielded, 22 AWG

C25

25-ft. instrumentation cable 24 AWG, shielded

IP 67, NEMA 6



25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

6-pin mating plug:

contact view

pin	standard	bridge
A	+IN	+IN
B	COMMON	-IN
C	+OUT	-OUT
D	-	+OUT

4-pin mating plug and cord set:

contact view

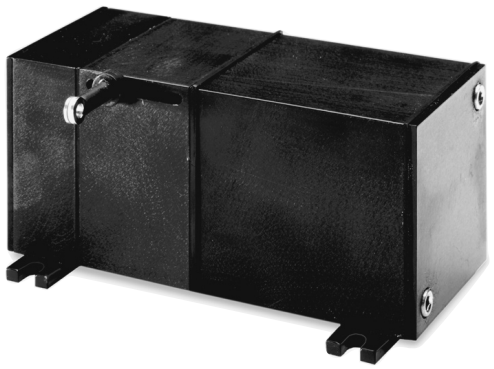
pin	color code	standard	bridge
1	RED-BLK TR.	+IN	+IN
2	RED-WHT TR.	COMMON	-IN
3	RED	+OUT	+OUT
4	GREEN	-	-OUT

25-ft. cable:

color code	standard	bridge
RED	+IN	+IN
BLACK	COMMON	-IN
GREEN	+OUT	+OUT
WHITE	-	-OUT

Position and Velocity Output Signals
Ranges: 0-10 to 0-250 inches
Industrial Grade • High Cycle Applications

PT5AV



The PT5AV is a combination position and velocity transducer. A precision plastic-hybrid potentiometer provides accurate position feedback while a self-generating DC tachometer provides a velocity signal that is proportional to the speed of the traveling measuring cable.

Like Celesco's other transducers, the PT5AV installs in minutes, functions properly without perfectly parallel alignment, and fits easily into small areas. The PT5AV also has an optional unique thermoplastic measuring cable that has virtually an infinite fatigue life for high-cycle applications.

Specification Summary:

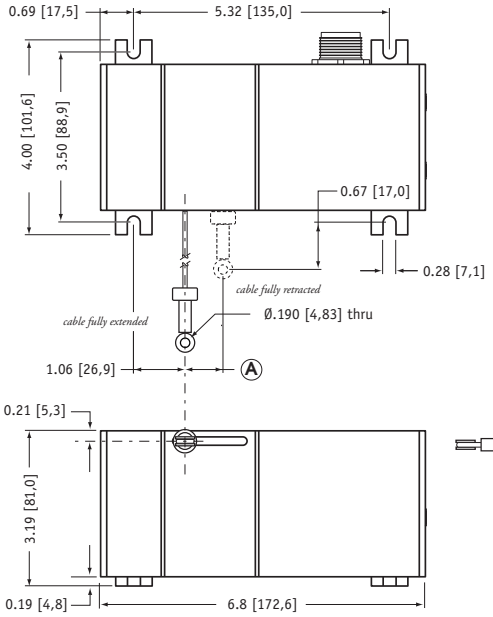
GENERAL
Full Stroke Range Options ..... 0-10 to 0-250 inches

POSITION
Output Signal ..... voltage divider (potentiometer)
Accuracy ..... ± 0.75% to ±0.18% full stroke, *see ordering information*
Repeatability ..... *see ordering information*
Resolution ..... *essentially infinite*
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Input Resistance Options ..... 500, 1K, 5K or 10K Ω, *see ordering information*
Power Rating, Watts ..... *see ordering information*
Recommended Maximum Input Voltage ..... *see ordering information*
Output Signal Change Over Full Stroke Range ..... 94% ±4% of input voltage

VELOCITY
Output Signal ..... DC voltage
Linearity ..... better than ±0.10% of output at any velocity
Repeatability ..... ±0.10% of reading
Maximum Velocity • Retraction Acceleration ..... *see ordering information*
Sensor ..... tach generator
Input Voltage ..... none required
Output Voltage @ 100 inches per minute—*varies slightly with measuring cable*
N34 cable option ..... 354 mV ±4%
S47 cable option ..... 352 mV ±4%
V62 cable option ..... 351 mV ±4%
Output Impedance ..... 350 ohms ±10%
Output Ripple (for velocity ≥ 1.35 inches per second) ..... ±3% rms

GENERAL
Measuring Cable Options ..... stainless steel, nylon-coated or thermoplastic
Enclosure Material ..... hard anodized aluminum
Weight ..... 5 lbs. max.

ENVIRONMENTAL
Enclosure ..... NEMA 4/6, IP 65/67
Operating Temperature ..... -40º to 200ºF (-40º to 90ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum

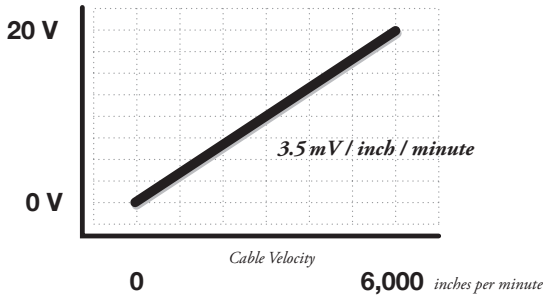


"A" Dimension

stroke range	measuring cable S47 • V62	N34
10	0.08 [2,0]	0.05 [1,2]
15	0.12 [3,0]	0.07 [1,8]
20	0.16 [3,9]	0.09 [2,4]
30	0.23 [5,9]	0.14 [3,5]
40	0.31 [7,9]	0.19 [4,7]
50	0.39 [9,9]	0.23 [5,9]
60	0.47 [11,8]	0.28 [7,0]
80	0.62 [15,8]	0.37 [9,4]
100	0.78 [19,7]	0.46 [11,7]
125	0.97 [24,7]	0.58 [14,7]
150	1.16 [29,6]	0.69 [17,6]
200	n/a	0.92 [23,5]
250	n/a	1.16 [29,3]

ALL DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 inches [0,8 mm]
unless otherwise noted

Output Signal



Celesco Transducer Products, Inc.
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celesco
celesco.com • info@celesco.com

Ordering Information:

Model Number:

PT5AV - _____ Ⓡ - ___ Ⓐ - ___ Ⓑ - ___ Ⓒ - ___ Ⓓ
order code:

Sample Model Number:

PT5AV - 100 - N34 - FR - 500 - M6

Ⓡ	range:	100 inches
Ⓐ	measuring cable:	.034 nylon-coated stainless
Ⓑ	cable exit:	front
Ⓒ	output signal:	500 ohm potentiometer
Ⓓ	electrical connection:	6-pin plastic connector

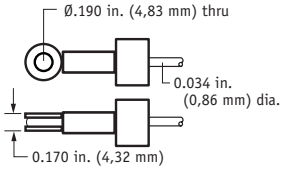
Full Stroke Range:

Ⓡ *order code:*	10	15	20	25	30	40	50	60	80	100	125	150	200	250
full stroke range, min:	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.	80 in.	100 in.	125 in.	150 in.	200 in.	250 in.
accuracy (±% of f.s.):	.75%	.6%	.5%	.5%	.5%	.3%	.3%	.25%	.25%	.25%	.25%	.18%	.18%	.18%
repeatability (±% of f.s.):	.1%	.1%	.05%	.05%	.05%	.05%	.05%	.02%	.02%	.02%	.02%	.02%	.02%	.02%
potentiometer cycle life:	2,500,000 cycles					500,000 cycles						250,000 cycles		
cable tension (20%):	41 ounces												21 ounces	
max. cable velocity/acceleration:	300 in./sec • 5 G's												120 in./sec • 2 G's	

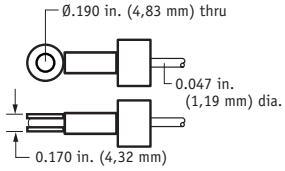
Measuring Cable:

Ⓐ *order code:*

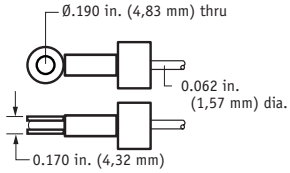
N34
.034 nylon-coated stainless steel
available in all ranges



S47
.047 stainless steel
all ranges up to 150 inches



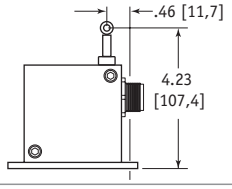
V62
.062 thermoplastic
all ranges up to 150 inches



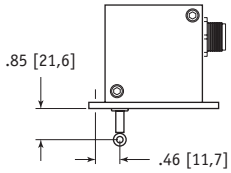
Cable Exit:

Ⓑ *order code:*

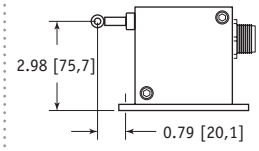
UP
up



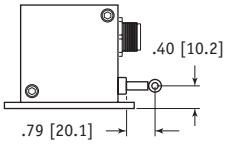
DN
down



FR
front



BK
back

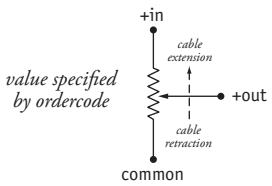


inches [mm]

Output Signals:

Ⓒ *order code:*	500	1K	5K	10K
position sensing potentiometer:	500 ohms*	1000 ohms*	5000 ohms*	10,000 ohms*

position sensing circuit



position circuit max input voltage & power rating

	10 to 30-inch range	*40 to 250-inch range*
500-ohms:	20 V AC/DC (1 W)	30 V AC/DC (2 W)
1K to 10K-ohms:	30 V AC/DC (1 W)	30 V AC/DC (2 W)

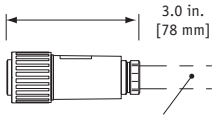
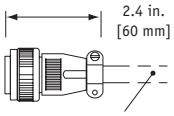
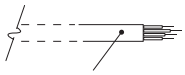
velocity sensing circuit

**–tolerance = ±10%*

Ordering Information (cont.)

Electrical Connection:

order code:

M6	M6M	C25
6-pin plastic connector with mating plug	6-pin metal connector with mating plug	25-ft. instrumentation cable 24 AWG, shielded
IP 67, NEMA 6	**IP 65, NEMA 4**	**IP 67, NEMA 6**
		
.30 - .39 in. [8 - 10 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	.375 in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

6-pin mating plug:

pin	signal	
A	+ in	} *position*
B	common	
C	+ out	
D	-	
E	+ out	} *velocity*
F	- out	

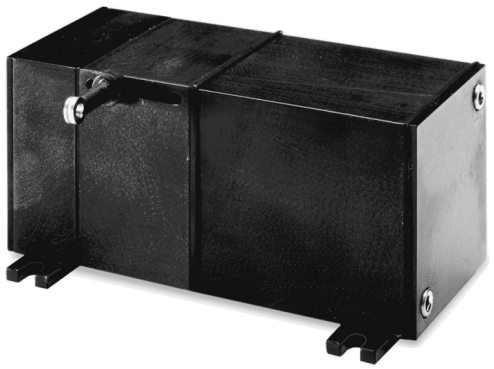
contact view

25-ft. instrumentation cable:

color	signal	
red	+ in	} *position*
black	common	
green	+ out	
white	+ out	} *velocity*
brown	- out	

CANbus • SAE J1939
Ranges: 0-10 to 0-250 inches
Industrial Grade • High Cycle Applications

PT5CN



The PT5CN cable extension position transducer communicates linear position via the CANbus SAE J1939 interface providing a precision position feedback to your PLC. The PT5DN is offered in full stroke ranges up to 250 inches and a thermoplastic measuring cable for high cycle and rugged applications.

Because the PT5CN uses a potentiometer as it's sensing element, the position signal is "absolute" and does not have to be reset to a "home" position upon startup.

Specification Summary:

GENERAL

Full Stroke Ranges	0-10 to 0-250 inches
Electrical Interface	CANbus SAE J1939
Protocol	Proprietary B
Accuracy	± 0.25% to ± 0.10% full stroke
Repeatability	± 0.02% full stroke
Resolution	± 0.003% full stroke
Measuring Cable	stainless steel or thermoplastic
Enclosure Material	hard anodized aluminum
Sensor	plastic-hybrid precision potentiometer
Potentiometer Cycle Life	*see ordering information*
Maximum Retraction Acceleration	*see ordering information*
Weight	5 lbs. max.

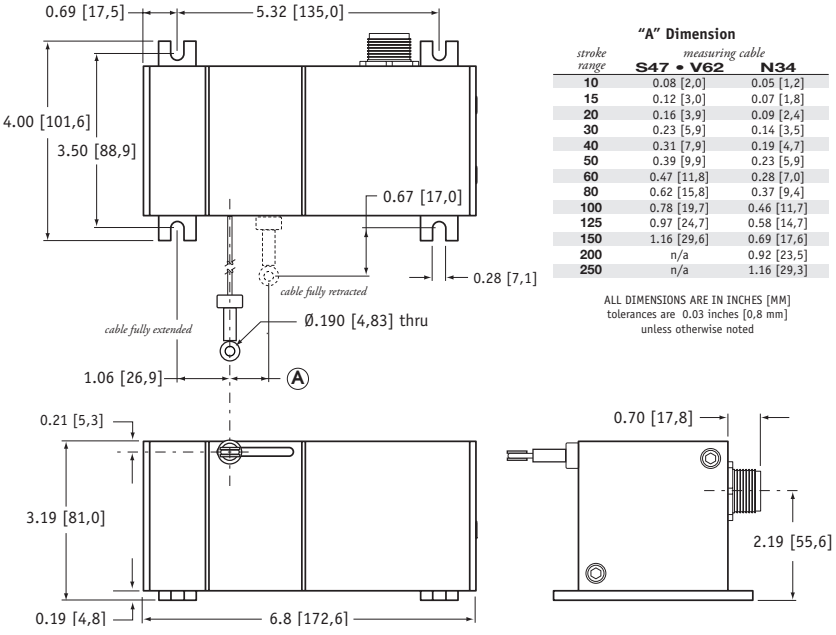
ELECTRICAL

Input Voltage	7 - 18 VDC
Input Current	60 mA max.
Baud Rate	125K, 250K, or 500K via DIP switches
Update Rate	10 ms. (20 ms. available–*contact factory*)

ENVIRONMENTAL

Environmental Suitability	NEMA 4/6, IP 65/67
Operating Temperature	-40° to 185°F (-40° to 85°C)
Vibration	up to 10 G's to 2000 Hz maximum

Outline Drawing

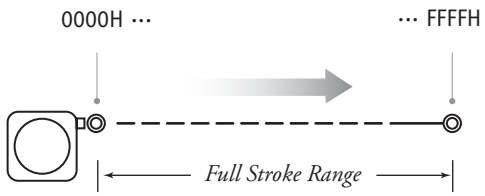


"A" Dimension

stroke range	measuring cable S47 • V62	measuring cable N34
10	0.08 [2,0]	0.05 [1,2]
15	0.12 [3,0]	0.07 [1,8]
20	0.16 [3,9]	0.09 [2,4]
30	0.23 [5,9]	0.14 [3,5]
40	0.31 [7,9]	0.19 [4,7]
50	0.39 [9,9]	0.23 [5,9]
60	0.47 [11,8]	0.28 [7,0]
80	0.62 [15,8]	0.37 [9,4]
100	0.78 [19,7]	0.46 [11,7]
125	0.97 [24,7]	0.58 [14,7]
150	1.16 [29,6]	0.69 [17,6]
200	n/a	0.92 [23,5]
250	n/a	1.16 [29,3]

ALL DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 inches [0,8 mm]
unless otherwise noted

Output Signal



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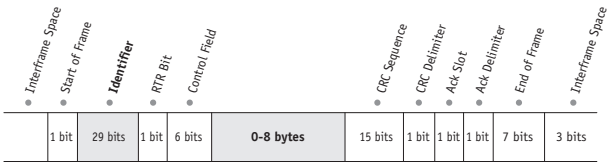
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

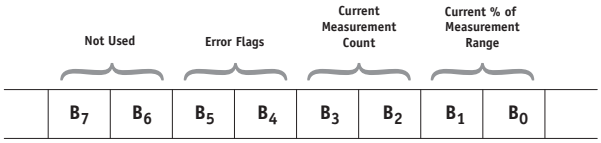
I/O Format:

Data Frame



repetition = 8 msec.

Data Field



B_0 = LSB current % of measurement range byte
B_1 = MSB current % of measurement range byte
B_4 - B_5 = error flags
B_2 = LSB current measurement count byte
B_3 = MSB current measurement count byte
B_6 - B_7 = not used

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.

Setting the Address (Node ID) and Baud Rate

Address Setting (Node ID)

The Address Setting (Node ID) is set via 6 switches located on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

Baud Rate

The transmission baud rate may be either factory preset at the time of order or set manually at the time of installation.

The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

address setting:

DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
…	…	…	…	…	…	…
1	1	1	1	1	1	63

baud rate setting:

DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

Current % of Measurement Range

The Current % of Measurement Range is a 2-byte value that expresses the current linear position as a percentage of the entire full stroke range. Resolution is **.1 %** of the full stroke measurement range.

This value starts at **0x0000** at the beginning of the stroke and ends at **0x03E8**.

Example:

Hex	Decimal	Percent
0000	0000	0.0%
0001	0001	0.1%
0002	0002	0.2%
…	…	…
03E8	1000	100.0%

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 16-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 **0x0000** with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at **0xFFFF**. This holds true for all ranges.

Error Flags

0x55 (yellow LED on controller board) indicates that the sensor has begun to travel beyond the calibrated range of the internal position potentiometer.

0xAA (red LED on controller board) indicates that the sensor has moved well beyond the calibrated range of the internal position potentiometer.

If either error flag occurs within the full stroke range of the sensor, the unit should be returned to the factory for repair and recalibration.

Converting CMC to Inches

If required, the CMC can easily be converted a linear measurement expressed in inches instead of just counts.

This is accomplished by first dividing the CMC by 65,535 (total counts over the range) and then multiplying that value by the FSR:

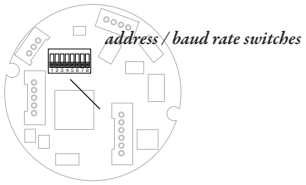
$$\left(\frac{\text{CMC}}{65{,}535}\right) \text{X FSR}$$

Example:

If the full stroke range is **30 inches** and the current position is **0x0FF2** (4082 Decimal) then,

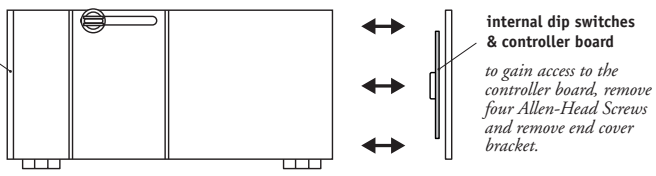
$$\left(\frac{4082}{65{,}535}\right) \text{X } 30.00 \text{ inches} = 1.87 \text{ inches}$$

CANBus Controller Board and DIP Switch Location



Caution! Do Not Remove Spring-Side End Cover

removing spring-side end cover could cause spring to become unseated and permanently damaged.



internal dip switches & controller board

to gain access to the controller board, remove four Allen-Head Screws and remove end cover bracket.

Ordering Information:

Model Number:

PT5CN - ____ - ___ - ___ - **J** - ___ - ___ - ___
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ

Sample Model Number:

PT5CN - 50 - S47 - FR - J - 500 - 32 - SC5

Ⓡ	range:	50 inches
Ⓐ	measuring cable:	.047 stainless steel
Ⓑ	measuring cable exit:	front
Ⓒ	interface:	CANbus SAE J1939
Ⓓ	baud rate:	500 k bits/sec.
Ⓔ	node ID:	32 decimal
Ⓕ	electrical connection:	5-meter cordset with straight plug

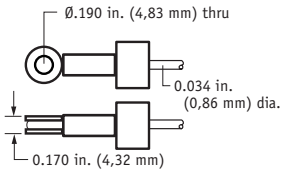
Full Stroke Range:

Ⓡ order code:	10	15	20	25	30	40	50	60	80	100	125	150	200	250
full stroke range, min:	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.	80 in.	100 in.	125 in.	150 in.	200 in.	250 in.
accuracy (±% of f.s.):	.75%	.6%	.5%	.5%	.5%	.3%	.3%	.25%	.25%	.25%	.25%	.18%	.18%	.18%
repeatability (±% of f.s.):	.1%	.1%	.05%	.05%	.05%	.05%	.05%	.02%	.02%	.02%	.02%	.02%	.02%	.02%
potentiometer cycle life:	2,500,000 cycles					500,000 cycles						250,000 cycles		
cable tension (20%):	41 ounces												21 ounces	
max. cable velocity/acceleration:	300 in./sec • 5 G's												120 in./sec • 2 G's	

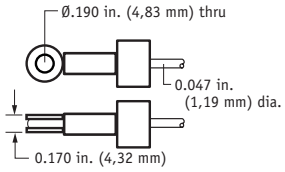
Measuring Cable:

Ⓐ order code:

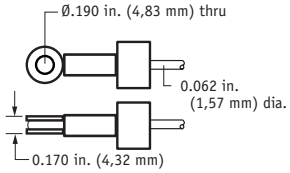
N34 — .034 nylon-coated stainless steel
available in all ranges



S47 — .047 stainless steel
all ranges up to 150 inches



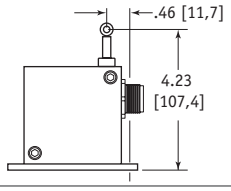
V62 — .062 thermoplastic
all ranges up to 150 inches



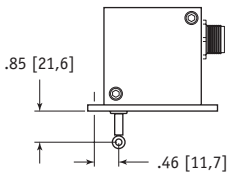
Cable Exit:

Ⓑ order code:

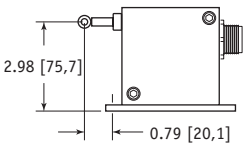
UP — up



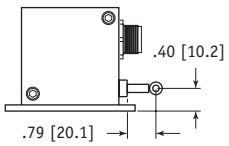
DN — down



FR — front



BK — back



inches [mm]

Baud Rate:

Ⓓ order code:

125	250	500
125 kbaud	250 kbaud	500 kbaud

Node ID:

Ⓔ order code: **0 1 2 ... 62 63**

select address (0 - 63 Decimal)

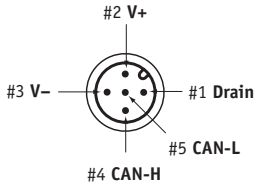
Ordering Information (cont.)

Electrical Connection:

order code:

blank

5-pin micro-connector
(no mating plug supplied)



connector
(contact view)

MC5

5-pin micro-connector
w/ mating plug

0.16" - 0.32" OD Cable (THIN)

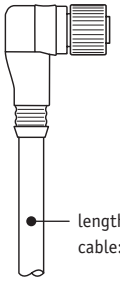
SC5

5-pin micro-connector
and 5 meter length cordset
w/straight mating plug

length: 16ft [5M]
cable: Thin

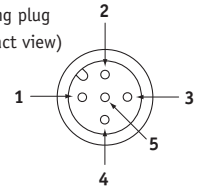
NC5

5-pin micro-connector
and 5 meter length cordset
w/90° mating plug



length: 16ft [5M]
cable: Thin

mating plug
(contact view)



pin	signal	wire color
1	drain	brown
2	V+	white
3	V-	blue
4	Can-H	black
5	Can-L	grey

0...5, 0...10, –5...+5, –10...+10 VDC Output Options
Ranges: 0-10 to 0-250 inches
Industrial Grade • High Cycle Applications

PT5DC

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-10 to 0-250 inches
Output Signal Options ..... 0...5, 0...10, -5...+5, -10...+10 VDC
Accuracy ..... ± 0.75% to ±0.18% full stroke *see ordering information*
Repeatability ..... *see ordering information*
Resolution ..... essentially infinite
Measuring Cable Options ..... stainless steel or thermoplastic
Enclosure Material ..... hard anodized aluminum
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Measuring Cable Velocity ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight ..... 5 lbs. max.

ELECTRICAL

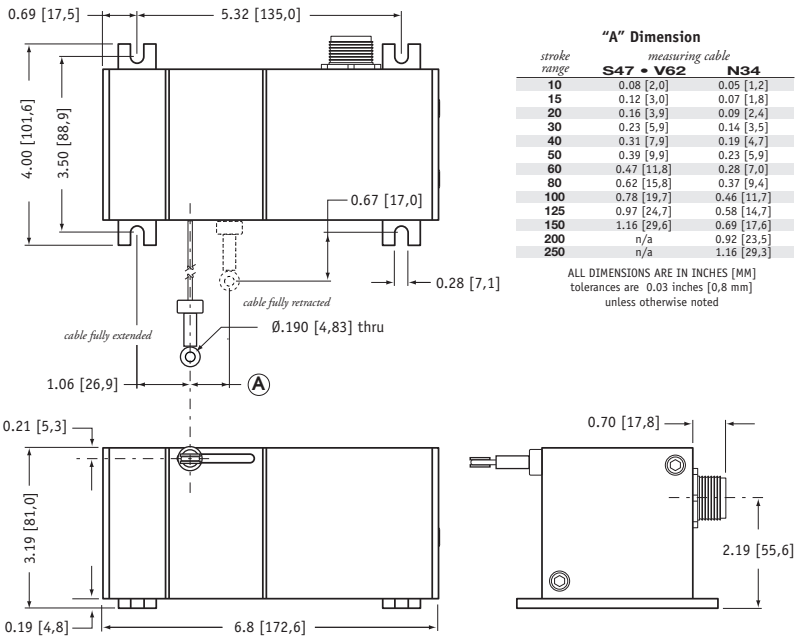
Input ..... 14.5-40 VDC (10.5-40 VDC for 0...5 and -5...+5 volt output)
Input Current ..... 10 mA maximum
Output Impedence ..... 1000 ohms
Maximum Load ..... 5000 ohms
Zero and Span Adjustment ..... *see ordering information*

ENVIRONMENTAL

Enclosure ..... NEMA 4/6, IP 65/67
Operating Temperature ..... -40º to 200ºF (-40º to 90ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum

EMC COMPLIENCE PER DIRECTIVE 89/336/EEC

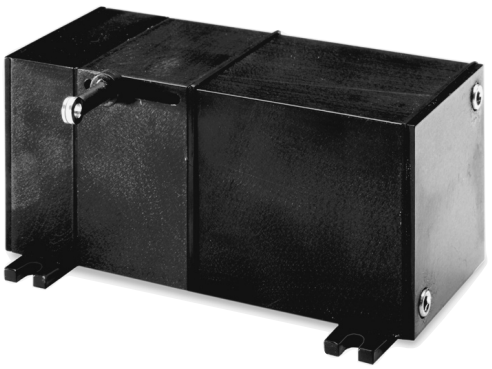
Emission/Immunity ..... EN50081-2 / EN50082-2



"A" Dimension

stroke range	measuring cable S47 • V62	measuring cable N34
10	0.08 [2,0]	0.05 [1,2]
15	0.12 [3,0]	0.07 [1,8]
20	0.16 [3,9]	0.09 [2,4]
30	0.23 [5,9]	0.14 [3,5]
40	0.31 [7,9]	0.19 [4,7]
50	0.39 [9,9]	0.23 [5,9]
60	0.47 [11,8]	0.28 [7,0]
80	0.62 [15,8]	0.37 [9,4]
100	0.78 [19,7]	0.46 [11,7]
125	0.97 [24,7]	0.58 [14,7]
150	1.16 [29,6]	0.69 [17,6]
200	n/a	0.92 [23,5]
250	n/a	1.16 [29,3]

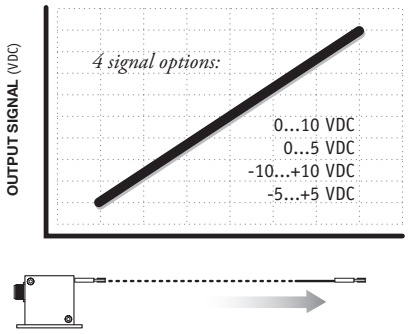
ALL DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 inches [0,8 mm]
unless otherwise noted



The PT5DC cable-extension transducer uses a unique thermoplastic cable that has virtually an infinite fatigue life. This cable, known as V62, has properties that are superior for high cycle and rugged applications.

Like Celesco's other transducers, the PT5DC installs in minutes, functions properly without perfectly parallel alignment, and fits easily into small areas. The PT5DC offers additional installation flexibility since its cable exit can be rotated relative to the mounting surface, providing four different cable exit orientations.

Output Signal



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Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

Ordering Information:

Model Number:

PT5DC - _____ Ⓡ - ___ Ⓐ - ___ Ⓑ - ___ Ⓒ - ___ Ⓓ
order code:

Sample Model Number:

PT5DC - 100 - N34 - FR - Z10 - M6

Ⓡ	range:	100 inches
Ⓐ	measuring cable:	.034 nylon-coated stainless
Ⓑ	cable exit:	front
Ⓒ	output signal:	0...10 vdc
Ⓓ	electrical connection:	6-pin plastic connector

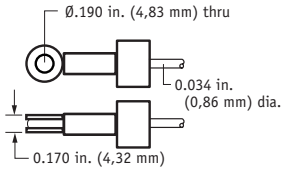
Full Stroke Range:

Ⓡ order code:	10	15	20	25	30	40	50	60	80	100	125	150	200	250
full stroke range, min:	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.	80 in.	100 in.	125 in.	150 in.	200 in.	250 in.
accuracy (±% of f.s.):	.75%	.6%	.5%	.5%	.5%	.3%	.3%	.25%	.25%	.25%	.25%	.18%	.18%	.18%
repeatability (±% of f.s.):	.1%	.1%	.05%	.05%	.05%	.05%	.05%	.02%	.02%	.02%	.02%	.02%	.02%	.02%
potentiometer cycle life:	2,500,000 cycles					500,000 cycles						250,000 cycles		
cable tension (20%):	41 ounces												21 ounces	
max. cable velocity/acceleration:	300 in./sec • 5 G's												120 in./sec • 2 G's	

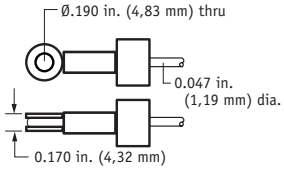
Measuring Cable:

Ⓐ *order code:*

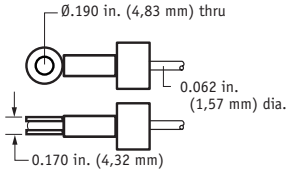
N34
.034 nylon-coated stainless steel
available in all ranges



S47
.047 stainless steel
all ranges up to 150 inches



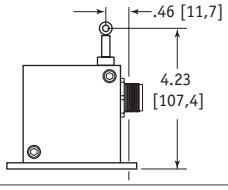
V62
.062 thermoplastic
all ranges up to 150 inches



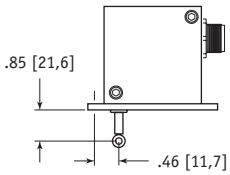
Cable Exit:

Ⓑ *order code:*

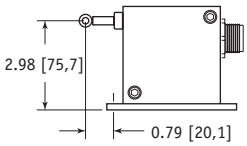
UP
up



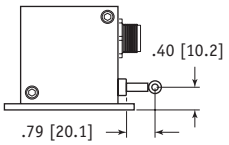
DN
down



FR
front



BK
back



inches [mm]

Output Signals:

Ⓒ *order code:*

	Z10	10Z	Z5	5Z	M0P0	P0M0	M5P5	P5M5
output signal options:	0...10 VDC	10...0 VDC	0...5 VDC	5...0 VDC	-10...+10 VDC	+10...-10 VDC	-5...+5 VDC	+5...-5 VDC
input voltage:	14.5 – 40 vdc		10.5 – 40 vdc		14.5 – 40 vdc		10.5 – 40 vdc	
span adjustment:	to 50% of factory set span				to 75% of factory set span			
zero adjustment:	from factory set zero to 50% of full stroke range				from factory set zero to 25% of full stroke range			

example:

ordercode = **Z10** = 0...10 VDC

0 vdc =

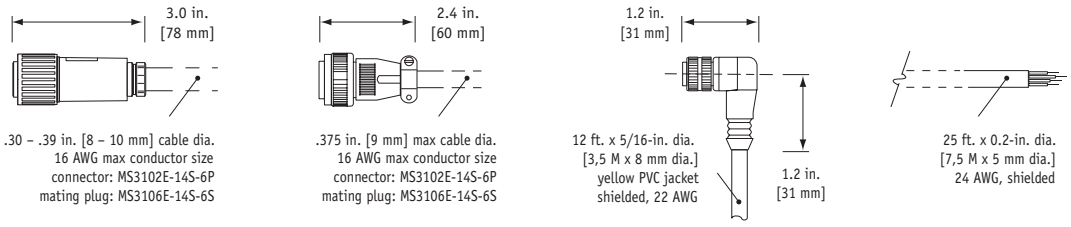
10 vdc =

Ordering Information (cont.)

Electrical Connection:

order code:

M6	M6M	MC4	C25
6-pin plastic connector with mating plug **IP 67, NEMA 6**	6-pin metal connector with mating plug **IP 65, NEMA 4**	4-pin micro-connector with 12 ft [3.5 M] cord set **IP 67, NEMA 6**	25-ft. instrumentation cable 24 AWG, shielded **IP 67, NEMA 6**



6-pin mating plug:

contact view

pin	signals
A	input voltage
B	output signal
C	common

4-pin mating plug and cord set:

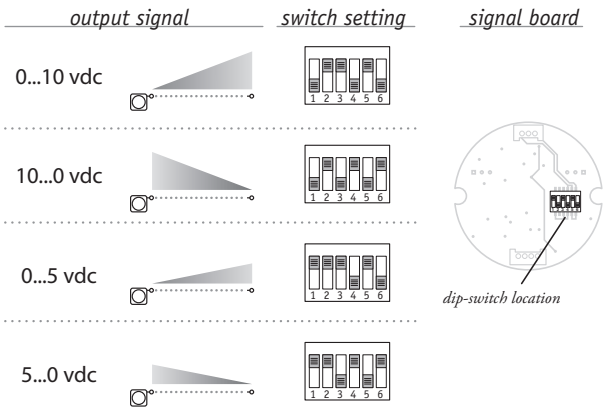
contact view

pin	color code	signals
1	RED-BLK TR.	input voltage
2	RED-WHT TR.	output signal
3	RED	common

25-ft. cable:

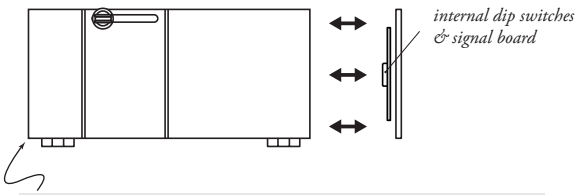
color code	standard
RED	input voltage
BLACK	common
GREEN	output signal

Output Signal Selection (does not apply to -5...+5 & -10...+10 vdc options)



The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.

To gain access to the signal board, remove four Allen-Head Screws and remove end cover bracket.

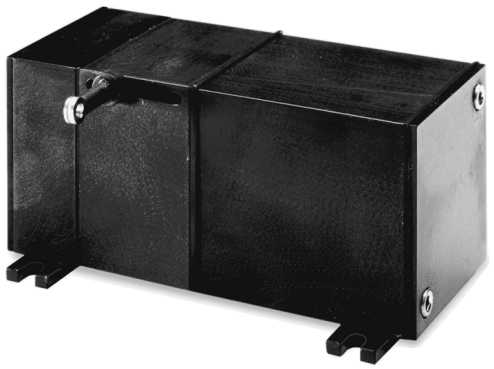


Caution! Do Not Remove Spring-Side End Cover

Removing spring-side end cover could cause spring to become unseated and permanently damaged.

DeviceNET®
Ranges: 0-10 to 0-250 inches
Industrial Grade

PT5DN



Specification Summary:

GENERAL

Full Stroke Ranges ..... 0-10 to 0-250 inches
Electrical Interface ..... CANbus ISO 11898
Protocol ..... DeviceNET version 2.0
Accuracy ..... ± 0.25% to ± 0.10% full stroke
Repeatability ..... ± 0.02% full stroke
Resolution ..... ± 0.003% full stroke
Measuring Cable ..... stainless steel or thermoplastic
Enclosure Material ..... hard anodized aluminum
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight ..... 5 lbs. max.

ELECTRICAL

Input Voltage ..... bus powered
Input Current ..... 40 mA
Address Setting/Node ID ..... 0...63 set via DIP switches –*default setting: 63*
Baud Rate ..... 125K, 250K or 500K set via DIP switches
EDS File ..... available @ http://www.celeso.com/download

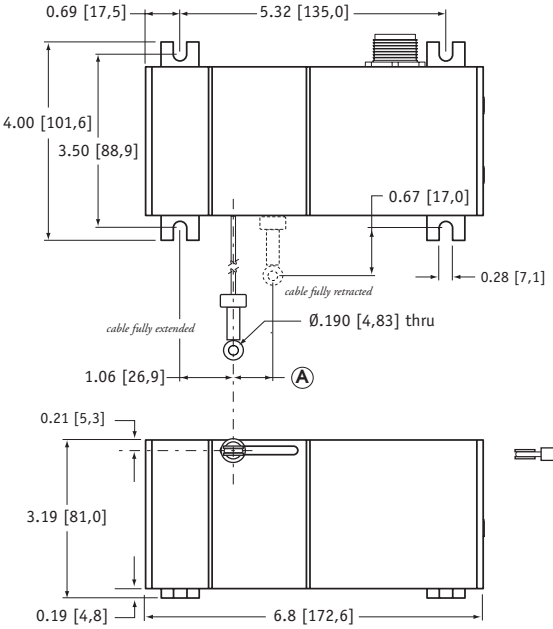
ENVIRONMENTAL

Environmental Suitability ..... NEMA 4/6, IP 67
Operating Temperature ..... -40º to 185ºF (-40º to 85ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum

The PT5DN, using a high cycle plastic-hybrid potentiometer, communicates via DeviceNET protocol with programmable controllers in factories and harsh environments requiring linear position measurements in ranges up to 250".

As a member of Celesco's innovative family of NEMA 4 rated cable-extension transducers, the PT5DN installs in minutes by simply mounting it's body to a fixed surface and attaching it's cable to the movable object. Perfect parallel alignment not required.

Outline Drawing

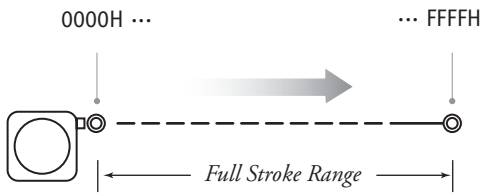


"A" Dimension

stroke range	measuring cable S47 • V62	measuring cable N34
10	0.08 [2,0]	0.05 [1,2]
15	0.12 [3,0]	0.07 [1,8]
20	0.16 [3,9]	0.09 [2,4]
30	0.23 [5,9]	0.14 [3,5]
40	0.31 [7,9]	0.19 [4,7]
50	0.39 [9,9]	0.23 [5,9]
60	0.47 [11,8]	0.28 [7,0]
80	0.62 [15,8]	0.37 [9,4]
100	0.78 [19,7]	0.46 [11,7]
125	0.97 [24,7]	0.58 [14,7]
150	1.16 [29,6]	0.69 [17,6]
200	n/a	0.92 [23,5]
250	n/a	1.16 [29,3]

ALL DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 inches [0,8 mm]
unless otherwise noted

Output Signal



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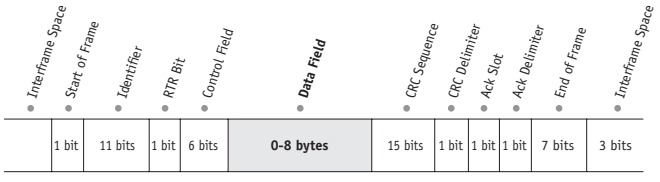
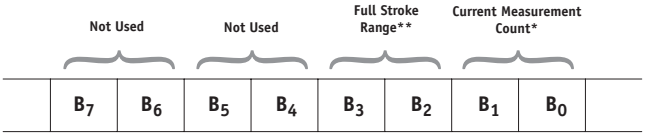
I/O Format:

Data Frame



Data Field



B_0 = LSB current measurement byte
B_1 = MSB current measurement byte
B_2 = LSB full stroke range byte
B_3 = MSB full stroke range byte
B_4 - B_7 = not used

***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 16-bit value that occupies the first two 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 0000H with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at FFFFH. This holds true for all ranges.

****Full Stroke Range**

The **F**ull **S**troke **R**ange **(FSR)** is a 16-bit value in the data field that expresses the full range of the sensor in inches. This value can be used to convert the actual count to units of measurement should the application require it.

The full stroke measurement range occupies the second two bytes (B_2 and B_3) of the data field.

B_2 is the LSB (least significant byte) and B_3 is the MSB (most significant byte).

This value is expressed in inches.

Example:

Hex Value	*Decimal Equivalent*	*Full Stroke Range*
001E	30	30 inches

Converting CMC to Inches

If required, the CMC can easily be converted to a linear measurement expressed in inches instead of just counts.

This is accomplished by first dividing the CMC by 65,535 (total counts over the range) and then multiplying that value by the FSR:

$$\left(\frac{\text{CMC}}{65{,}535}\right) \text{X FSR}$$

Example:

If the full stroke range is **30 inches** and the current position is **OFF2 Hex** (4082 Decimal) then,

$$\left(\frac{4082}{65{,}535}\right) \text{X } 30.00 \text{ inches} = 1.87 \text{ inches}$$

Address Setting (Node ID), Baud Rate and Bus Termination Settings

Address Setting (Node ID)

The Address Setting (Node ID) is set via 6 switches located on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
…	…	…	…	…	…	…
1	1	1	1	1	1	63

Baud Rate

The transmission baud rate may be either factory preset at the time of order or set manually at the time of installation.

The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

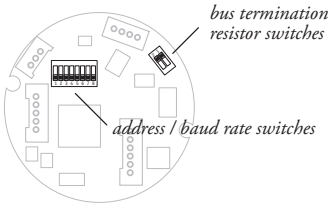
DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

Bus Termination

The setting of the internal bus termination resistor may be specified upon order or manually changed by the end user at the time of installation.

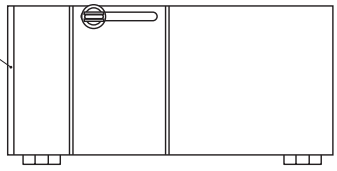
The bus termination resistor is activated setting switches **1** & **2** on the 2-pole DIP switch (located on the internal DeviceNET controller board) to the "ON" position.

DeviceNET Controller Board and DIP Switch Location



Caution! Do Not Remove Spring-Side End Cover

removing spring-side end cover could cause spring to become unseated and permanently damaged.



internal dip switches & controller board

to gain access to the controller board, remove four Allen-Head Screws and remove end cover bracket.

Ordering Information:

Model Number:

PT5DN - ____ Ⓡ - ____ Ⓐ - ____ Ⓑ - ____ Ⓒ - ____ Ⓓ - ____ Ⓔ
order code:

Sample Model Number:

PT5DN - 50 - S47 - FR - 500 - TR - SC5

Ⓡ	range:	50 inches
Ⓐ	measuring cable:	.047 stainless steel
Ⓑ	measuring cable exit:	front
Ⓒ	baud rate:	500 k bits/sec.
Ⓓ	terminating resistor:	yes
Ⓔ	electrical connection:	5-meter cordset with straight plug

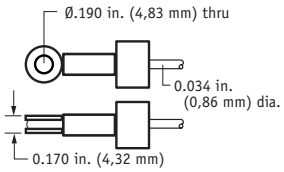
Full Stroke Range:

Ⓡ *order code:*	10	15	20	25	30	40	50	60	80	100	125	150	200	250
full stroke range, min:	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.	80 in.	100 in.	125 in.	150 in.	200 in.	250 in.
accuracy (±% of f.s.):	.75%	.6%	.5%	.5%	.5%	.3%	.3%	.25%	.25%	.25%	.25%	.18%	.18%	.18%
repeatability (±% of f.s.):	.1%	.1%	.05%	.05%	.05%	.05%	.05%	.02%	.02%	.02%	.02%	.02%	.02%	.02%
potentiometer cycle life:	2,500,000 cycles					500,000 cycles						250,000 cycles		
cable tension (20%):	41 ounces												21 ounces	
max. cable velocity/acceleration:	300 in./sec • 5 G's												120 in./sec • 2 G's	

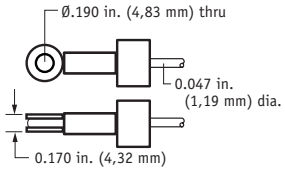
Measuring Cable:

Ⓐ *order code:*

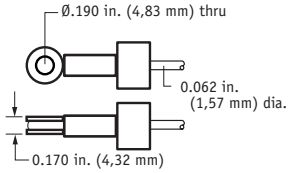
N34
.034 nylon-coated stainless steel
available in all ranges



S47
.047 stainless steel
all ranges up to 150 inches



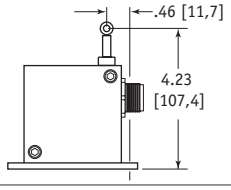
V62
.062 thermoplastic
all ranges up to 150 inches



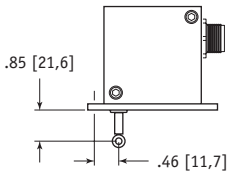
Cable Exit:

Ⓑ *order code:*

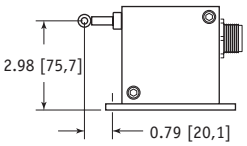
UP
up



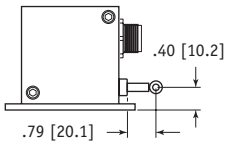
DN
down



FR
front



BK
back



inches [mm]

Baud Rate:

Ⓒ *order code:*

125	250	500
125 kbaud	250 kbaud	500 kbaud

Terminating Resistor:

Ⓓ *order code:*

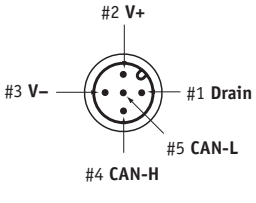
TR	NR
terminating resistor	no terminating resistor

Ordering Information (cont.)

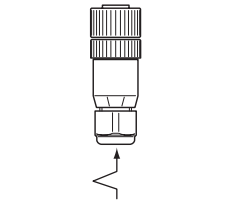
Electrical Connection:

Ⓔ *order code:*

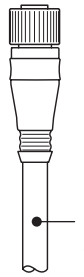
blank	MC5	SC5	NC5
5-pin micro-connector *(no mating plug supplied)*	5-pin micro-connector w/ mating plug	5-pin micro-connector and 5 meter length cordset w/straight mating plug	5-pin micro-connector and 5 meter length cordset w/90° mating plug



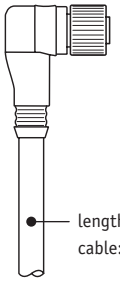
connector
(contact view)



0.16" - 0.32" OD Cable (THIN)

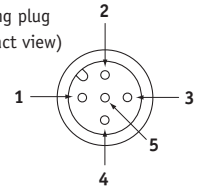


length: 16ft [5M]
cable: Thin



length: 16ft [5M]
cable: Thin

mating plug
(contact view)



pin	signal	wire color
1	drain	brown
2	V+	white
3	V-	blue
4	Can-H	black
5	Can-L	grey

Incremental Encoder Output
Ranges: 0-50 to 0-250 inches
Industrial Grade • High Cycle Applications

PT5E

CE

Specification Summary:

GENERAL

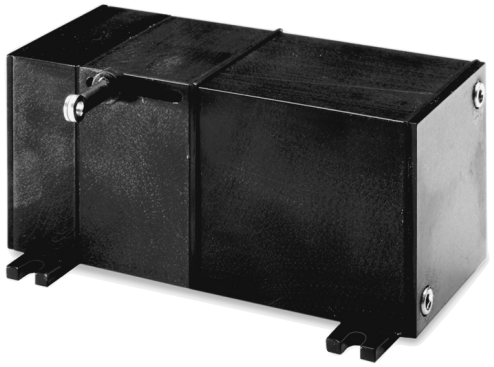
Full Stroke Range Options ..... 0-50 to 0-250 inches
Output Signal Options ..... incremental encoder (quadrature)
Accuracy ..... *see ordering information*
Repeatability ..... *see ordering information*
Resolution ..... 10 to 250 pulses per inch
Measuring Cable Options ..... stainless steel or thermoplastic
Enclosure Material ..... hard anodized aluminum
Sensor ..... optical encoder
Maximum Measuring Cable Velocity ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight ..... 5 lbs. max.

ELECTRICAL

Input Voltage ..... *see ordering information*
Input Current ..... *see ordering information*

ENVIRONMENTAL

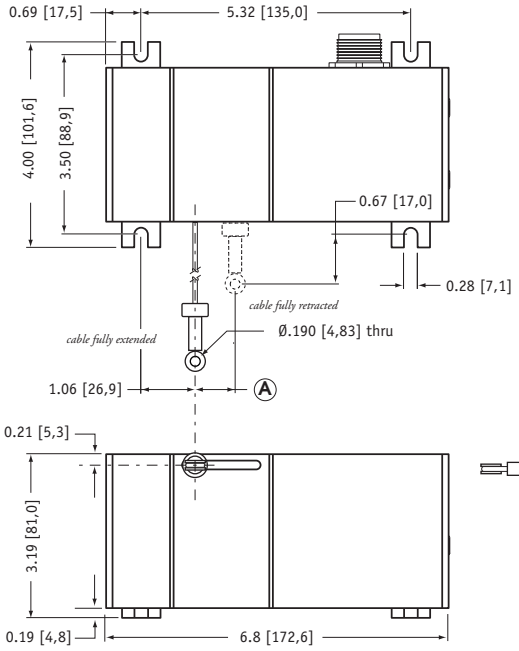
Enclosure ..... NEMA 4/6, IP 65/67
Operating Temperature ..... 0º to 160ºF (-17º to 71ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum



The PT5E encoder-based cable-extension transducer offers a unique thermoplastic cable that has virtually an infinite fatigue life. This cable, known as V62, has properties that are superior for high cycle and rugged applications.

Like Celesco's other transducers, the PT5E installs in minutes, functions properly without perfectly parallel alignment, and fits easily into small areas. The PT5E offers additional installation flexibility since its cable exit can be rotated relative to the mounting surface, providing four different cable exit orientations.

Outline Drawing

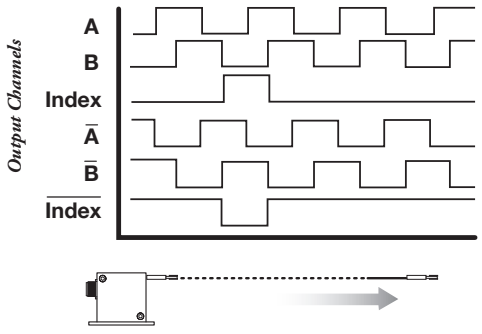


"A" Dimension

stroke range	measuring cable S47 • V62	measuring cable N34
10	0.08 [2,0]	0.05 [1,2]
15	0.12 [3,0]	0.07 [1,8]
20	0.16 [3,9]	0.09 [2,4]
30	0.23 [5,9]	0.14 [3,5]
40	0.31 [7,9]	0.19 [4,7]
50	0.39 [9,9]	0.23 [5,9]
60	0.47 [11,8]	0.28 [7,0]
80	0.62 [15,8]	0.37 [9,4]
100	0.78 [19,7]	0.46 [11,7]
125	0.97 [24,7]	0.58 [14,7]
150	1.16 [29,6]	0.69 [17,6]
200	n/a	0.92 [23,5]
250	n/a	1.16 [29,3]

ALL DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 inches [0,8 mm]
unless otherwise noted

Output Signal



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Ordering Information:

Model Number:

PT5E - ____ Ⓡ - ___ Ⓐ - ___ Ⓑ - ___ Ⓒ - ___ Ⓓ - ___ Ⓔ
order code:

Sample Model Number:

PT5E - 100 - N34 - FR - 100 - AB-TTL - M

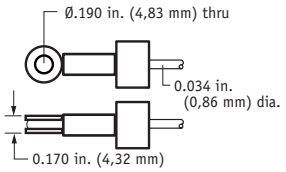
Ⓡ	range:	100 inches
Ⓐ	measuring cable:	.034 nylon-coated stainless
Ⓑ	cable exit:	front
Ⓒ	resolution:	100±2 pulses per inch
Ⓓ	output signal:	TTL/CMOS compatible driver
Ⓔ	electrical connection:	6-pin plastic connector

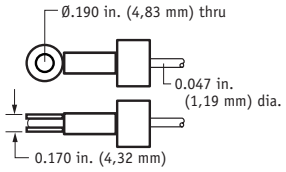
Full Stroke Range:

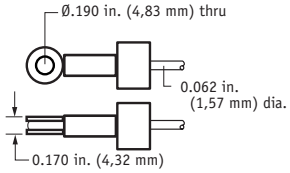
Ⓡ *order code:*	50	100	150	200	250	1250	2500	3750	5000	6250
full stroke range, min:	50 in.	100 in.	150 in.	200 in.	250 in.	1250 mm	2500 mm	3750 mm	5000 mm	6250 mm
⚠ accuracy (± % of f.s.):	.1	.07	.06	.05	.04	.1	.07	.06	.05	.04
repeatability (± % of f.s.):	.02	.01	.01	.01	.01	.02	.01	.01	.01	.01
cable tension (±20%):	41 ounces			21 ounces		11,4 N			5,8 N	
max. cable velocity • acceleration:	300 in./sec • 5 G's			120 in./sec • 2 G's		8 M/sec • 5 G's			3 M/sec • 2 G's	

Measuring Cable:

Ⓐ *order code:*	N34	S47	V62
	.034 nylon-coated stainless steel *available in all ranges*	.047 stainless steel *all ranges up to 150 inches*	.062 thermoplastic *all ranges up to 150 inches*

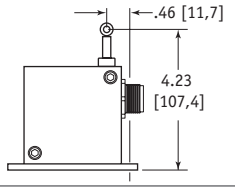


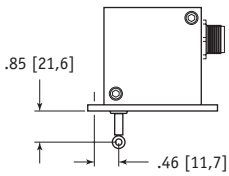


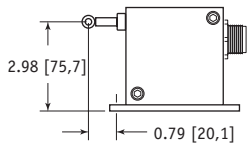


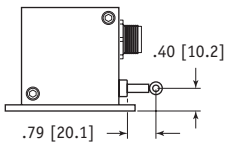
Cable Exit:

Ⓑ *order code:*	UP	DN	FR	BK
	up	down	front	back









inches [mm]

Resolution:

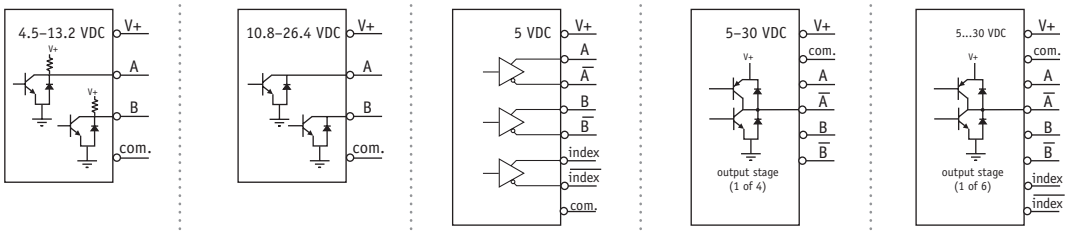
Ⓒ *order code:*	10	100	200	250
resolution for **english** ranges:	10 ±0.2 pulses per inch	100 ±2 pulses per inch	200 ±4 pulses per inch	250 ±5 pulses per inch

Ⓒ *order code:*	.5	5	10	12.5
resolution for **metric** ranges:	0.5 ±0.01 pulses per mm	5 ±0.1 pulses per mm	10 ±0.2 pulses per mm	12.5 ±0.3 pulses per mm

Ordering Information (cont.)

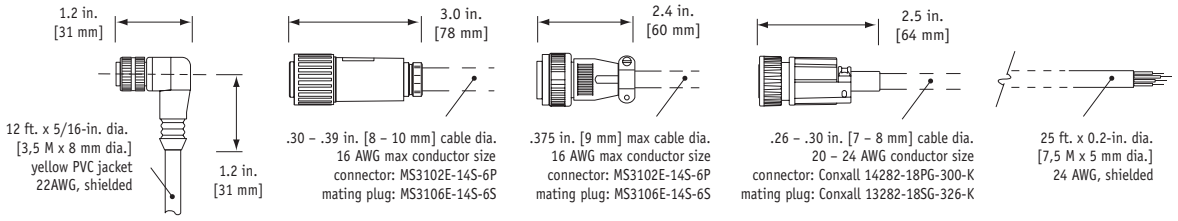
Output Signals:

ⓓ order code:	AB-TTL	AB-OC	ABC-LD	ABC-UD	ABZC-UD
output driver:	TTL/CMOS compatible	open collector	5-volt line driver	universal line driver *(no index)*	universal line driver *(with index)*
input voltage:	4.5...13.2 VDC	10.8...26.4 VDC	5 VDC	5...30 VDC	5...30 VDC
max. source/sink current:	20 mA sink	20 mA sink	20 mA sink	20 mA source/sink	20 mA source/sink
max. input current:	80 mA	80 mA	150 mA	100 mA, no load	100 mA, no load



Electrical Connection:

ⓔ order code:	MC4	M6	M6M	M18	C25
	4-pin micro-connector with 12 ft [3.5 M] cord set	6-pin plastic connector with mating plug	6-pin metal connector with mating plug	18-pin plastic connector with mating plug	25-ft. instrumentation cable 24 AWG, shielded
	IP 67, NEMA 6	**IP 67, NEMA 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**	**IP 67, NEMA 6**



4-pin cordset:

contact view

pin	color code	TTL/CMOS Open Collector
1	RED-BLK TR.	input voltage
2	RED-WHT TR.	channel A
3	RED	channel B
4	GREEN	common

6-pin mating plug:

contact view

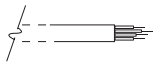
pin	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
A	input voltage	input voltage
B	common	common
C	channel A	channel A
D	channel B	channel B
E	-	channel A'
F	-	channel B'

18-pin mating plug:

contact view

pin	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
1	input voltage	input voltage
2	common	common
3	channel B	channel B
6	channel A	channel A
7	-	index
11	-	channel B'
12	-	channel A'
15	-	index'

25-ft. instrumentation cable:



color	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
red	input voltage	input voltage
black	common	common
green	channel A	channel A
white	channel B	channel B
blue	-	channel A'
brown	-	channel B'
yellow	-	index
orange	-	index'

① *Total accuracy includes uncertainty due to resolution and is calculated:* {± [(%FS)(FS) + length of 1 pulse]}

Example: *Model Number:* PT5E-100-N34-FR100-AB-TTL-M6
Full Stroke: 100 inches
Accuracy: [.07% (100 in.) + 1/100 in.] = ± .08 inches

version: **5.0** last updated: **December 26, 2007**

0/4...20 mA Output
Ranges: 0-10 to 0-250 inches
Industrial Grade

PT5MA

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-10 to 0-250 inches
Output Signal Options ..... 4...20 mA (2-wire) and 0...20 mA (3-wire)
Accuracy ..... ± 0.75% to ±0.18% full stroke *see ordering information*
Repeatability ..... *see ordering information*
Resolution ..... essentially infinite
Measuring Cable Options ..... stainless steel or thermoplastic
Enclosure Material ..... hard anodized aluminum
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Measuring Cable Velocity ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight ..... 5 lbs. max.

ELECTRICAL

Input Voltage ..... *see ordering information*
Input Current ..... 20 mA max.
Maximum Loop Resistance (Load) ..... (loop supply voltage – 8)/0.020
Circuit Protection ..... 38 mA max.
Impedance ..... 100 M ohms @ 100 VDC, min.
Output Signal Adjustment
Zero Adjustment ..... from factory set zero to 50% of full stroke range
Span Adjustment ..... to 50% of factory set span

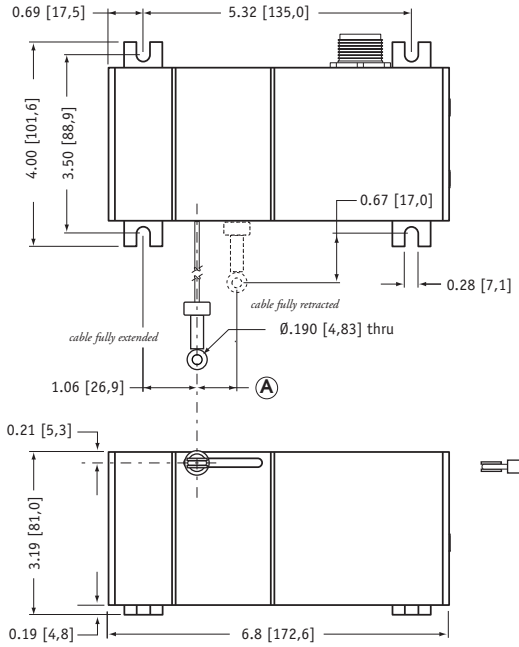
ENVIRONMENTAL

Enclosure ..... NEMA 4/6, IP 65/67
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration ..... up to 10 G's to 2000 Hz maximum

EMC COMPLIANCE PER DIRECTIVE 89/336/EEC

Emission / Immunity ..... EN50081-2 / EN50082-2

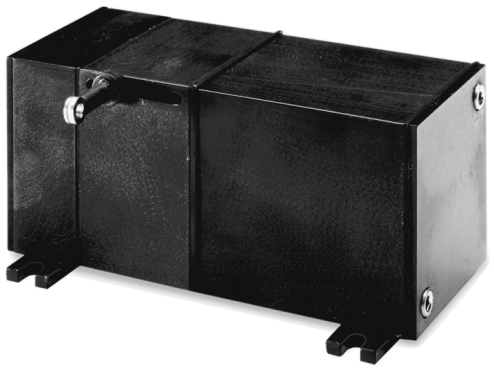
Outline Drawing



"A" Dimension

stroke range	measuring cable S47 • V62	measuring cable N34
10	0.08 [2,0]	0.05 [1,2]
15	0.12 [3,0]	0.07 [1,8]
20	0.16 [3,9]	0.09 [2,4]
30	0.23 [5,9]	0.14 [3,5]
40	0.31 [7,9]	0.19 [4,7]
50	0.39 [9,9]	0.23 [5,9]
60	0.47 [11,8]	0.28 [7,0]
80	0.62 [15,8]	0.37 [9,4]
100	0.78 [19,7]	0.46 [11,7]
125	0.97 [24,7]	0.58 [14,7]
150	1.16 [29,6]	0.69 [17,6]
200	n/a	0.92 [23,5]
250	n/a	1.16 [29,3]

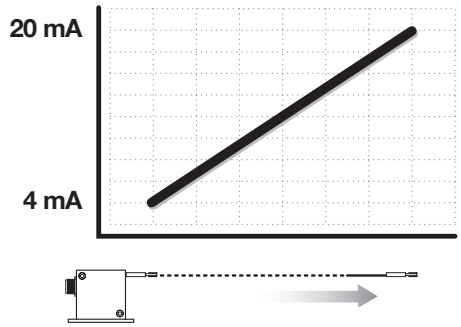
ALL DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 inches [0,8 mm]
unless otherwise noted



The PT5MA potentiometric cable-extension transducer uses a unique thermoplastic cable that has virtually an infinite fatigue life. This cable, known as V62, has properties that are superior for high cycle and rugged applications.

Like Celesco's other transducers, the PT5MA installs in minutes, functions properly without perfectly parallel alignment, and fits easily into small areas. The PT5MA offers additional installation flexibility since its cable exit can be rotated relative to the mounting surface, providing four different cable exit orientations.

Output Signal



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Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

Ordering Information:

Model Number:

PT5MA - _____ Ⓡ - ___ Ⓐ - ___ Ⓑ - ___ Ⓒ - ___ Ⓓ
order code:

Sample Model Number:

PT5MA - 100 - N34 - FR - 420E - M6

Ⓡ	range:	100 inches
Ⓐ	measuring cable:	.034 nylon-coated stainless
Ⓑ	cable exit:	front
Ⓒ	output signal:	4...20 mA
Ⓓ	electrical connection:	6-pin plastic connector

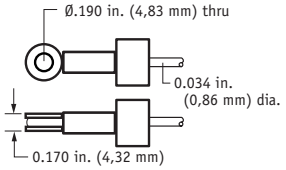
Full Stroke Range:

Ⓡ *order code:*	10	15	20	25	30	40	50	60	80	100	125	150	200	250
full stroke range, min:	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.	80 in.	100 in.	125 in.	150 in.	200 in.	250 in.
accuracy (±% of f.s.):	.75%	.6%	.5%	.5%	.5%	.3%	.3%	.25%	.25%	.25%	.25%	.18%	.18%	.18%
repeatability (±% of f.s.):	.1%	.1%	.05%	.05%	.05%	.05%	.05%	.02%	.02%	.02%	.02%	.02%	.02%	.02%
potentiometer cycle life:	2,500,000 cycles					500,000 cycles						250,000 cycles		
cable tension (20%):	41 ounces												21 ounces	
max. cable velocity/acceleration:	300 in./sec • 5 G's												120 in./sec • 2 G's	

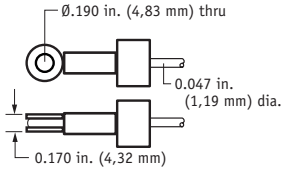
Measuring Cable:

Ⓐ *order code:*

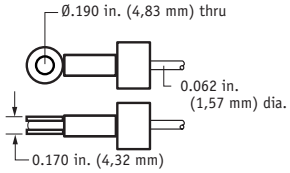
N34 — .034 nylon-coated stainless steel
available in all ranges



S47 — .047 stainless steel
all ranges up to 150 inches



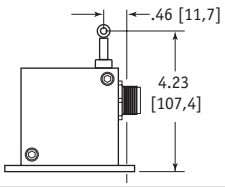
V62 — .062 thermoplastic
all ranges up to 150 inches



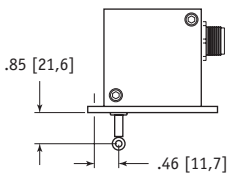
Cable Exit:

Ⓑ *order code:*

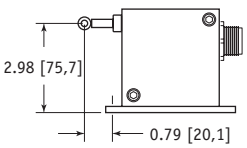
UP — up



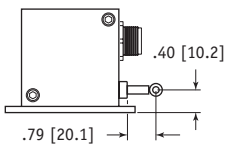
DN — down



FR — front



BK — back



inches [mm]

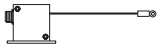
Output Signals:

Ⓒ *order code:*	420E	420R	020E	020R
output signal options:	4...20 mA	20...4 mA	0...20 mA	20...0 mA
sensitivity:	16 mA/full stroke ±0.25%		20 mA/full stroke ±0.25%	
wiring configuration:	2 – wire		3 – wire	
input voltage:	8 – 40 vdc		14 – 29 vdc	

example:

ordercode = **420E** = 4...20 mA

4 mA = 

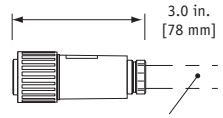
20 mA = 

Ordering Information (cont.)

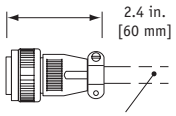
Electrical Connection:

order code:

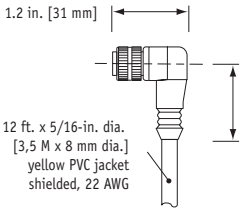
M6	M6M	MC4	C25
6-pin plastic connector with mating plug	6-pin metal connector with mating plug	4-pin micro-connector with 12 ft [3.5 M] cordset	25-ft. instrumentation cable 24 AWG, shielded
IP 67, NEMA 6	**IP 65, NEMA 4**	**IP 67, NEMA 6**	**IP 67, NEMA 6**



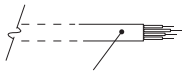
.30 – .39 in. [8 – 10 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S



.375 in. [9 mm] max cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

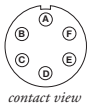


12 ft. x 5/16-in. dia.
[3,5 M x 8 mm dia.]
yellow PVC jacket
shielded, 22 AWG



25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

6-pin mating plug:



contact view

pin	2-wire	3-wire
A	8...40 vdc	14...29 vdc
B	4...20 mA	common
C	-	0...20 mA
D	earth ground	-

4-pin mating plug and cordset:

contact view

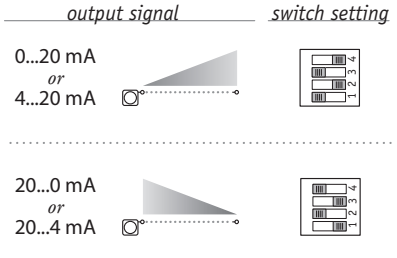
pin	color code	2-wire	3-wire
1	RED-BLK TR.	8...40 vdc	14...29 vdc
2	RED-WHT TR.	4...20 mA	0...20 mA
3	RED	-	common
4	GREEN	earth ground	-

25-ft. cable:

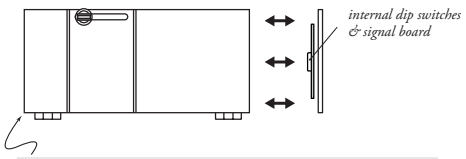
color code	2-wire	3-wire
RED	8...40 vdc	14...29 vdc
BLACK	4...20 mA	common
WHITE	-	-
GREEN	earth ground	0...20 mA

Output Signal Selection:

The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.



To gain access to the signal board, remove four Allen-Head Screws and remove end cover bracket.

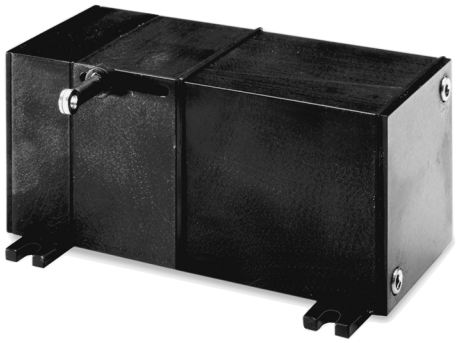


Caution! Do Not Remove Spring-Side End Cover
Removing spring-side end cover could cause spring to become unseated and permanently damaged.

version: **6.0** last updated: **May 12, 2010**

RS232 Data Communication
Ranges: 0-10 to 0-250 inches
Industrial Grade

PT5232



Specification Summary:

GENERAL

Full Stroke Ranges . . . . . 0-2 to 0-50 inches
Electrical Interface RS232
Format . . . . . Hex
Accuracy . . . . . ± 0.75 to 0.18% full stroke
Repeatability . . . . . *see ordering information*
Resolution . . . . . ± 0.003% full stroke
Measuring Cable . . . . . thermoplastic or stainless steel
Enclosure Material . . . . . hard-anodized aluminum
Sensor . . . . . plastic-hybrid precision potentiometer
Potentiometer Cycle Life . . . . . *see ordering information*
Maximum Cable Velocity • Acceleration . . . . . *see ordering information*
Weight . . . . . 5 lbs., max.

ELECTRICAL

Input Voltage . . . . . 9...22 VDC
Input Current . . . . . 40 mA
Baud Rate . . . . . 9600 (selectable to 38.4K)
Update Rate 32msec

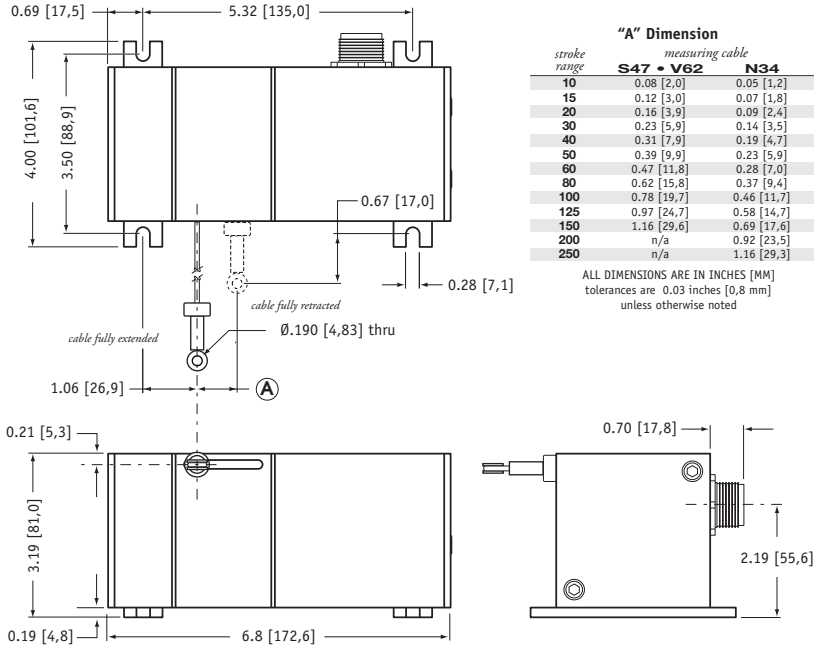
ENVIRONMENTAL

Environmental Suitability . . . . . NEMA 6, IP 67
Operating Temperature . . . . . -40º to 200ºF (-40º to 90ºC)
Vibration . . . . . up to 10 G's to 2000 Hz maximum

The PT5232, delivers position feedback via RS232 serial communication to your data acquisition or controller system. The PT5232 sends a raw 16-bit position count from 0000 to FFFF (hex). Additionally this device can be set to continuously send data or send data only when polled.

As the internal position sensing element is a precision potentiometer, this transducer maintains current accurate position even during power loss and does not need to be reset to a "home" position.

Outline Drawing

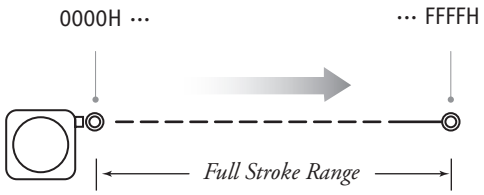


"A" Dimension

stroke range	*measuring cable* S47 • V62	N34
10	0.08 [2,0]	0.05 [1,2]
15	0.12 [3,0]	0.07 [1,8]
20	0.16 [3,9]	0.09 [2,4]
30	0.23 [5,9]	0.14 [3,5]
40	0.31 [7,9]	0.19 [4,7]
50	0.39 [9,9]	0.23 [5,9]
60	0.47 [11,8]	0.28 [7,0]
80	0.62 [15,8]	0.37 [9,4]
100	0.78 [19,7]	0.46 [11,7]
125	0.97 [24,7]	0.58 [14,7]
150	1.16 [29,6]	0.69 [17,6]
200	n/a	0.92 [23,5]
250	n/a	1.16 [29,3]

ALL DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 inches [0,8 mm]
unless otherwise noted

Output Signal



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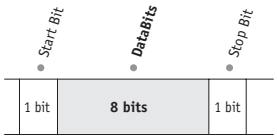
I/O Format:

Data Format



no parity bit

Data Frame

6 byte Hex string:

STX	CMD	B_0	B_1	B_2	ETX

STX = 0x02 **CMD** = Command Code* B_0 - B_2 = Data Field* **ETX** = 0x03

** –see below*

Important! All communications to/from the transducer are in **HEX**!

User Commands:

	User Command				Sensor Response			
Description	**<CMD>**	**<B_0>**	**<B_1>**	**<B_2>**	**<CMD>**	**<B_0>**	**<B_1>**	**<B_2>**
Get Sensor Info	0x05	0x00	0x00	0x00	0x05	version(4)	date(5)	date(5)
Get Serial Number	0x15	0x00	0x00	0x00	0x15	serial number(3)		
Start Continuous Data	0x25	0x00	0x00	0x00	0x25	0x00	0x00	0x00
Stop Continuous Data	0x35	0x00	0x00	0x00	0x35	0x00	0x00	0x00
Get Position Data	0x45	0x00	0x00	0x00	0x45	CMC(1)	CMC(1)	status(2)

(1)CMC - Current Measurement Count (Position)

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 16-bit value that occupies the first two bytes (B_0 and B_1) of the data field. B_0 is the MSB (most significant byte) and B_1 is the LSB (least significant byte).

The CMC starts at 0000H with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at FFFFH. This holds true for all ranges.

(2)Status

The status byte is used as a flag to indicate the validity of the position signal that the internal electronics receives from the potentiometer.

Flags are as follows:
0x00 = GREEN, 0x55 = YELLOW, 0xAA = RED

A "green" flag shows everything OK. A "yellow" or "red" flag indicates that the sensor has either been extended beyond its range or that there is a problem with the potentiometer.

(3)Serial Number

Each sensor has it's own unique serial number. This information can be retrieved by sending the sensor the "Get Serial Number" command.

The serial number is a 3 byte value from which ranges from 0 to 9999999 (decimal).

(4)Version

This is a single byte value (0-255 decimal) which indicates the currently installed firmware version of the sensor.

(5)Date

This is a 2 byte value showing the date of currently installed firmware. This value ranges from 01011 - 12319 (decimal). Format is MMDDY. While the month and day are expressed as two digit numbers the year is expressed in a single digit only.

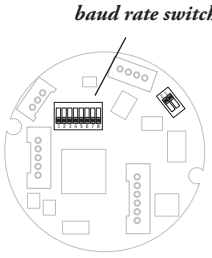
Example: 08054 = August 5, 2004

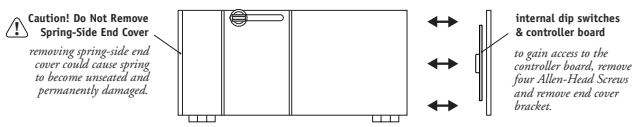
Baud Rate

The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the rs232 controller board located inside the transducer.

DIP-7	DIP-8	baud rate
0	0	9600
1	0	19200
0	1	38400
1	1	9600

RS232 Controller Board and DIP Switch Location





Ordering Information:

Model Number:

PT5232 - ____ - ____ - ____ - ____
order code: Ⓡ Ⓐ Ⓑ Ⓒ

Sample Model Number:

PT5232 - 50 - N34 - UP - M6

Ⓡ	range:	50 inches
Ⓐ	measuring cable:	.034 nylon-coated stainless
Ⓑ	measuring cable exit:	up (top exit)
Ⓒ	electrical connection:	6-pin plastic connector

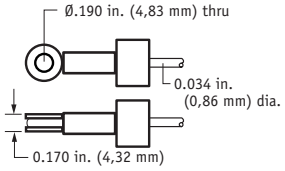
Full Stroke Range:

Ⓡ order code:	10	15	20	25	30	40	50	60	80	100	125	150	200	250
full stroke range, min:	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.	80 in.	100 in.	125 in.	150 in.	200 in.	250 in.
accuracy (±% of f.s.):	.75%	.6%	.5%	.5%	.5%	.3%	.3%	.25%	.25%	.25%	.25%	.18%	.18%	.18%
repeatability (±% of f.s.):	.1%	.1%	.05%	.05%	.05%	.05%	.05%	.02%	.02%	.02%	.02%	.02%	.02%	.02%
potentiometer cycle life:	2,500,000 cycles					500,000 cycles						250,000 cycles		
cable tension (20%):	41 ounces												21 ounces	
max. cable velocity/acceleration:	300 in./sec • 5 G's												120 in./sec • 2 G's	

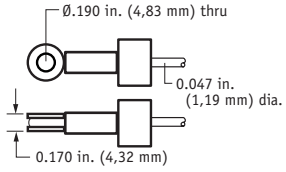
Measuring Cable:

Ⓐ order code:

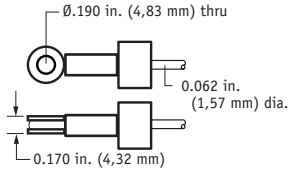
N34 — .034 nylon-coated stainless steel
available in all ranges



S47 — .047 stainless steel
all ranges up to 150 inches



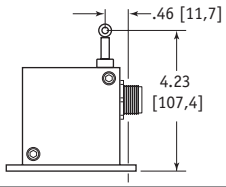
V62 — .062 thermoplastic
all ranges up to 150 inches



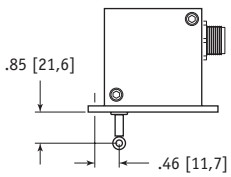
Cable Exit:

Ⓑ order code:

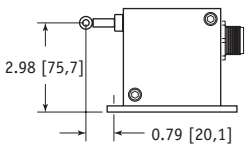
UP — up



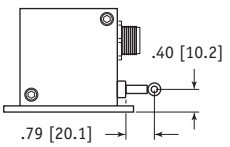
DN — down



FR — front



BK — back

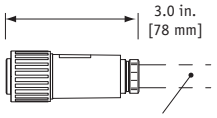


inches [mm]

Electrical Connection:

Ⓒ order code:

M6 — 6-pin plastic connector with mating plug
IP 67, NEMA 6

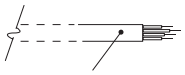


.30 – .39 in. [8 – 10 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

contact view

pin	signal
A	9...22 VDC
B	common
C	–
D	Transmitted Data
E	Received Data
F	common

C25 — 25-ft. instrumentation cable 24 AWG, shielded
IP 67, NEMA 6



25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

color code	signal
Red	9...22 VDC
Black	common
White	–
Green	Transmitted Data
Blue	Received Data
Brown	common

version: **3.0** last updated: **July 10, 2008**

Mates To Virtually Any Encoder
Ranges: 0-50 to 0-250 inches
Available With or Without Encoder

PT5600

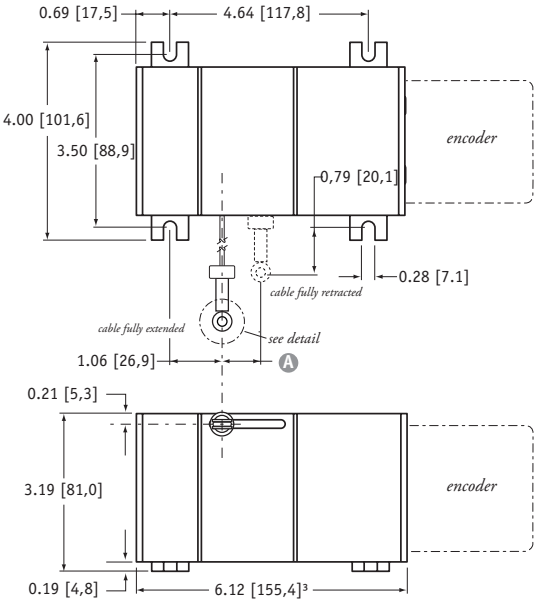
Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-50 to 0-250 inches
Motion Conversion Ratio ..... 8 inches per turn, *see ordering information*
Accuracy ..... the lesser of 0.02% full stroke or 0.04% of measurement range
Measuring Cable Options ..... stainless steel or thermoplastic
Module Material ..... hard anodized aluminum
Maximum Allowable Rotational Sensor Torque ..... 1.0 in-lbs.
Weight ..... 5 lbs. max.

ENVIRONMENTAL

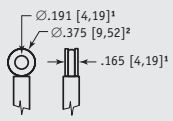
Operating Temperature ..... -40° to 200°F (-40° to 90°C)

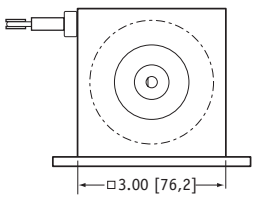


Ⓐ DIMENSION - INCHES [MM]

stroke range	measuring cable S47 • V62	N34
50	0.39 [9,9]	0.23 [5,9]
100	0.78 [19,7]	0.46 [11,7]
150	1.16 [29,6]	0.69 [17,6]
200	n/a	0.92 [23,5]
250	n/a	1.16 [29,3]

eyelet detail





DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM]
unless otherwise noted.

¹ tolerance = +.005 −.001 [+.13 −.03]
² tolerance = +.005 −.005 [+.13 −.13]
³Overall dimension may vary depending on encoder configuration.

Our unique linear-to-rotational, industrial-grade string encoder module mates to virtually any encoder, giving you a cost-effective linear position measurement solution that precisely fits your requirements. The PT5600 takes just minutes to install, fits easily into tight areas, does not require perfectly parallel alignment, and provides reliable and precise position measurements without needing periodic adjustments.

For any high resolution or absolute encoder requirement, the PT5600 delivers the ultimate in flexibility. To order, simply select the measurement range and encoder mounting style—it's that easy! We even supply all the necessary encoder mounting tools and attaching hardware. If you can't find your encoder mounting style or you want us to provide the encoder, please give us a call.

Ordering Information:

Model Number:

PT5600 - _____ - ___ - ___ - ___
order code: Ⓡ Ⓐ Ⓑ Ⓒ

Sample Model Number:

PT5600 - 100 - N34 - FR - F01

Ⓡ	range:	100 inches
Ⓐ	measuring cable:	.034 nylon-coated stainless
Ⓑ	cable exit:	front
Ⓒ	rotational sensor mounting style:	F01 (2.5-in. sq. flange)

» Trying to reorder but can't find your existing model number? Please contact factory for help.

Full Stroke Range:

Ⓡ *order code:*	50	100	150	200	250
full stroke range, min:	50 in.	100 in.	150 in.	200 in.	250 in.
cable tension (±20%):	41 ounces	41 ounces	41 ounces	21 ounces	21 ounces

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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

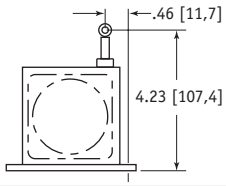
Measuring Cable:

Ⓐ order code:	N34	S47	V62
measuring cable:	.034 nylon-coated stainless steel	.047 stainless steel	.062 thermoplastic
available stroke ranges:	*all ranges*	*all ranges up to 150 inches*	*all ranges up to 150 inches*
conversion ratio:	1 turn = 8.002 ± 0.022 inches	1 turn = 8.042 ± 0.022 inches	1 turn = 8.077 ± 0.022 inches

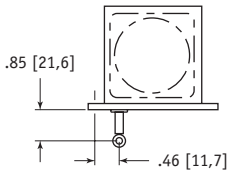
Cable Exit:

Ⓑ order code:

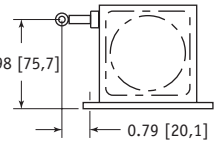
UP — up



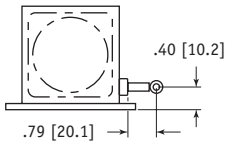
DN — down



FR — front



BK — back



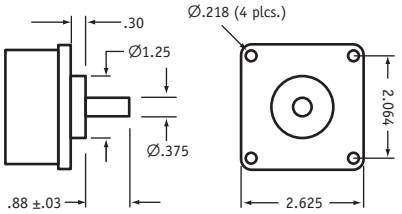
inches [mm]

Rotational Sensor Mounting Style:

Ⓒ order code:	F01	F02	S01	S02	S04
	2.5-in. Flange Mount 3/8-inch shaft	2-in. Flange Mount 3/8-inch shaft	Face-Mount 6 mm shaft M4 mounting screws	Face-Mount 10 mm shaft M4 mounting screws	Face-Mount 10 mm shaft M3 mounting screws

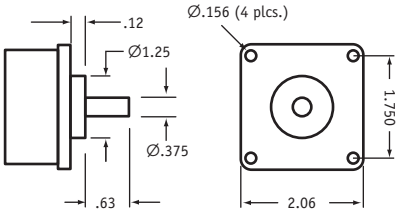
Note: If you don't see your encoder style, please contact factory. All encoder types supported.

F01 - 2½-inch Sq. Flange Mount (3/8-inch shaft)



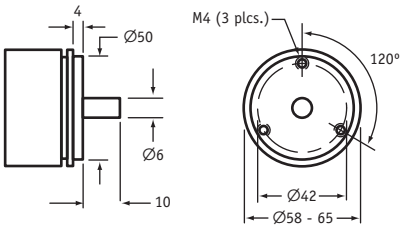
all dimensions are in ***inches***

F02 - 2-inch Sq. Flange Mount (3/8-inch shaft)



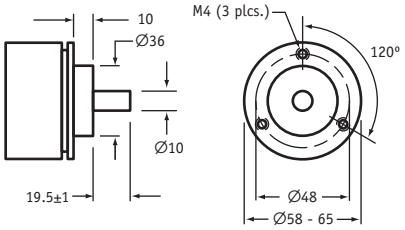
all dimensions are in ***inches***

S01 - Face-Mount (6mm shaft/M4 screws)



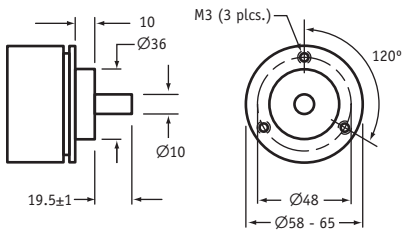
all dimensions are in ***mm***

S02 - Face-Mount (10mm shaft/M4 screws)



all dimensions are in ***mm***

S04 - Face-Mount (10mm shaft/M3 screws)

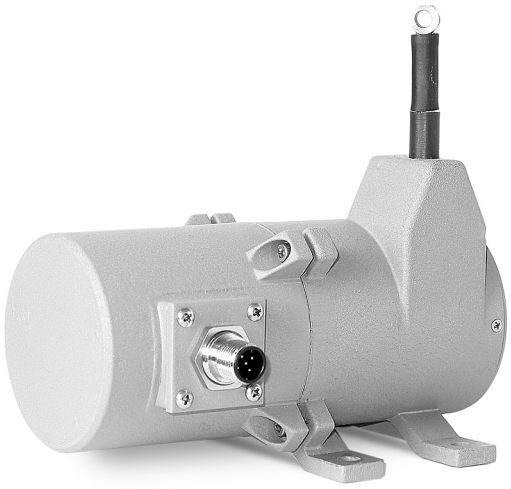


all dimensions are in ***mm***

version: **4.2** last updated: **September 16, 2008**

CANbus • SAE J1939
Ranges: 0-2 to 0-60 inches
Industrial Grade

PT8CN



The PT8CN, using a high cycle plastic-hybrid potentiometer, communicates to your PLC via the CANbus SAE J1939 interface. Suitable for factory and harsh environment applications requiring linear position feedback in ranges up to 60".

As a member of Celesco's innovative family of NEMA 4 rated cable-extension transducers, the PT8CN installs in minutes by simply mounting it's body to a fixed surface and attaching it's cable to the movable object. Perfect parallel alignment not required.

Specification Summary:

GENERAL

Full Stroke Ranges ..... 0-2 to 0-60 inches
Electrical Interface ..... CANbus SAE J1939
Protocol ..... Proprietary B
Accuracy ..... ± 0.25% to ± 0.10% full stroke
Repeatability ..... ± 0.02% full stroke
Resolution ..... ± 0.003% full stroke
Measuring Cable ..... stainless steel, nylon-coated or thermoplastic
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 3 lbs. (6 lbs.), max.

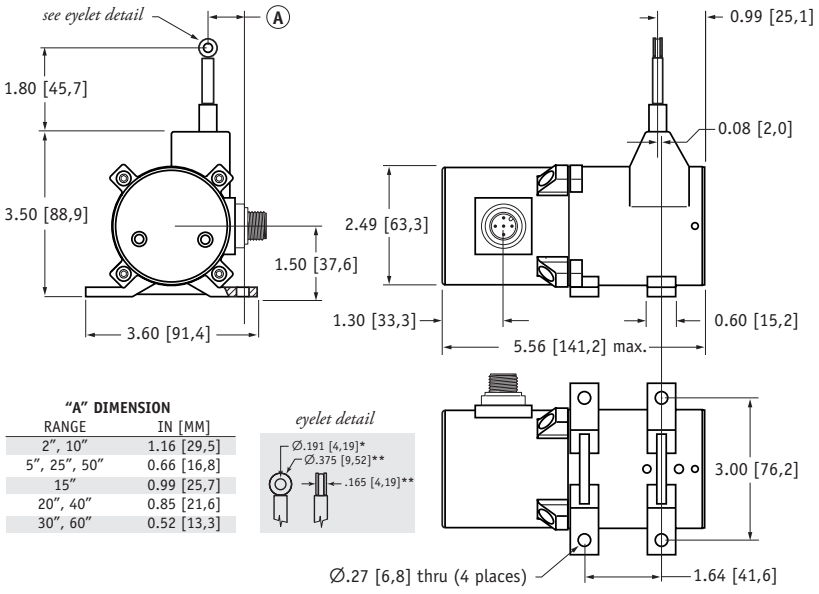
ELECTRICAL

Input Voltage ..... 7 - 18 VDC
Input Current ..... 60 mA max.
Baud Rate ..... 125K, 250K, or 500K via DIP switches
Update Rate ..... 10 ms. (20 ms. available–*contact factory*)

ENVIRONMENTAL

Environmental Suitability ..... NEMA 4X/6, IP 67
Operating Temperature ..... -40° to 185°F (-40° to 85°C)
Vibration ..... up to 10 G's to 2000 Hz maximum

Outline Drawing



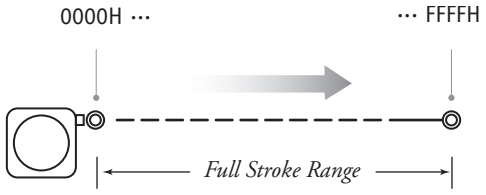
"A" DIMENSION

RANGE	IN [MM]
2", 10"	1.16 [29,5]
5", 25", 50"	0.66 [16,8]
15"	0.99 [25,7]
20", 40"	0.85 [21,6]
30", 60"	0.52 [13,3]

DIMENSIONS ARE IN INCHES [MM]
tolerances are ±0.02 in. [±0,5 mm] unless otherwise noted

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

Output Signal



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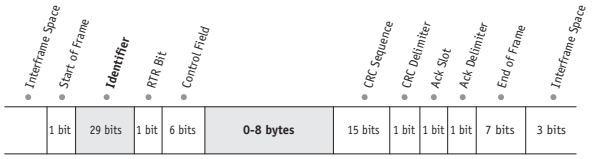
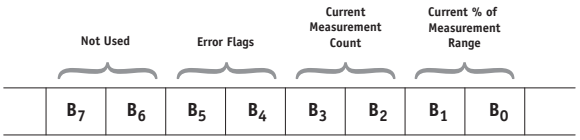
I/O Format

Data Frame



repetition = 8 msec.

Data Field



B_0 = LSB current % of measurement range byte
B_1 = MSB current % of measurement range byte
B_4 - B_5 = error flags
B_2 = LSB current measurement count byte
B_3 = MSB current measurement count byte
B_6 - B_7 = not used

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.

Setting the Address (Node ID) and Baud Rate

Address Setting (Node ID)

The Address Setting (Node ID) is set via 6 switches located on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

Baud Rate

The transmission baud rate may be either factory preset at the time of order or set manually at the time of installation.

The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

address setting:

DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
...	...	...	...	...	...	...
1	1	1	1	1	1	63

baud rate setting:

DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

Current % of Measurement Range

The Current % of Measurement Range is a 2-byte value that expresses the current linear position as a percentage of the entire full stroke range. Resolution is **.1 %** of the full stroke measurement range.

This value starts at **0x0000** at the beginning of the stroke and ends at **0x03E8**.

Example:

Hex	Decimal	Percent
0000	0000	0.0%
0001	0001	0.1%
0002	0002	0.2%
...	...	...
03E8	1000	100.0%

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 16-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 **0x0000** with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at **0xFFFF**. This holds true for all ranges.

Error Flags

0x55 (yellow LED on controller board) indicates that the sensor has begun to travel beyond the calibrated range of the internal position potentiometer.

0xAA (red LED on controller board) indicates that the sensor has moved well beyond the calibrated range of the internal position potentiometer.

If either error flag occurs within the full stroke range of the sensor, the unit should be returned to the factory for repair and recalibration.

Converting CMC to Inches

If required, the CMC can easily be converted a linear measurement expressed in inches instead of just counts.

This is accomplished by first dividing the CMC by 65,535 (total counts over the range) and then multiplying that value by the FSR:

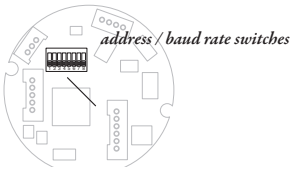
$$\left(\frac{\text{CMC}}{65{,}535}\right) \text{X FSR}$$

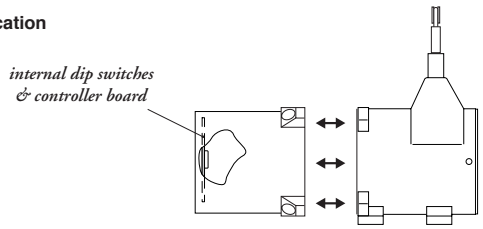
Example:

If the full stroke range is **30 inches** and the current position is **0x0FF2** (4082 Decimal) then,

$$\left(\frac{4082}{65{,}535}\right) \text{X } 30.00 \text{ inches} = 1.87 \text{ inches}$$

CANBus Controller Board and DIP Switch Location





to gain access to the controller board, remove four Allen-Head Screws and remove rear cover.

Ordering Information:

Model Number:

PT8CN - _____ - ___ - ___ - ___ - ___ - ___ - J - ___ - ___ - ___ - ___
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ Ⓗ

Sample Model Number:

PT8CN - 50 - AL - N34 - T1 - CG - J - 500 - 32 - SC

Ⓡ	range:	50 inches
Ⓐ	enclosure	aluminum
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	measuring cable tension:	standard
Ⓓ	cable guide:	standard
Ⓔ	interface:	CANbus SAE J1939
Ⓕ	baud rate:	500 k bits/sec.
Ⓖ	node ID:	32 decimal
Ⓗ	electrical connection:	5-meter cordset with straight plug

Full Stroke Range:

Ⓡ order code:	2	5	10	15	20	25	30	40	50	60
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50	60
accuracy (% of f.s.):	0.25%	0.25%	0.15%	0.15%	0.15%	0.15%	0.15%	0.10%	0.10%	0.10%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	5×10^5	5×10^5	5×10^5	5×10^5	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

**–1 cycle is defined as the travel of the measuring cable from full retraction to full extension and back to full retraction*

Enclosure Material:

Ⓐ order code:	AL	SS	316
	powder-painted aluminum	303 stainless steel	316 stainless steel

Measuring Cable:

Ⓑ order code:	N34	S47	V62
	Ø.034-inch nylon-coated stainless steel *available in all ranges*	Ø.047-inch stainless steel *5, 15, 20, 25, 30-inch ranges only*	Ø.062-inch thermoplastic *all ranges up to 30 inches only*

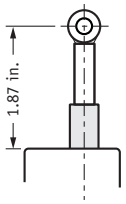
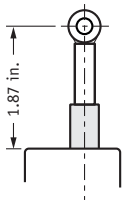
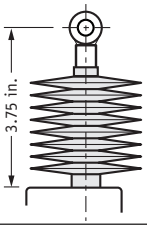
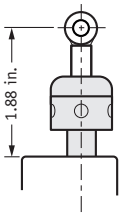
Measuring Cable Tension:

Ⓒ order code:	T1	T2	T3
	standard tension	medium tension	high tension
full stroke range cable tension specifications — 2, 10-inch:	39 oz.	65 oz.	116 oz.
15-inch:	26 oz.	43 oz.	77 oz.
20, 40-inch:	20 oz.	33 oz.	60 oz.
5, 25, 50-inch:	16 oz.	26 oz.	47 oz.
30, 60-inch:	13 oz.	22 oz.	40 oz.

tension tolerance: ± 30%

	maximum acceleration	*maximum acceleration*	*maximum acceleration*
aluminum enclosure:	15 G	25 G	40 G
stainless steel enclosure:	6 G	12 G	18 G

Cable Guide:

Ⓓ order code:	CG	SS	CB*	BR
	standard cable guide	stainless steel cable guide	polyurethane cable guide	integral cable brush
				

**note: all ranges up to 25 inches only*

Ordering Information (cont.)

Baud Rate:

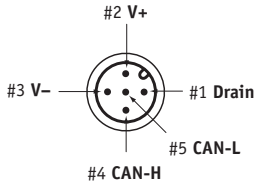
order code:	125	250	500
	125 kbaud	250 kbaud	500 kbaud

Node ID:

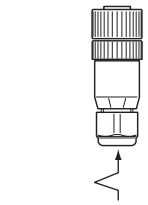
order code:	0	1	2	...	62	63
	select address (0 - 63 Decimal)					

Electrical Connection:

order code:	blank	MC5	SC5	NC5
	5-pin micro-connector *(no mating plug supplied)*	5-pin micro-connector w/ mating plug	5-pin micro-connector and 5 meter length cordset w/straight mating plug	5-pin micro-connector and 5 meter length cordset w/90° mating plug

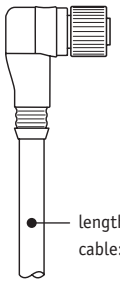


connector
(contact view)



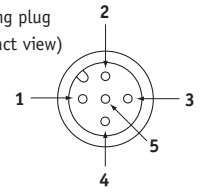
0.16" - 0.32" OD Cable (THIN)

length: 16ft [5M]
cable: Thin



length: 16ft [5M]
cable: Thin

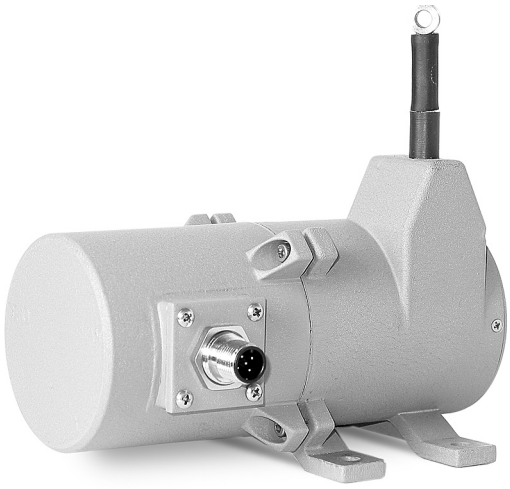
mating plug
(contact view)



pin	signal	wire color
1	drain	brown
2	V+	white
3	V-	blue
4	Can-H	black
5	Can-L	grey

DeviceNET®
Ranges: 0-2 to 0-60 inches
Industrial Grade

PT8DN



Specification Summary:

GENERAL

Full Stroke Ranges ..... 0-2 to 0-60 inches
Electrical Interface ..... CANbus ISO 11898
Protocol ..... DeviceNET version 2.0
Accuracy ..... ± 0.25% to ± 0.10% full stroke
Repeatability ..... ± 0.02% full stroke
Resolution ..... ± 0.003% full stroke
Measuring Cable ..... stainless steel, nylon-coated or thermoplastic
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 3 lbs. (6 lbs.), max.

ELECTRICAL

Input Voltage ..... bus powered
Input Current ..... 40 mA
Address Setting/Node ID ..... 0...63 set via DIP switches –*default setting: 63*
Baud Rate ..... 125K, 250K or 500K set via DIP switches
EDS File ..... available @ http://www.celesco.com/download

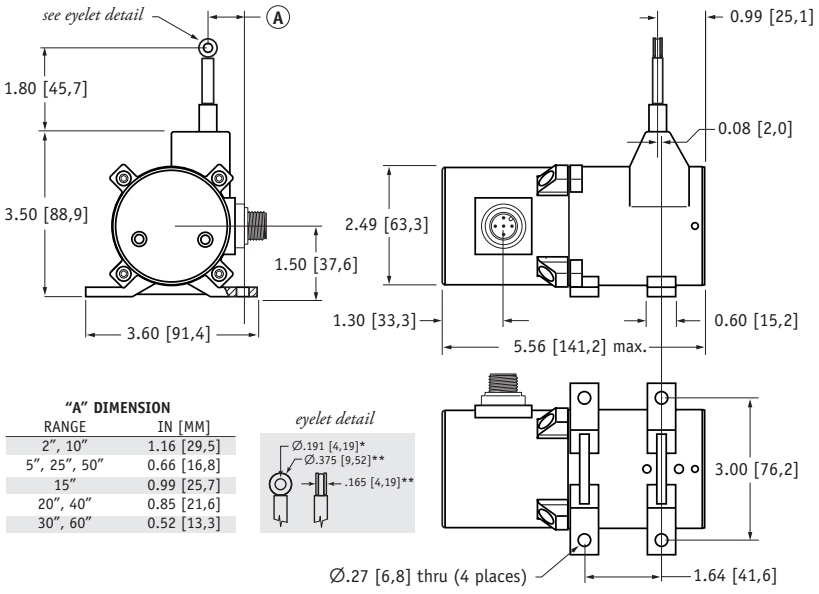
ENVIRONMENTAL

Environmental Suitability ..... NEMA 4X/6, IP 67
Operating Temperature ..... -40º to 185ºF (-40º to 85ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum

The PT8DN, using a high cycle plastic-hybrid potentiometer, communicates via DeviceNET protocol with programmable controllers in factories and harsh environments requiring linear position measurements in ranges up to 60".

As a member of Celesco's innovative family of NEMA 4 rated cable-extension transducers, the PT8DN installs in minutes by simply mounting it's body to a fixed surface and attaching it's cable to the movable object. Perfect parallel alignment not required.

Outline Drawing



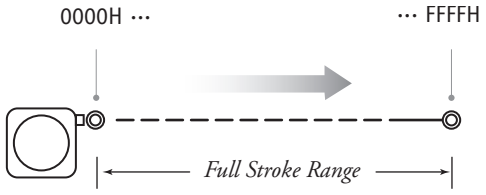
"A" DIMENSION

RANGE	IN [MM]
2", 10"	1.16 [29,5]
5", 25", 50"	0.66 [16,8]
15"	0.99 [25,7]
20", 40"	0.85 [21,6]
30", 60"	0.52 [13,3]

DIMENSIONS ARE IN INCHES [MM]
tolerances are ±0.02 in. [±0,5 mm] unless otherwise noted

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

Output Signal



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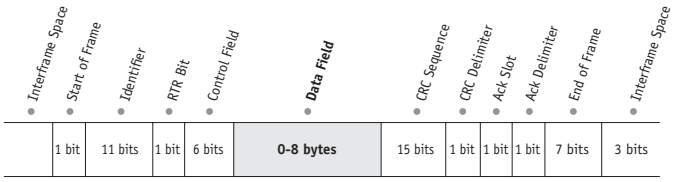
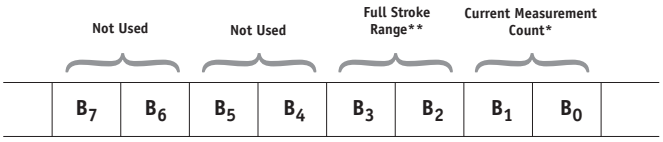
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

I/O Format

Data Frame



Data Field



B_0 = LSB current measurement byte
B_1 = MSB current measurement byte
B_2 = LSB full stroke range byte
B_3 = MSB full stroke range byte
B_4 - B_7 = not used

***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 16-bit value that occupies the first two 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 0000H with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at FFFFH. This holds true for all ranges.

****Full Stroke Range**

The **F**ull **S**troke **R**ange **(FSR)** is a 16-bit value in the data field that expresses the full range of the sensor in inches. This value can be used to convert the actual count to units of measurement should the application require it.

The full stroke measurement range occupies the second two bytes (B_2 and B_3) of the data field.

B_2 is the LSB (least significant byte) and B_3 is the MSB (most significant byte).

This value is expressed in inches.

Example:

Hex Value	*Decimal Equivalent*	*Full Stroke Range*
001E	30	30 inches

Converting CMC to Inches

If required, the CMC can easily be converted to a linear measurement expressed in inches instead of just counts.

This is accomplished by first dividing the CMC by 65,535 (total counts over the range) and then multiplying that value by the FSR:

$$\left(\frac{\text{CMC}}{65{,}535}\right) \text{X FSR}$$

Example:

If the full stroke range is **30 inches** and the current position is **OFF2 Hex** (4082 Decimal) then,

$$\left(\frac{4082}{65{,}535}\right) \text{X } 30.00 \text{ inches} = 1.87 \text{ inches}$$

Address Setting (Node ID), Baud Rate and Bus Termination Settings

Address Setting (Node ID)

The Address Setting (Node ID) is set via 6 switches located on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
…	…	…	…	…	…	…
1	1	1	1	1	1	63

Baud Rate

The transmission baud rate may be either factory preset at the time of order or set manually at the time of installation.

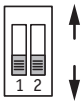
The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

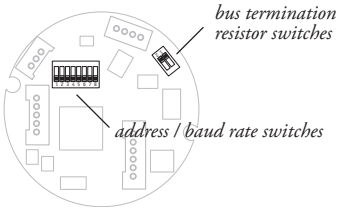
Bus Termination

The setting of the internal bus termination resistor may be specified upon order or manually changed by the end user at the time of installation.

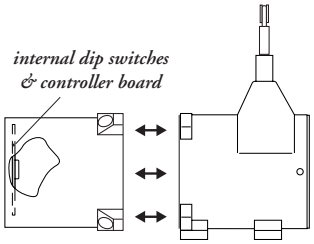
The bus termination resistor is activated setting switches **1** & **2** on the 2-pole DIP switch (located on the internal DeviceNET controller board) to the "ON" position.



DeviceNET Controller Board and DIP Switch Location



to gain access to the controller board, remove four Allen-Head Screws and remove rear cover



Ordering Information:

Model Number:

PT8DN - ____ - ____ - ____ - ____ - ____ - ____ - ____ - ____ - ____
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:

PT8DN - 50 - AL - N34 - T1 - CG - 500 - TR - SC

Ⓡ	range:	50 inches
Ⓐ	enclosure	aluminum
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	measuring cable tension:	standard
Ⓓ	cable guide:	standard
Ⓔ	baud rate:	500 k bits/sec.
Ⓕ	terminating resistor:	yes
Ⓖ	electrical connection:	5-meter cordset with straight plug

Full Stroke Range:

Ⓡ order code:	2	5	10	15	20	25	30	40	50	60
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50	60
accuracy (% of f.s.):	0.25%	0.25%	0.15%	0.15%	0.15%	0.15%	0.15%	0.10%	0.10%	0.10%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	5×10^5	5×10^5	5×10^5	5×10^5	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

**–1 cycle is defined as the travel of the measuring cable from full retraction to full extension and back to full retraction*

Enclosure Material:

Ⓐ order code:	AL	SS	316
	powder-painted aluminum	303 stainless steel	316 stainless steel

Measuring Cable:

Ⓑ order code:	N34	S47	V62
	Ø.034-inch nylon-coated stainless steel *available in all ranges*	Ø.047-inch stainless steel *5, 15, 20, 25, 30-inch ranges only*	Ø.062-inch thermoplastic *all ranges up to 30 inches only*

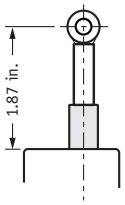
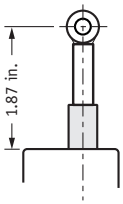
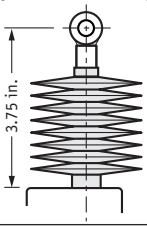
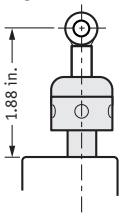
Measuring Cable Tension:

Ⓒ order code:	T1	T2	T3
	standard tension	medium tension	high tension
full stroke range cable tension specifications 2, 10-inch:	39 oz.	65 oz.	116 oz.
15-inch:	26 oz.	43 oz.	77 oz.
20, 40-inch:	20 oz.	33 oz.	60 oz.
5, 25, 50-inch:	16 oz.	26 oz.	47 oz.
30, 60-inch:	13 oz.	22 oz.	40 oz.

tension tolerance: ± 30%

	maximum acceleration	*maximum acceleration*	*maximum acceleration*
aluminum enclosure:	15 G	25 G	40 G
stainless steel enclosure:	6 G	12 G	18 G

Cable Guide:

Ⓓ order code:	CG	SS	CB*	BR
	standard cable guide	stainless steel cable guide	polyurethane cable guide	integral cable brush
				

**note: all ranges up to 25 inches only*

Ordering Information (cont.)

Baud Rate:

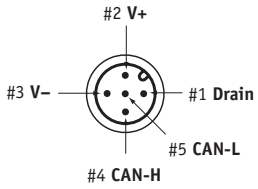
order code:	125	250	500
	125 kbaud	250 kbaud	500 kbaud

Terminating Resistor:

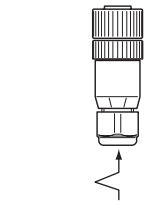
order code:	TR	NR
	terminating resistor	no terminating resistor

Electrical Connection:

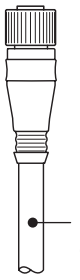
order code:	blank	MC5	SC5	NC5
	5-pin micro-connector *(no mating plug supplied)*	5-pin micro-connector w/ mating plug	5-pin micro-connector and 5 meter length cordset w/straight mating plug	5-pin micro-connector and 5 meter length cordset w/90° mating plug



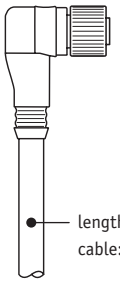
connector
(contact view)



0.16" - 0.32" OD Cable (THIN)

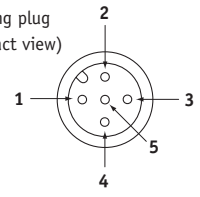


length: 16ft [5M]
cable: Thin



length: 16ft [5M]
cable: Thin

mating plug
(contact view)



pin	signal	wire color
1	drain	brown
2	V+	white
3	V-	blue
4	Can-H	black
5	Can-L	grey

Precision Potentiometric Output
Ranges: 0-2 to 0-60 inches
Industrial Grade

PT8101

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-2 to 0-60 inches
Output Signal Options..... voltage divider (potentiometer)
Accuracy ..... ± 0.25% to ±0.10% full stroke *see ordering information*
Repeatability..... ± 0.02% full stroke
Resolution ..... essentially infinite
Measuring Cable Options..... nylon-coated stainless steel or thermoplastic
Enclosure Material..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 3 lbs. (6 lbs.) max.

ELECTRICAL

Input Resistance Options ..... 500, 1K, 5K, 10K or bridge, *see ordering information*
Power Rating, Watt ..... *see ordering information*
Recommended Maximum Input Voltage ..... *see ordering information*
Output Signal Change Over Full Stroke Range..... 94% ±4% of input voltage

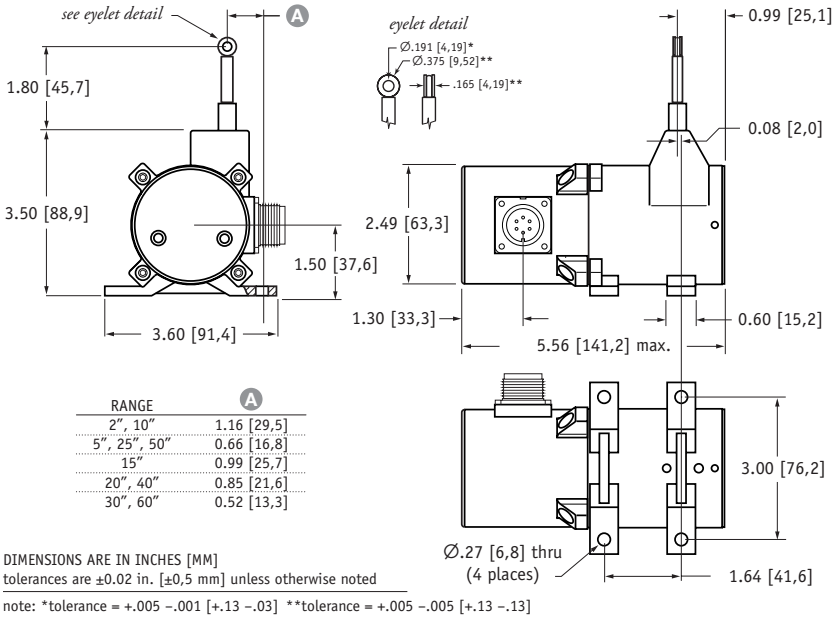
ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration..... up to 10 G's to 2000 Hz maximum

The PT8101, using a high cycle plastic-hybrid potentiometer, operates with any basic panel meter or programmable controller in factories and harsh environments requiring linear position measurements in ranges up to 60".

As a member of Celesco's innovative family of NEMA 4 rated cable-extension transducers, the PT8101: installs in minutes by mounting it's body to a fixed surface and attaching it's cable to the movable object, works without perfect parallel alignment, and when it's stainless-steel cable is retracted, it measures only 5".

Outline Drawing

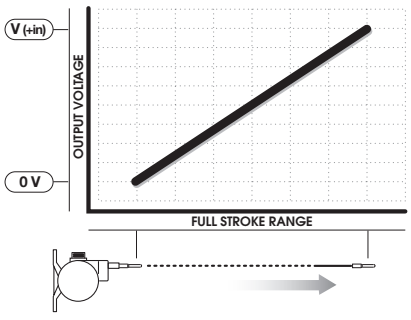


RANGE	A
2", 10"	1.16 [29,5]
5", 25", 50"	0.66 [16,8]
15"	0.99 [25,7]
20", 40"	0.85 [21,6]
30", 60"	0.52 [13,3]

DIMENSIONS ARE IN INCHES [MM]
tolerances are ±0.02 in. [±0,5 mm] unless otherwise noted

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

Output Signal



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

Ordering Information:

Model Number:

PT8101- ____ Ⓡ - __ Ⓐ __ Ⓑ 1 Ⓒ - __ Ⓓ 1 Ⓔ __ Ⓕ __ Ⓖ

order code:

Sample Model Number:

PT8101 - 0030 - 111 - 1110

Ⓡ	range:	30 inches
Ⓐ	enclosure/cable tension:	aluminum/standard (13 oz.)
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓓ	output signal:	500 ohm potentiometer
Ⓔ	electrical connection:	6-pin plastic connector
Ⓕ	cable guide option:	standard nylon cable guide

Full Stroke Range:

Ⓡ order code:	0002	0005	0010	0015	0020	0025	0030	0040	0050	0060
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50	60
accuracy (% of f.s.):	0.25%	0.25%	0.15%	0.15%	0.15%	0.15%	0.15%	0.10%	0.10%	0.10%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	5×10^5	5×10^5	5×10^5	5×10^5	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

**–1 cycle is defined as the travel of the measuring cable from full retraction to full extension and back to full retraction*

Enclosure Material and Measuring Cable Tension:

Ⓐ order code:	1	5	2	3	6	4	8	7	9
enclosure:	aluminum			303 stainless			316 stainless		
cable tension:	standard	medium	high	standard	medium	high	standard	medium	high
max. acceleration:	15 G	25 G	40 G	6 G	12 G	18 G	6 G	12 G	18 G

cable tension option specifications

Range:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.
Standard:	39 oz.	16 oz.	39 oz.	26 oz.	20 oz.	16 oz.	13 oz.	20 oz.	16 oz.	13 oz.
Medium:	65 oz.	26 oz.	65 oz.	43 oz.	33 oz.	26 oz.	22 oz.	33 oz.	26 oz.	22 oz.
High:	116 oz.	47 oz.	116 oz.	77 oz.	60 oz.	47 oz.	40 oz.	60 oz.	47 oz.	40 oz.

tension tolerance: ± 30%

Measuring Cable:

Ⓑ order code:	1	2	3
	Ø.034-inch nylon-coated stainless steel *available in all ranges*	Ø.047-inch stainless steel *5, 15, 20, 25, 30-inch ranges only*	Ø.062-inch thermoplastic *all ranges up to 30 inches only*

Output Signals:

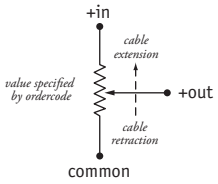
Ⓓ order code:	1	2	3	4	5	6
	500 ohm*	1000 ohm*	5000 ohm*	10,000 ohm*	fixed bridge (2 mV/V)	adjustable bridge (0...30 mV/V)

**tolerance = ±10%*

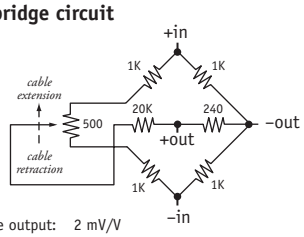
max. input voltage and power rating, options: 1 – 4

	2-inch, 5-inch range	*10-inch to 60-inch range*
500-ohms:	20 V AC/DC (1 W)	30 V AC/DC (2 W)
1K to 10K-ohms:	30 V AC/DC (1 W)	30 V AC/DC (2 W)

circuit, options 1-4

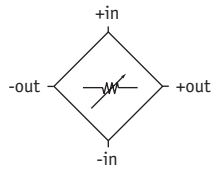


fixed bridge circuit



full scale output: 2 mV/V
zero adjust: not available

adjustable bridge cicuit

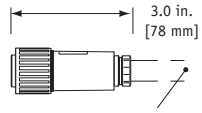
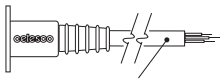
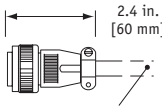
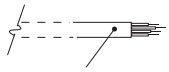


full scale output: adjustable from 0 to 30mV/V
zero adjust: from factory set zero to 50% of full stroke

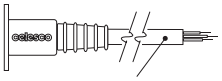
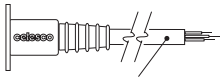
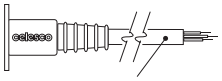
Ordering Information:

Electrical Connection:

Ⓕ *order code:*

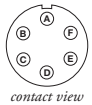
1	2	3	4
6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
			
1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

Ⓕ *order code:*

5	6	7
100-ft. [30 M] waterproof cable	10-ft. [3 M] **pressure tested*** waterproof cable	100-ft. [30 M] **pressure tested*** waterproof cable
IP 67, NEMA 4X,6**	**IP 68, NEMA 4X**, 6P**	**IP 68, NEMA 4X**, 6P**
		
100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	standard	bridge
A	+ in	+ in
B	common	– in
C	+ out	– out
D	-	+ out



contact view

Waterproof Cable

color code	standard	bridge
WHITE	+ in	n/a
BLACK	common	n/a
GREEN	+ out	n/a

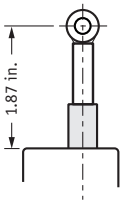
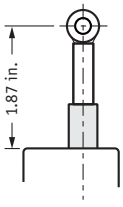
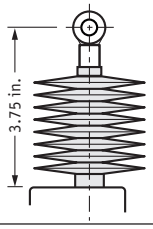
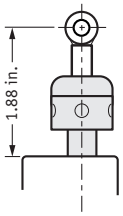
Instrumentation Cable

color code	standard	bridge
RED	+ in	+ in
BLACK	common	– in
GREEN	+ out	+ out
WHITE	-	– out

**–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours. **–Applies to stainless steel enclosure only.*

Cable Guide Options:

Ⓖ *order code:*

0	1	2*	3
standard cable guide	stainless steel cable guide	polyurethane cable guide	integral cable brush
			

**note: all ranges up to 25 inches only*

Incremental Encoder Output
Ranges: 0-30, 0-60 in. • 0-625, 0-1250 mm
Industrial Grade • 20 to 500 ppi

PT8150

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-30 to 0-60 inches
Output Signal ..... incremental encoder (quadrature)
Accuracy ..... 0.04% full stroke *contact factory for higher accuracy*
Repeatability ..... ± 0.02% full stroke
Resolution Options ..... 20 to 500 pulses per inch
Measuring Cable Options ..... nylon-coated stainless steel or thermoplastic
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... optical encoder
Maximum Retraction Acceleration ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 3 lbs. (6 lbs.) max.

ELECTRICAL

Input Voltage ..... *see ordering information*
Input Current ..... *see ordering information*

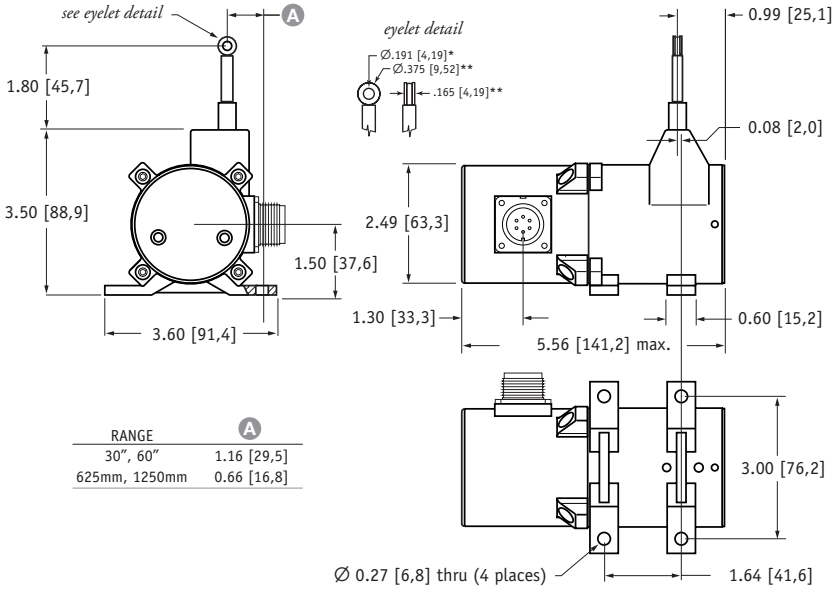
ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... 0º to 160ºF (-17º to 71ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum

With its incremental optical encoder and industrial design, this rugged transducer provides the highest accuracy and longest life of any measurement device of its kind. For measurements up to 60 inches, this model is available in a variety of resolutions and output stages to fit virtually any requirement.

The PT8150 offers numerous advantages over other industrial-grade sensors: It installs in minutes by mounting its body to a fixed surface and attaching it's cable to the movable object, fits into areas unsuited for rod-type measurement devices, and works without perfect parallel alignment.

Outline Drawing

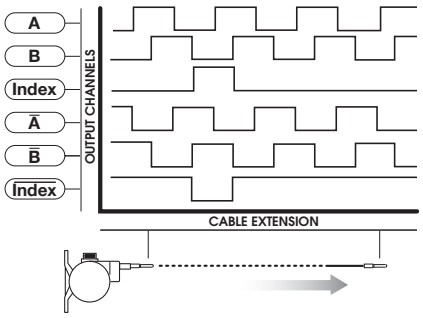


RANGE	A
30", 60"	1.16 [29,5]
625mm, 1250mm	0.66 [16,8]

DIMENSIONS ARE IN INCHES [MM]
tolerances are ±0.02 in. [±0,5 mm] unless otherwise noted

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

Output Signal



Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco
celesco.com • info@celesco.com

Ordering Information:

Model Number:

PT8150- ____ Ⓡ - __ Ⓐ Ⓑ 1 Ⓒ - Ⓓ Ⓔ Ⓕ Ⓖ
order code:

Sample Model Number:

PT8150 - 0030 - 111 - 1110

Ⓡ	range:	30 inches
Ⓐ	enclosure/cable tension:	aluminum/standard (12 oz.)
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓓ	output signal:	TTL/CMOS driver
Ⓔ	resolution:	200 ±4 pulses per inch
Ⓕ	electrical connection:	6-pin plastic connector
Ⓖ	cable guide option:	standard nylon cable guide

Full Stroke Range:

Ⓡ order code:	0030	0060	0625	1250
full stroke range, min:	30 in.	60 in.	625 mm	1250 mm

Enclosure Material and Measuring Cable Tension:

Ⓐ order code:	1	5	2	3	6	4	8	7	9
enclosure:	aluminum			303 stainless			316 stainless		
cable tension:	standard	medium	high	standard	medium	high	standard	medium	high
max. acceleration:	15 G	25 G	40 G	6 G	12 G	18 G	6 G	12 G	18 G

cable tension option specifications
(tension tolerance: ± 30%)

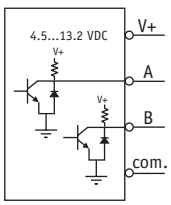
Range:	30 in.	60 in.	625 mm	1250 mm
Standard:	16 oz.	16 oz.	4,5 N	4,5 N
Medium:	26 oz.	26 oz.	7,2 N	7,2 N
High:	47 oz.	47 oz.	13,1 N	13,1 N

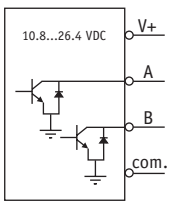
Measuring Cable:

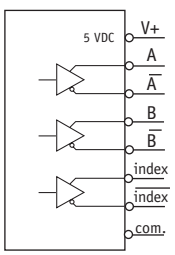
Ⓑ order code:	1	2	3
	Ø.034-inch nylon-coated stainless steel *available in **all** ranges*	Ø.047-inch stainless steel ***30 in.** and **625 mm** ranges only*	Ø.062-inch thermoplastic ***30 in.** and **625 mm** ranges only*

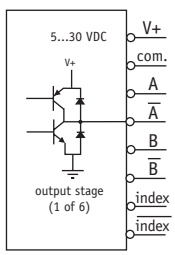
Output Signals:

Ⓓ order code:	1	2	3	4
output driver:	TTL - CMOS	Open Collector	5 V - Line Driver	Universal Line Driver
	Input voltage (V+): 4.5...13.2 Vdc Sink current: 20 mA max. Input current: 80 mA max.	Input voltage (V+): 10.8...26.4 Vdc Sink current: 20 mA max. Input current: 80 mA max.	Input voltage (V+): 5 Vdc Sink current: 20 mA max. Input current: 150 mA max.	Input voltage (V+): 5...30 VDC Source/Sink: 20 mA max. Input current: 100 mA max, no load









Ordering Information:

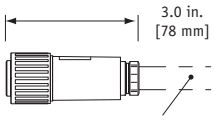
Resolution:

E order code:	1	2	3	4
english ranges:	200 ±4 pulses per in.	400 ±8 pulses per in.	500 ±10 pulses per in.	20 ±0.4 pulses per in.
metric ranges:	10 ±0,2 pulses per mm	20 ±0,4 pulses per mm	25 ±0,5 pulses per mm	1 ±0,02 pulses per mm

Electrical Connection:

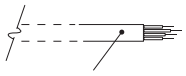
F order code:

1 — 6-pin plastic connector with mating plug
IP 67, NEMA 4X*,6



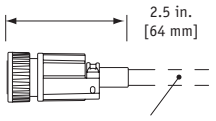
.30 – .39 in. [8 – 10 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

2 — 25-ft. instrumentation cable 24 AWG, shielded
IP 67, NEMA 6



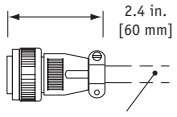
25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

3 — 18-pin plastic connector with mating plug
IP 65, NEMA 4



.26 – .30 in. [7 – 8 mm] cable dia.
20 – 24 AWG conductor size
connector: Conxall 14282-18PG-300-K
mating plug: Conxall 13282-18SG-326-K

4 — 6-pin metal connector with mating plug
IP 67, NEMA 6



.375 in. [9 mm] max cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

6-pin mating plug:

pin	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
A	input voltage	input voltage
B	common	common
C	channel A	channel A
D	channel B	channel B
E	-	channel A'
F	-	channel B'

contact view

18-pin mating plug:

pin	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
1	input voltage	input voltage
2	common	common
3	channel B	channel B
6	channel A	channel A
7	-	index
11	-	channel B'
12	-	channel A'
15	-	index'

contact view

25-ft. instrumentation cable:

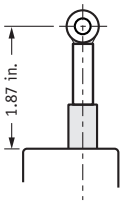
color	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
red	input voltage	input voltage
black	common	common
green	channel A	channel A
white	channel B	channel B
blue	-	channel A'
brown	-	channel B'
yellow	-	index
orange	-	index'

** –applies to stainless steel enclosure only.*

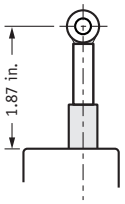
Cable Guide Options:

G order code:

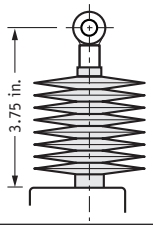
0 — standard cable guide



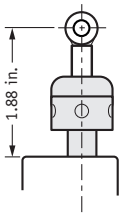
1 — stainless steel cable guide



2* — polyurethane cable guide



3 — integral cable brush



**note: bellows limits measuring cable travel to 25 inches. If ordering this option, select 30 inch [625 mm] full stroke range.*

RS232 Data Communication
Ranges: 0-2 to 0-60 inches
Industrial Grade

PT8232

Specification Summary:

GENERAL

Full Stroke Ranges	0-2 to 0-60 inches
Electrical Interface	RS232
Format	HEX
Accuracy	± 0.25% to ± 0.10% full stroke
Repeatability	± 0.02% full stroke
Resolution	± 0.003% full stroke
Measuring Cable	stainless steel, nylon-coated or thermoplastic
Enclosure Material	powder-painted aluminum or stainless steel
Sensor	plastic-hybrid precision potentiometer
Potentiometer Cycle Life	*see ordering information*
Maximum Retraction Acceleration	*see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure	3 lbs. (6 lbs.), max.

ELECTRICAL

Input Voltage	9...22 VDC
Input Current	40 mA
Baud Rate	9600 (selectable to 38.4K)
Update Rate	32 msec

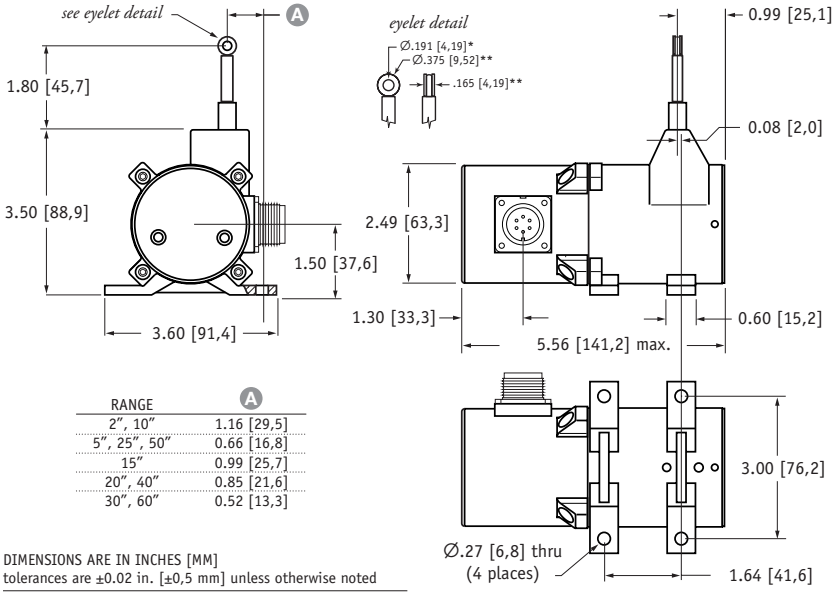
ENVIRONMENTAL

Environmental Suitability	NEMA 4X/6, IP 67
Operating Temperature	-40° to 200°F (-40° to 90°C)
Vibration	up to 10 G's to 2000 Hz maximum

The PT8232 delivers position feedback via RS232 serial communication to your data acquisition or controller system. The PT8232 sends a raw 16-bit count from 0000H to FFFFH. Additionally this device can be set to continuously send data or send data only when polled.

As the internal position sensing element is a precision potentiometer, this transducer maintains current accurate position even during power loss and does not need to be reset to a "home" position.

Outline Drawing

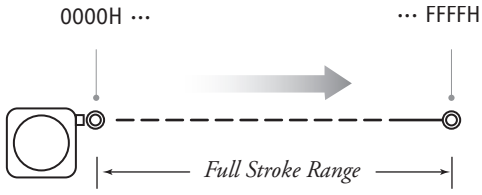


RANGE	A
2", 10"	1.16 [29,5]
5", 25", 50"	0.66 [16,8]
15"	0.99 [25,7]
20", 40"	0.85 [21,6]
30", 60"	0.52 [13,3]

DIMENSIONS ARE IN INCHES [MM]
tolerances are ±0.02 in. [±0,5 mm] unless otherwise noted

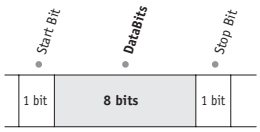
note: *tolerance = +.005 –.001 [+.13 –.03] **tolerance = +.005 –.005 [+.13 –.13]

Output Signal



I/O Format

Data Format



Data Frame

6 byte Hex string:

STX	CMD	B_0	B_1	B_2	ETX

STX = 0x02 **CMD** = Command Code* **B_0 - B_2** = Data Field* **ETX** = 0x03

** –see below*

Important! All communications to/from the transducer are in **HEX**!

User Commands:

	User Command				Sensor Response			
Description	**<CMD>**	**<B_0>**	**<B_1>**	**<B_2>**	**<CMD>**	**<B_0>**	**<B_1>**	**<B_2>**
Get Sensor Info	0x05	0x00	0x00	0x00	0x05	version(4)	date(5)	date(5)
Get Serial Number	0x15	0x00	0x00	0x00	0x15	serial number(3)		
Start Continuous Data	0x25	0x00	0x00	0x00	0x25	0x00	0x00	0x00
Stop Continuous Data	0x35	0x00	0x00	0x00	0x35	0x00	0x00	0x00
Get Position Data	0x45	0x00	0x00	0x00	0x45	CMC(1)	CMC(1)	status(2)

(1)CMC - Current Measurement Count (Position)

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 16-bit value that occupies the first two bytes (B_0 and B_1) of the data field. B_0 is the MSB (most significant byte) and B_1 is the LSB (least significant byte).

The CMC starts at 0000H with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at FFFFH. This holds true for all ranges.

(2)Status

The status byte is used as a flag to indicate the validity of the position signal that the internal electronics receives from the potentiometer.

Flags are as follows:
0x00 = GREEN, 0x55 = YELLOW, 0xAA = RED

A "green" flag shows everything OK. A "yellow" or "red" flag indicates that the sensor has either been extended beyond its range or that there is a problem with the potentiometer.

(3)Serial Number

Each sensor has it's own unique serial number. This information can be retrieved by sending the sensor the "Get Serial Number" command.

The serial number is a 3 byte value from which ranges from 0 to 9999999 (decimal).

(4)Version

This is a single byte value (0-255 decimal) which indicates the currently installed firmware version of the sensor.

(5)Date

This is a 2 byte value showing the date of currently installed firmware. This value ranges from 01011 - 12319 (decimal). Format is MMDDY. While the month and day are expressed as two digit numbers the year is expressed in a single digit only.

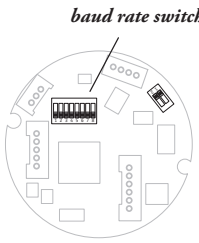
Example: 08054 = August 5, 2004

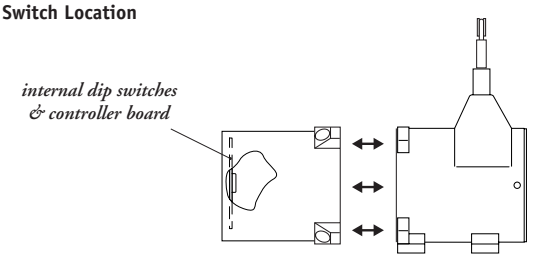
Baud Rate

The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the rs232 controller board located inside the transducer.

DIP-7	DIP-8	baud rate
0	0	9600
1	0	19200
0	1	38400
1	1	9600

RS232 Controller Board and DIP Switch Location





to gain access to the controller board, remove four Allen-Head Screws and remove rear cover.

Ordering Information:

Model Number:

PT8232 - ____ - ____ - ____ - ____ - ____ - ____ - ____
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

Sample Model Number:

PT8232 - 50 - AL - N34 - T1 - CG - M6

Ⓡ	range:	200 inches
Ⓐ	enclosure	aluminum
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	measuring cable tension:	standard
Ⓓ	cable guide:	standard
Ⓔ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ order code:	2	5	10	15	20	25	30	40	50	60
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50	60
accuracy (% of f.s.):	0.25%	0.25%	0.15%	0.15%	0.15%	0.15%	0.15%	0.10%	0.10%	0.10%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	5×10^5	5×10^5	5×10^5	5×10^5	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

**–1 cycle is defined as the travel of the measuring cable from full retraction to full extension and back to full retraction*

Enclosure Material:

Ⓐ order code:	AL	SS	316
	powder-painted aluminum	303 stainless steel	316 stainless steel

Measuring Cable:

Ⓑ order code:	N34	S47	V62
	Ø.034-inch nylon-coated stainless steel *available in all ranges*	Ø.047-inch stainless steel *5, 15, 20, 25, 30-inch ranges only*	Ø.062-inch thermoplastic *all ranges up to 30 inches only*

Measuring Cable Tension:

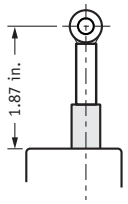
Ⓒ order code:	T1	T2	T3
	standard tension	medium tension	high tension
full stroke range cable tension specifications — 2, 10-inch:	39 oz.	65 oz.	116 oz.
15-inch:	26 oz.	43 oz.	77 oz.
20, 40-inch:	20 oz.	33 oz.	60 oz.
5, 25, 50-inch:	16 oz.	26 oz.	47 oz.
30, 60-inch:	13 oz.	22 oz.	40 oz.

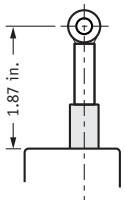
tension tolerance: ± 30%

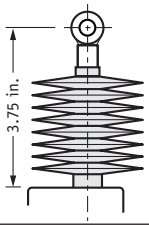
	maximum acceleration	*maximum acceleration*	*maximum acceleration*
aluminum enclosure:	15 G	25 G	40 G
stainless steel enclosure:	6 G	12 G	18 G

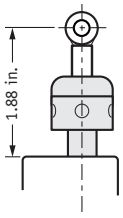
Cable Guide:

Ⓓ order code:	CG	SS	CB*	BR
	standard cable guide	stainless steel cable guide	polyurethane cable guide	integral cable brush









**note: all ranges up to 25 inches only*

Ordering Information (cont.)

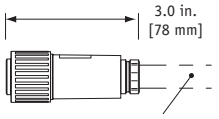
Electrical Connection:

order code:

M6

6-pin plastic connector with mating plug

IP 67, NEMA 6, NEMA 4X (stainless enclosure only)



.30 – .39 in. [8 – 10 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

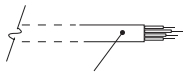
contact view

pin	signal
A	9...22 VDC
B	common
C	–
D	Transmitted Data
E	Received Data
F	common

C25

25-ft. instrumentation cable 24 AWG, shielded

IP 67, NEMA 6



25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

color code	signal
Red	9...22 VDC
Black	common
White	–
Green	Transmitted Data
Blue	Received Data
Brown	common

0/4...20 mA Output • Hazardous Area Certification
Ranges: 0-2 to 0-60 inches
Industrial Grade

PT8420

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-2 to 0-60 inches
Output Signal Options ..... 4...20 mA (2-wire) and 0...20 mA (3-wire)
Accuracy ..... ± 0.28% to ±0.15% full stroke *see ordering information*
Repeatability ..... ± 0.05% full stroke
Resolution ..... essentially infinite
Measuring Cable Options ..... nylon-coated stainless steel or thermoplastic
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 3 lbs. (6 lbs.) max.

ELECTRICAL

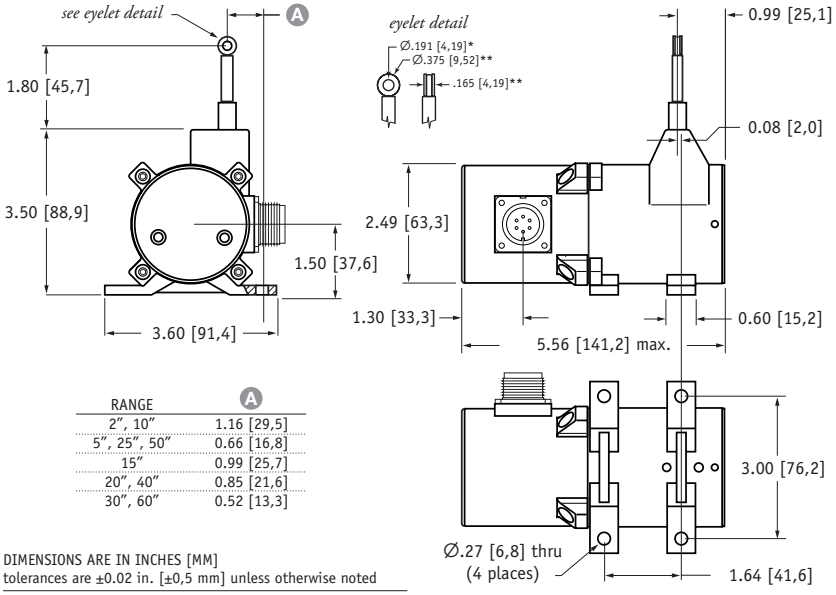
Input Voltage ..... *see ordering information*
Input Current ..... 20 mA max.
Maximum Loop Resitance (Load) ..... (loop supply voltage - 8)/0.020
Circuit Protection ..... 38 mA max.
Impedence ..... 100M ohms@100 VDC, min.
Output Signal Adjustment
  Zero Adjustment ..... from factory set zero to 50% of full stroke range
  Span Adjustment ..... to 50% of factory set span
Thermal Effects
  Zero ..... 0.01% f.s./°F, max.
  Span ..... 0.01% f.s./°F, max.

ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67/68
Hazardous Area Certification ..... *see ordering information*
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration ..... up to 10 G's to 2000 Hz maximum

EMC COMPLIENCE PER DIRECTIVE 89/336/EEC

Emission/Immunity EN50081-2/EN50082-2



RANGE	A
2", 10"	1.16 [29,5]
5", 25", 50"	0.66 [16,8]
15"	0.99 [25,7]
20", 40"	0.85 [21,6]
30", 60"	0.52 [13,3]

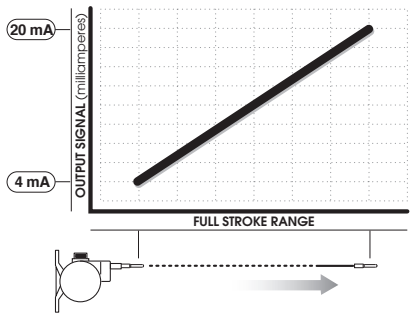
DIMENSIONS ARE IN INCHES [MM]
tolerances are ±0.02 in. [±0,5 mm] unless otherwise noted

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

The PT8420 with its 4-20 mA feedback signal, is ideal for monitoring the stroke of a hydraulic cylinder and other applications requiring position data acquisition in harsh environments.

As a member of Celesco's family of NEMA 4-rated cable-extension transducers, the PT8420 provides a feedback signal that is proportional to the linear movement of a traveling stainless-steel extension cable. Simply mount the body of the transducer to a fixed surface and attach the extension cable to the moving object.

Output Signal



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Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

Ordering Information:

Model Number:

PT8420- _____ **-** ___ ___ **1** **-** **1** ___ ___ ___
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:

PT8420 - 0030 - 111 - 1110

Ⓡ	range:	30 inches
Ⓐ	enclosure/cable tension:	aluminum/standard (13 oz.)
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓔ	output signal:	4...20mA, 2-wire
Ⓕ	electrical connection:	6-pin plastic connector
Ⓖ	cable guide option:	standard nylon cable guide

Full Stroke Range:

Ⓡ order code:	0002	0005	0010	0015	0020	0025	0030	0040	0050	0060
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50	60
accuracy (% of f.s.):	0.28%	0.28%	0.18%	0.18%	0.18%	0.18%	0.18%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	5×10^5	5×10^5	5×10^5	5×10^5	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

**–1 cycle is defined as the travel of the measuring cable from full retraction to full extension and back to full retraction*

Enclosure Material and Measuring Cable Tension:

Ⓐ order code:	1	5	2	3	6	4	8	7	9
enclosure:	aluminum			303 stainless			316 stainless		
cable tension:	standard	medium	high	standard	medium	high	standard	medium	high
max. acceleration:	15 G	25 G	40 G	6 G	12 G	18 G	6 G	12 G	18 G

cable tension option specifications

Range:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.
Standard:	39 oz.	16 oz.	39 oz.	26 oz.	20 oz.	16 oz.	13 oz.	20 oz.	16 oz.	13 oz.
Medium:	65 oz.	26 oz.	65 oz.	43 oz.	33 oz.	26 oz.	22 oz.	33 oz.	26 oz.	22 oz.
High:	116 oz.	47 oz.	116 oz.	77 oz.	60 oz.	47 oz.	40 oz.	60 oz.	47 oz.	40 oz.

tension tolerance: ± 30%

Measuring Cable:

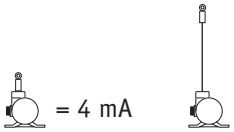
Ⓑ order code:	1	2	3
	Ø.034-inch nylon-coated stainless steel *available in all ranges*	Ø.047-inch stainless steel *5, 15, 20, 25, 30-inch ranges only*	Ø.062-inch thermoplastic *all ranges up to 30 inches only*

Output Signals:

Ⓔ order code:	1	2	3	4	5*	6*
output signal options:	4...20 mA	20...4 mA	0...20 mA	20...0 mA	4...20 mA	20...4 mA
sensitivity:	16 mA/full stroke ±0.25%		20 mA/full stroke ±0.25%		16 mA/full stroke ±0.25%	
wiring configuration:	2 – wire		3 – wire		2 – wire	
input voltage:	8 – 40 vdc		14 – 29 vdc		14 – 32 vdc	
hazardous area certification:	not certified				CSA • Cenelec	

Example:

ordercode = **1** = 4...20 mA



Hazardous Area Certifications:

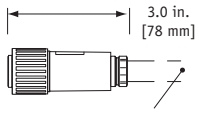
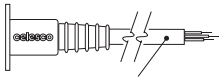
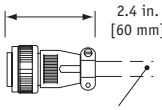
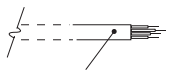
CSA Standard 22.2 Class 1 Groups A, B, C and D

Cenelec LCIE EEx ia IIc T4

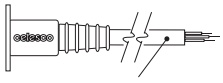
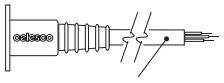
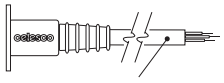
***IMPORTANT:** intrinsically safe when powered from a CSA certified zener barrier rated 28 VDC max, 110 mA max per installation drawing#677984*

Electrical Connection:

F *order code:*

1	2	3	4
6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
			
1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

F *order code:*

5	6	7
100-ft. [30 M] waterproof cable	10-ft. [3 M] **pressure tested*** waterproof cable	100-ft. [30 M] **pressure tested*** waterproof cable
IP 67, NEMA 4X,6**	**IP 68, NEMA 4X**, 6P**	**IP 68, NEMA 4X**, 6P**
		
100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	2-wire	3-wire
A	8...40 vdc***	14...29 vdc
B	4...20 mA out	common
C	–	0...20 mA out
D	case ground	–

contact view

Waterproof Cable

color code	2-wire	3-wire
WHITE	8...40 vdc***	14...29 vdc
BLACK	4...20 mA out	common
GREEN	case ground	0...20 mA out

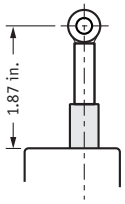
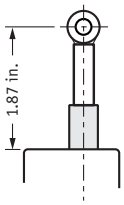
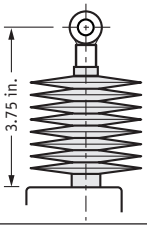
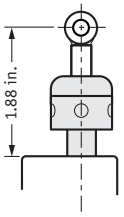
Instrumentation Cable

color code	2-wire	3-wire
RED	8...40 vdc***	14...29 vdc
BLACK	4...20 mA out	common
WHITE	n/a	n/a
GREEN	case ground	0...20 mA out

**–Test pressure: 100 feet [30 meters] H_2O (40 PSID) Test Medium: Air; Duration: 2 hours. ** –applies to stainless steel enclosure only. ***14-32 VDC for hazardous area option.*

Cable Guide Options:

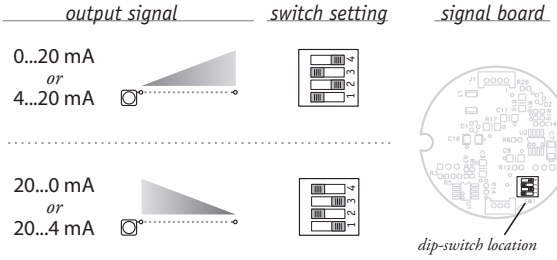
G *order code:*

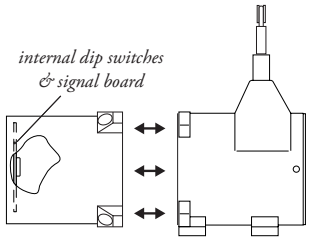
0	1	2*	3
standard cable guide	stainless steel cable guide	polyurethane cable guide	integral cable brush
			

**note: all ranges up to 25 inches only*

Output Signal Selection:

The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.





To gain access to the signal board, remove four Allen-Head Screws and remove rear cover.

version: **7.0** last updated: **May 12, 2010**

0...5, 0...10, –5...+5, –10...+10 VDC Output Options
Ranges: 0-2 to 0-60 inches
Industrial Grade

PT8510

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-2 to 0-60 inches
Output Signal Options ..... 0...5, 0...10, -5...+5, -10...+10 VDC
Accuracy ..... ± 0.28% to ±0.15% full stroke *see ordering information*
Repeatability ..... ± 0.05% full stroke
Resolution ..... essentially infinite
Measuring Cable Options ..... nylon-coated stainless steel or thermoplastic
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 3 lbs. (6 lbs.) max.

ELECTRICAL

Input Voltage ..... *see ordering information*
Input Current ..... 10 mA maximum
Output Impedence ..... 1000 ohms
Maximum Load ..... 5000 ohms
Zero and Span Adjustment ..... *see ordering information*

ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... -40º to 200ºF (-40º to 90ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum

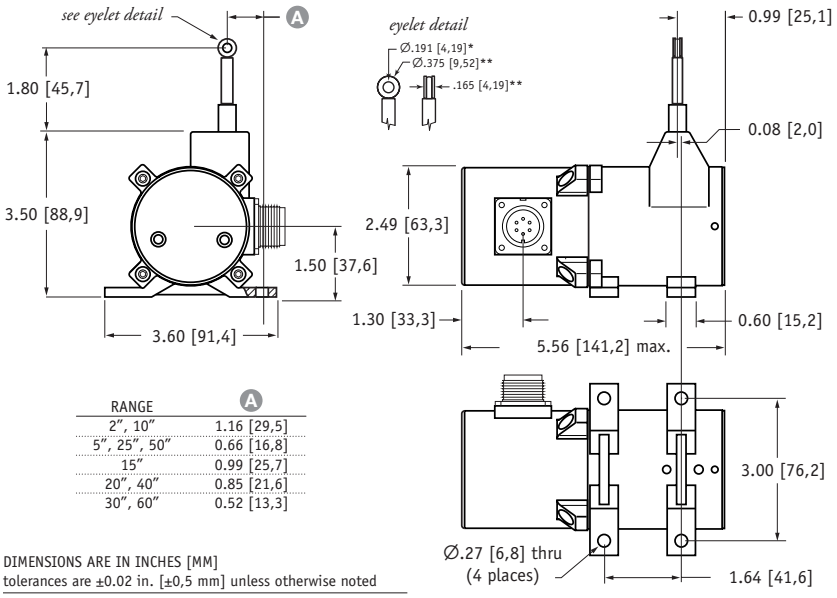
EMC COMPLIENCE PER DIRECTIVE 89/336/EEC

Emission/Immunity ..... EN50081-2 / EN50082-2

The PT8510 can operate from an unregulated 14.5 to 40 VDC power supply while providing an output signal that is proportional to the linear movement of it's measuring cable. The PT8510 has a maximum measurement range up to 60" and has 4 output signal options to choose from: 0...10, 0...5, -10...+10 and -5...+5 Vdc.

As a member of Celesco's innovative family of NEMA-4 rated cable-extension transducers, the PT8510 offers numerous benefits. It installs in minutes, fits into areas unsuited for rod-type measurement devices, and works without perfectly parallel alignment.

Outline Drawing

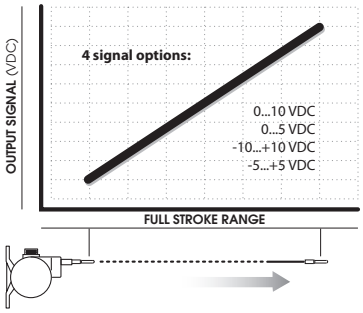


RANGE	A
2", 10"	1.16 [29,5]
5", 25", 50"	0.66 [16,8]
15"	0.99 [25,7]
20", 40"	0.85 [21,6]
30", 60"	0.52 [13,3]

DIMENSIONS ARE IN INCHES [MM]
tolerances are ±0.02 in. [±0,5 mm] unless otherwise noted

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

Output Signal



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celesco
celesco.com • info@celesco.com

Ordering Information:

Model Number:

PT8510- ____ Ⓡ - __ Ⓐ __ Ⓑ 1 Ⓒ - 1 Ⓓ __ Ⓔ __ Ⓕ __ Ⓖ
order code:

Sample Model Number:

PT8510 - 0030 - 111 - 1110

Ⓡ	range:	30 inches
Ⓐ	enclosure/cable tension:	aluminum/standard (9 oz.)
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓔ	output signal:	0...10 vdc
Ⓕ	electrical connection:	6-pin plastic connector
Ⓖ	cable guide option:	standard nylon cable guide

Full Stroke Range:

Ⓡ order code:	0002	0005	0010	0015	0020	0025	0030	0040	0050	0060
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50	60
accuracy (% of f.s.):	0.28%	0.28%	0.18%	0.18%	0.18%	0.18%	0.18%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	5×10^5	5×10^5	5×10^5	5×10^5	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

**–1 cycle is defined as the travel of the measuring cable from full retraction to full extension and back to full retraction*

Enclosure Material and Measuring Cable Tension:

Ⓐ order code:	1	5	2	3	6	4	8	7	9
enclosure:	aluminum			303 stainless			316 stainless		
cable tension:	standard	medium	high	standard	medium	high	standard	medium	high
max. acceleration:	15 G	25 G	40 G	6 G	12 G	18 G	6 G	12 G	18 G

cable tension option specifications

Range:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.
Standard:	39 oz.	16 oz.	39 oz.	26 oz.	20 oz.	16 oz.	13 oz.	20 oz.	16 oz.	13 oz.
Medium:	65 oz.	26 oz.	65 oz.	43 oz.	33 oz.	26 oz.	22 oz.	33 oz.	26 oz.	22 oz.
High:	116 oz.	47 oz.	116 oz.	77 oz.	60 oz.	47 oz.	40 oz.	60 oz.	47 oz.	40 oz.

tension tolerance: ± 30%

Measuring Cable:

Ⓑ order code:	1	2	3
	Ø.034-inch nylon-coated stainless steel *available in all ranges*	Ø.047-inch stainless steel *5, 15, 20, 25, 30-inch ranges only*	Ø.062-inch thermoplastic *all ranges up to 30 inches only*

Output Signals:

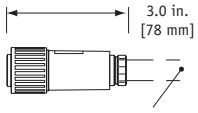
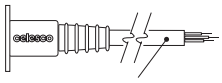
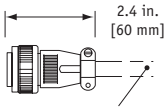
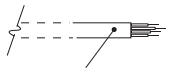
Ⓔ order code:	1	2	3	4	5	6	7	8
output signal options:	0...10 VDC	10...0 VDC	0...5 VDC	5...0 VDC	-10...+10 VDC	+10...-10 VDC	-5...+5 VDC	+5...-5 VDC
input voltage:	14.5 – 40 vdc		10.5 – 40 vdc		14.5 – 40 vdc		10.5 – 40 vdc	
span adjustment:	to 50% of factory set span				to 75% of factory set span			
zero adjustment:	from factory set zero to 50% of full stroke range				from factory set zero to 25% of full stroke range			

Example:

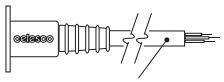
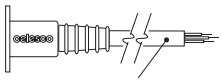
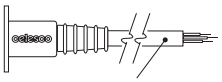
ordercode = **1** = 0...10 vdc

Electrical Connection:

F *order code:*

1	2	3	4
6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
			
1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

F *order code:*

5	6	7
100-ft. [30 M] waterproof cable	10-ft. [3 M] **pressure tested*** waterproof cable	100-ft. [30 M] **pressure tested*** waterproof cable
IP 67, NEMA 4X,6**	**IP 68, NEMA 4X**, 6P**	**IP 68, NEMA 4X**, 6P**
		
100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	signal
A	input voltage
B	output signal
C	common

contact view

Waterproof Cable

color code	signal
WHITE	input voltage
GREEN	output signal
BLACK	common

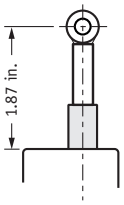
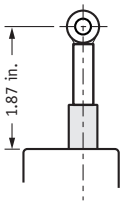
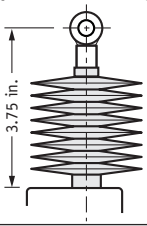
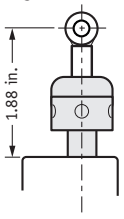
Instrumentation Cable

color code	signal
RED	input voltage
GREEN	output signal
BLACK	common

**–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours. ** –Applies to stainless steel enclosure only.*

Cable Guide Options:

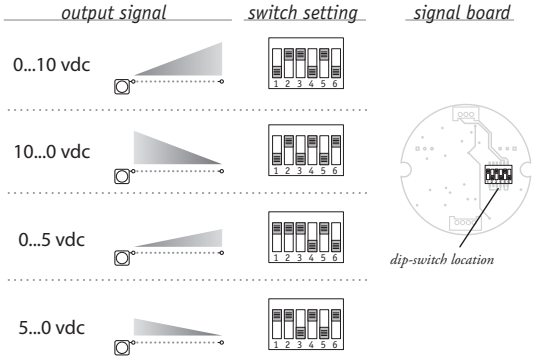
G *order code:*

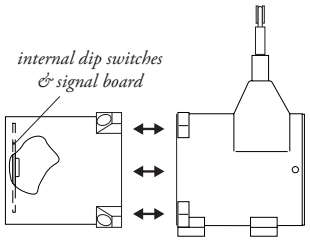
0	1	2*	3
standard cable guide	stainless steel cable guide	polyurethane cable guide	integral cable brush
			

**note: all ranges up to 25 inches only*

Output Signal Selection (does not apply to -5...+5 & -10...+10 vdc options)

The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.





To gain access to the signal board, remove four Allen-Head Screws and remove rear cover.

version: **5.0** last updated: **April 28, 2009**

Mates To Virtually Any Encoder
Ranges: 0-25 to 0-50 inches
Available With or Without Encoder

PT8600

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-25, 0-50 in. and 0-625, 0-1250 mm
Motion Conversion Ratio:
English Ranges ..... 5 inches per turn, *see ordering information*
Metric Ranges ..... 125 mm per turn, *see ordering information*
Accuracy ..... ±0.04% full stroke, *contact factory for better accuracy*
Measuring Cable Options ..... *see ordering information*
Module Material ..... powder-painted aluminum
Maximum Allowable Rotational Sensor Torque ..... 1.0 in-lbs.
Weight ..... 3 lbs. max.

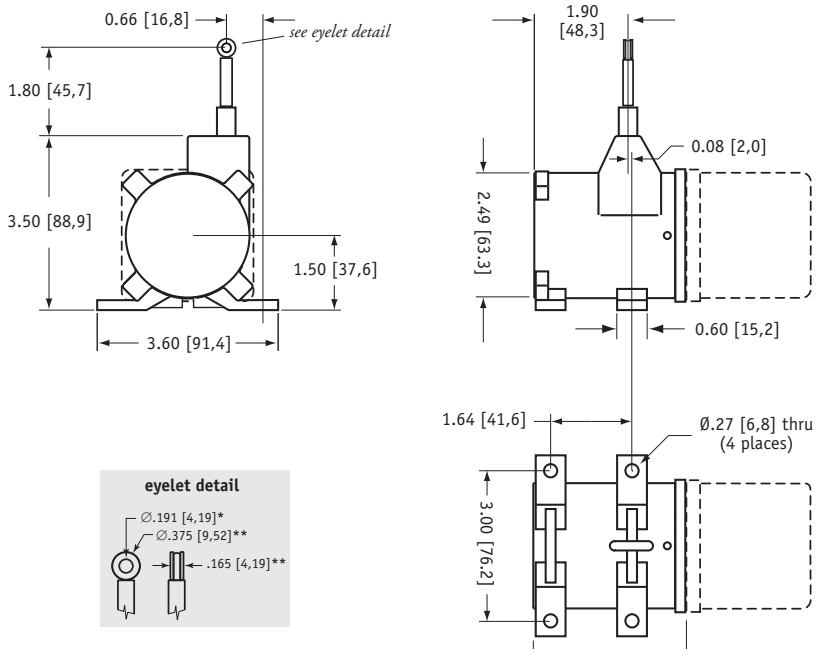
ENVIRONMENTAL

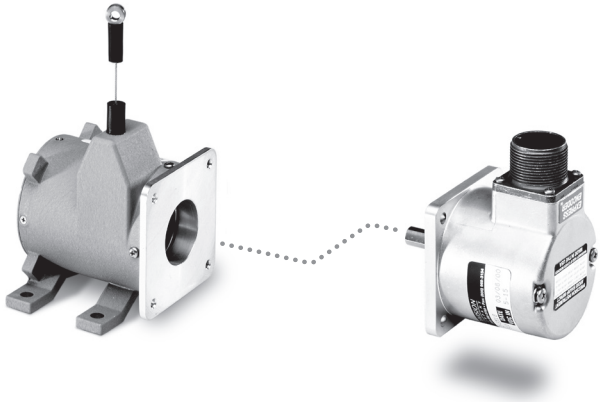
Operating Temperature ..... -40º to 200ºF (-40º to 90ºC)

Our unique linear-to-rotational, industrial-grade string encoder module mates to virtually any encoder giving you a cost-effective linear position measurement solution that precisely fits your requirements. The PT8600 takes just minutes to install, fits easily into tight areas and does not require perfectly parallel alignment. To order, simply select the stroke range, the cable tension and the mounting style that matches your encoder.

If you want us to provide the encoder or you don't see the mounting style you need, please give us a call.

Outline Drawing





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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

Ordering Information:

Model Number:

PT8600 - _____ - ___ ___ 1 - ___ - _____
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

Sample Model Number:

PT8600 - 0025 - 111 - BR - F01

Ⓡ	range:	25 inches
Ⓐ	measuring cable tension:	standard (12 oz.)
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓓ	cable guide option:	cable brush
Ⓔ	rotational sensor mounting style:	F01 (2.5-in. sq. flange)

» Trying to reorder but can't find your existing model number? Please contact factory for help.

Full Stroke Range:

Ⓡ *order code:*	0025	0050	0625	1250
full stroke range, min:	25 in.	50 in.	625 mm	1250 mm

Measuring Cable Tension:

Ⓐ *order code:*	1	2
cable tension (±30%)	standard tension	high tension
25, 50-inch ranges:	17 oz. [5 G max. acceleration]	50 oz. [15 G max. acceleration]
625, 1250-mm ranges:	4,2 N [8 G max. acceleration]	13,9 N [30 G max. acceleration]

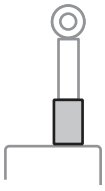
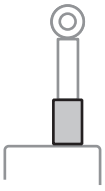
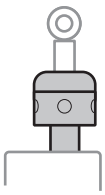
Measuring Cable:

Ⓑ *order code:*	1	2*
measuring cable:	.034 nylon-coated stainless steel	.047 stainless steel
conversion ratio { **english** ranges:	1 turn = 5.000 ± 0.0094 in.	1 turn = 5.034 ± 0.0094 in.
conversion ratio { **metric** ranges:	1 turn = 125,001 ± 0,2394 mm	1 turn = 125,879 ± 0,2394 mm

***25-inch and 625-mm** ranges only*

Cable Guide Options:

Ⓓ *order code:*	blank	SS	BR
	standard cable guide	stainless steel cable guide	integral cable brush

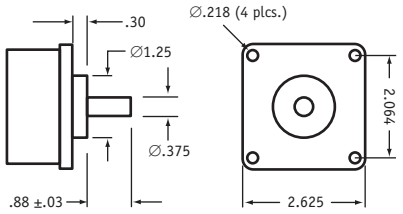




Rotational Sensor Mounting Style:

B order code:	F01	F02	S01	S02	S04
	2.5-in. Flange Mount 3/8-inch shaft	2-in. Flange Mount 3/8-inch shaft	Face-Mount 6 mm shaft M4 mounting screws	Face-Mount 10 mm shaft M4 mounting screws	Face-Mount 10 mm shaft M3 mounting screws

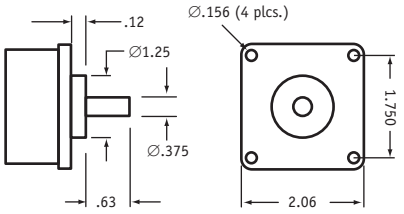
Note: If you don't see your encoder style, please contact factory. All encoder types supported.

F01 - 2½-inch Sq. Flange Mount (3/8-inch shaft)



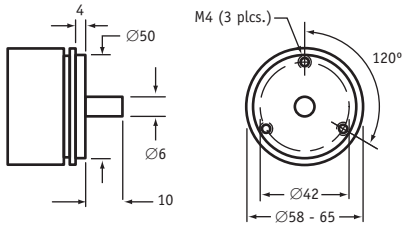
*all dimensions are in **inches***

F02 - 2-inch Sq. Flange Mount (3/8-inch shaft)



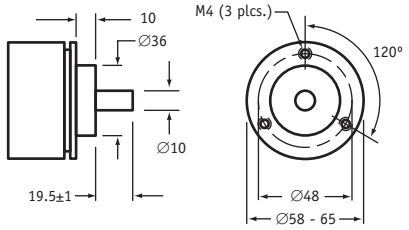
*all dimensions are in **inches***

S01 - Face-Mount (6mm shaft/M4 screws)



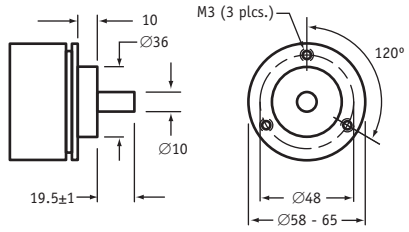
*all dimensions are in **mm***

S02 - Face-Mount (10mm shaft/M4 screws)



*all dimensions are in **mm***

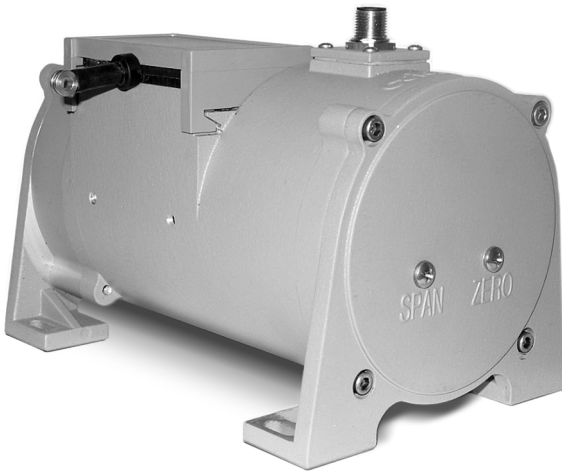
S04 - Face-Mount (10mm shaft/M3 screws)



*all dimensions are in **mm***

CANbus • SAE J1939
Ranges: 0-75 to 0-550 inches
Industrial Grade

PT9CN



The PT9CN communicates linear position feedback via the CANbus SAE J1939 interface. The PT9CN has been designed for factory and harsh environment applications requiring full stroke ranges up to 550".

As a member of Celesco's innovative family of NEMA 4 rated cable-extension transducers, the PT9CN installs in minutes by simply mounting it's body to a fixed surface and attaching it's cable to the movable object. Perfect parallel alignment not required.

Specification Summary:

GENERAL

Full Stroke Range Options–*on this datasheet*	0-75 to 0-550 inches
Electrical Signal Interface	CANbus SAE J1939
Protocol	Proprietary B
Accuracy	± 0.10% full stroke
Repeatability	± 0.02% full stroke
Resolution	± 0.003% full stroke
Measuring Cable Options	nylon-coated stainless steel or thermoplastic
Enclosure Material	powder-painted aluminum or stainless steel
Sensor	plastic-hybrid precision potentiometer
Potentiometer Cycle Life	250,000, min. –*before signal degradation can occur*
Maximum Retraction Acceleration	*see ordering information*
Maximum Velocity	*see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure	8 lbs. (16 lbs.) max.

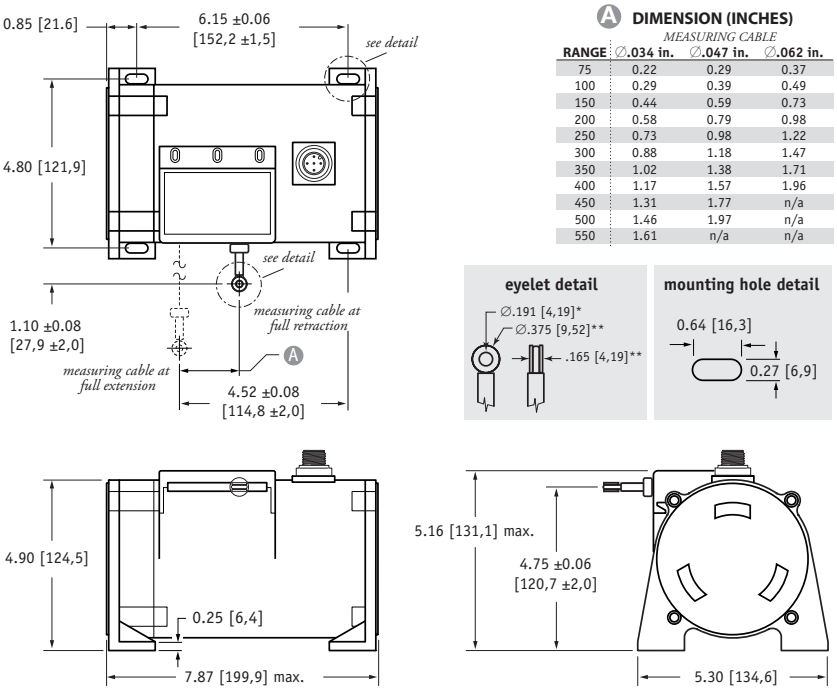
ELECTRICAL

Input Voltage	7 - 18 VDC
Input Current	60 mA max.
Address Setting/Node ID	0...63 set via DIP switches
Baud Rate	125K, 250K or 500K set via DIP switches
Update Rate	10 ms. (20 ms. available–*contact factory*)

ENVIRONMENTAL

Enclosure	NEMA 4/4X/6, IP 67
Operating Temperature	-40º to 200ºF (-40º to 90ºC)
Vibration	up to 10 G's to 2000 Hz maximum

Fig. 1 – Outline Drawing (26 oz. cable tension only)



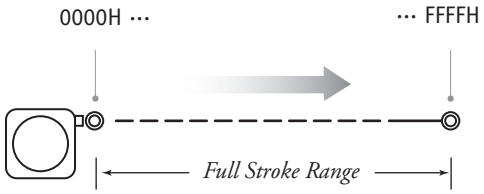
A DIMENSION (INCHES)

RANGE	MEASURING CABLE ∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

Output Signal



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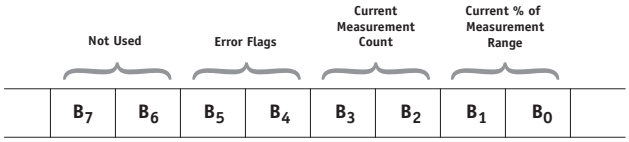
I/O Format:

Data Frame

repetition = 8 msec.

Data Field



B_0 = LSB current % of measurement range byte
B_1 = MSB current % of measurement range byte
B_4 - B_5 = error flags
B_2 = LSB current measurement count byte
B_3 = MSB current measurement count byte
B_6 - B_7 = not used

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.

Setting the Address (Node ID) and Baud Rate

Address Setting (Node ID)

The Address Setting (Node ID) is set via 6 switches located on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

Baud Rate

The transmission baud rate may be either factory preset at the time of order or set manually at the time of installation.

The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

address setting:

DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
…	…	…	…	…	…	…
1	1	1	1	1	1	63

baud rate setting:

DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

Current % of Measurement Range

The Current % of Measurement Range is a 2-byte value that expresses the current linear position as a percentage of the entire full stroke range. Resolution is **.1 %** of the full stroke measurement range.

This value starts at **0x0000** at the beginning of the stroke and ends at **0x03E8**.

Example:

Hex	Decimal	Percent
0000	0000	0.0%
0001	0001	0.1%
0002	0002	0.2%
…	…	…
03E8	1000	100.0%

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 16-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 **0x0000** with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at **0xFFFF**. This holds true for all ranges.

Error Flags

0x55 (yellow LED on controller board) indicates that the sensor has begun to travel beyond the calibrated range of the internal position potentiometer.

0xAA (red LED on controller board) indicates that the sensor has moved well beyond the calibrated range of the internal position potentiometer.

If either error flag occurs within the full stroke range of the sensor, the unit should be returned to the factory for repair and recalibration.

Converting CMC to Inches

If required, the CMC can easily be converted a linear measurement expressed in inches instead of just counts.

This is accomplished by first dividing the CMC by 65,535 (total counts over the range) and then multiplying that value by the FSR:

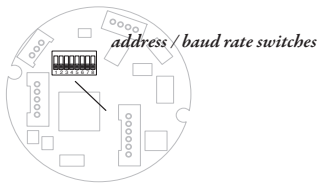
$$\left(\frac{\text{CMC}}{65{,}535}\right) \text{X FSR}$$

Example:

If the full stroke range is **30 inches** and the current position is **0x0FF2** (4082 Decimal) then,

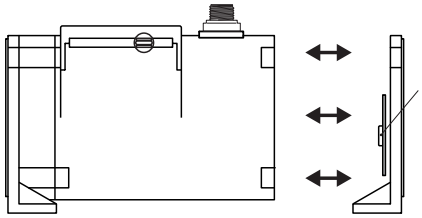
$$\left(\frac{4082}{65{,}535}\right) \text{X } 30.00 \text{ inches} = 1.87 \text{ inches}$$

CANBus Controller Board and DIP Switch Location



Caution! Do Not Remove Spring-Side End Cover

removing spring-side end cover could cause spring to become unseated and permanently damaged.



internal dip switches & controller board

to gain access to the controller board, remove four Allen-Head Screws and remove end cover bracket.

Ordering Information:

Model Number:

PT9CN - ____ Ⓡ - ___ Ⓐ - ___ Ⓑ - ___ Ⓒ - ___ Ⓓ - **J** Ⓔ - ___ Ⓕ - ___ Ⓖ - ___ Ⓗ
order code:

Sample Model Number:
PT9CN - 200 - AL - N34 - 26 - FR - J - 500 - 32 - SC5

Ⓡ	range:	200 inches
Ⓐ	enclosure	aluminum
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	measuring cable tension:	26 oz.
Ⓓ	cable exit:	front (horizontal)
Ⓔ	interface:	CANbus SAE J1939
Ⓕ	baud rate:	500 k bits/sec.
Ⓖ	node ID:	32 decimal
Ⓗ	electrical connection:	5-meter cordset with straight plug

Full Stroke Range:

Ⓡ *order code:*	75	100	150	200	250	300	350	400	450*	500*	550*
full stroke range, min:	75 in.	100 in.	150 in.	200 in.	250 in.	300 in.	350 in.	400 in.	450 in.	500 in.	550 in.

** – 52 oz. cable tension strongly recommended*

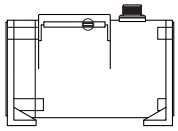
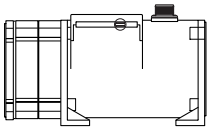
Enclosure Material:

Ⓐ *order code:*	AL	SS
	powder-painted aluminum	303 stainless

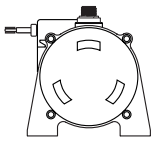
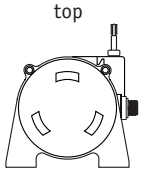
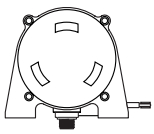
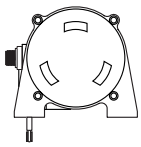
Measuring Cable:

Ⓑ *order code:*	N34	S47	V62
	Ø.034-inch nylon-coated stainless steel *available in **all** ranges*	Ø.047-inch stainless steel *all ranges up to **500 inches***	Ø.062-inch thermoplastic *all ranges up to **400 inches***

Measuring Cable Tension:

Ⓒ *order code:*	26		52	
tension (30%):	26 oz.		52 oz.	
enclosure material:	*aluminum*	*stainless steel*	*aluminum*	*stainless steel*
max. acceleration:	1 G	.33 G	5 G	2 G
max. velocity:	60 inches/sec	20 inches/sec	200 inches/sec	80 inches/sec
	 standard housing *see fig 1.*		 dual-spring housing *see fig 2.*	

Cable Exit:

Ⓓ *order code:*	FR	UP	BK	DN
	front	top	back	down
				

Baud Rate:

Ⓕ *order code:*	125	250	500
	125 kbaud	250 kbaud	500 kbaud

Node ID:

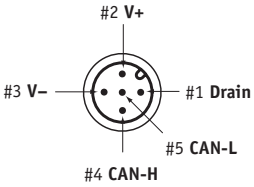
Ⓖ *order code:*	0	1	2	3	...	61	62	63

select address (0 - 63 Decimal)

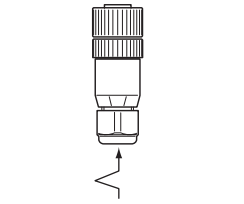
Ordering Information:

Electrical Connection:

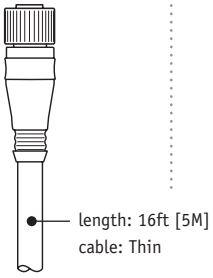
order code:	blank	MC5	SC5	NC5
	5-pin micro-connector *(no mating plug supplied)*	5-pin micro-connector w/ mating plug	5-pin micro-connector and 5 meter length cordset w/straight mating plug	5-pin micro-connector and 5 meter length cordset w/90° mating plug



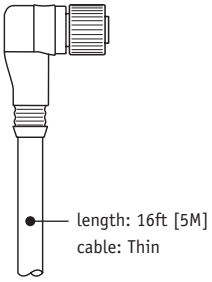
connector (contact view)



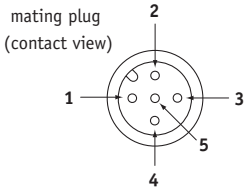
0.16" - 0.32" OD Cable (THIN)



length: 16ft [5M]
cable: Thin

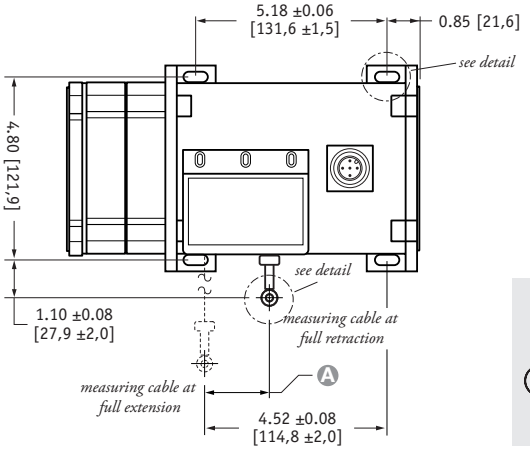


length: 16ft [5M]
cable: Thin



pin	signal	wire color
1	drain	brown
2	V+	white
3	V-	blue
4	Can-H	black
5	Can-L	grey

Fig. 2 – Outline Drawing (52 oz. cable tension only)

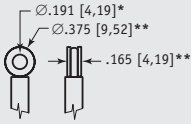


A DIMENSION (INCHES)

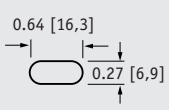
MEASURING CABLE

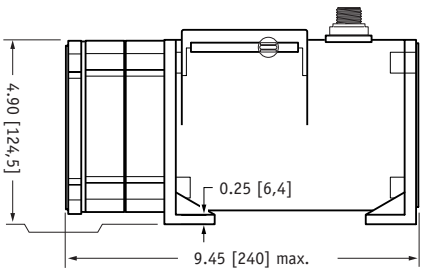
RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

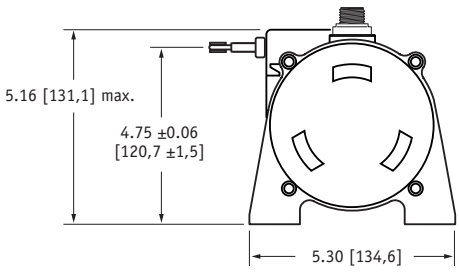
eyelet detail



mounting hole detail







DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

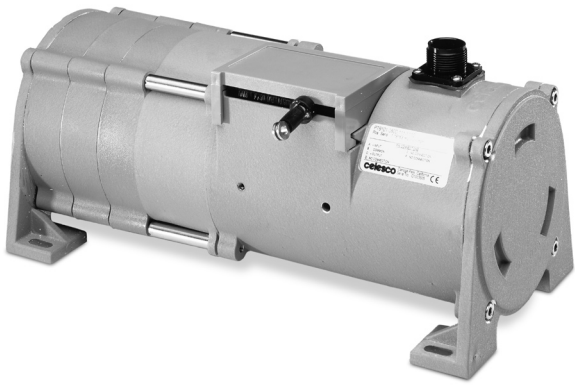
* tolerance = +.005 –.001 [+.13 –.03]
** tolerance = +.005 –.005 [+.13 –.13]

version: **6.0** last updated: **February 26, 2008**

CANbus • SAE J1939
Ranges: 0-600 to 0-1700 inches
Industrial Grade

<Extended Range>

PT9CN



The PT9CN communicates linear position feedback via the CANbus SAE J1939 interface. The PT9CN has been designed for factory and harsh environment applications requiring full stroke ranges up to 1700".

As a member of Celesco's innovative family of NEMA 4 rated cable-extension transducers, the PT9CN installs in minutes by simply mounting it's body to a fixed surface and attaching it's cable to the movable object. Perfect parallel alignment not required.

Specification Summary:

GENERAL

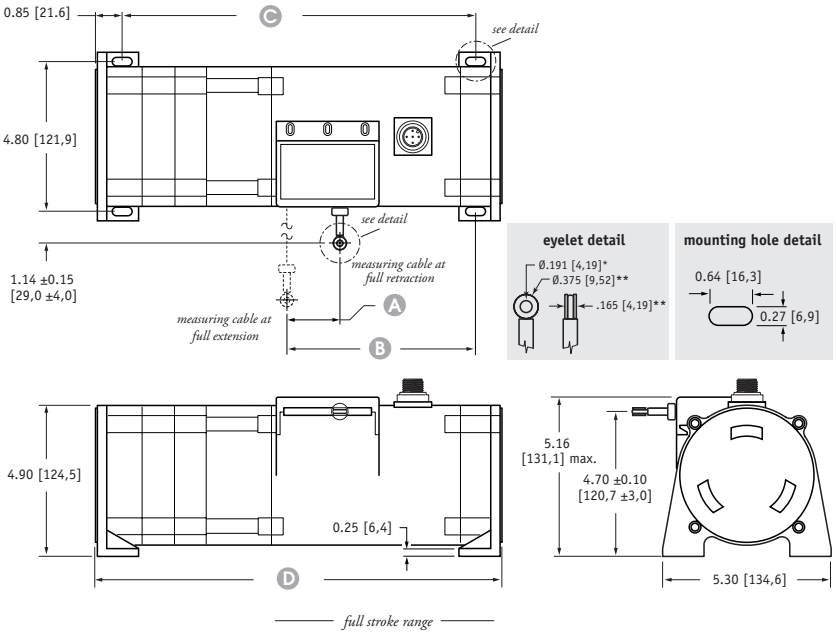
Full Stroke Range Options–*on this datasheet* ..... 0-600 to 0-1700 inches
Electrical Signal Interface ..... CANbus SAE J1939
Protocol ..... Proprietary B
Accuracy ..... ± 0.10% full stroke
Repeatability ..... ± 0.02% full stroke
Resolution ..... ± 0.003% full stroke
Measuring Cable ..... nylon-coated stainless steel
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... 250,000, min. –*before signal degradation can occur*
Maximum Retraction Acceleration ..... *see ordering information*
Maximum Velocity ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 14 lbs. (28 lbs.) max.

ELECTRICAL

Input Voltage ..... 7 - 18 VDC
Input Current ..... 60 mA max.
Address Setting/Node ID ..... 0...63 set via DIP switches
Baud Rate ..... 125K, 250K or 500K set via DIP switches
Update Rate ..... 10 ms. (20 ms. available–*contact factory*)

ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67
Operating Temperature ..... -40º to 200ºF (-40º to 90ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum



	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
A	1.76 [44,7]	1.58 [40,1]	1.98 [50,2]	1.49 [37,8]	1.86 [47,2]	2.11 [53,6]
B	4.52 ±0.15 [114,8 ±4,0]	5.46 ±0.15 [138,7 ±4,0]				
C	10.40 ±0.08 [264,2 ±2,0]	11.34 ±0.08 [288,0 ±2,0]				
D	12.15 [308,6] max.	13.09 [332,5] max.				

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

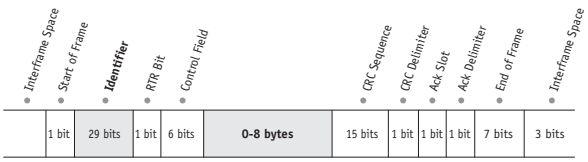
* tolerance = +.005 –.001 [+.13 –.03]
** tolerance = +.005 –.005 [+.13 –.13]

Output Signal

Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco.com • info@celesco.com

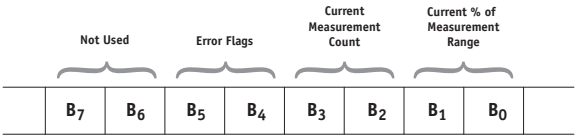
I/O Format:

Data Frame



repetition = 8 msec.

Data Field



B_0 = LSB current % of measurement range byte
B_1 = MSB current % of measurement range byte
B_4 - B_5 = error flags
B_2 = LSB current measurement count byte
B_3 = MSB current measurement count byte
B_6 - B_7 = not used

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.

Setting the Address (Node ID) and Baud Rate

Address Setting (Node ID)

The Address Setting (Node ID) is set via 6 switches located on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

Baud Rate

The transmission baud rate may be either factory preset at the time of order or set manually at the time of installation.

The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

address setting:

DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
...	...	...	...	...	...	...
1	1	1	1	1	1	63

baud rate setting:

DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

Current % of Measurement Range

The Current % of Measurement Range is a 2-byte value that expresses the current linear position as a percentage of the entire full stroke range. Resolution is **.1 %** of the full stroke measurement range.

This value starts at **0x0000** at the beginning of the stroke and ends at **0x03E8**.

Example:

Hex	Decimal	Percent
0000	0000	0.0%
0001	0001	0.1%
0002	0002	0.2%
...	...	...
03E8	1000	100.0%

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 16-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 **0x0000** with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at **0xFFFF**. This holds true for all ranges.

Error Flags

0x55 (yellow LED on controller board) indicates that the sensor has begun to travel beyond the calibrated range of the internal position potentiometer.

0xAA (red LED on controller board) indicates that the sensor has moved well beyond the calibrated range of the internal position potentiometer.

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Converting CMC to Inches

If required, the CMC can easily be converted a linear measurement expressed in inches instead of just counts.

This is accomplished by first dividing the CMC by 65,535 (total counts over the range) and then multiplying that value by the FSR:

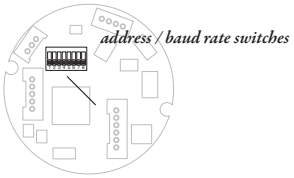
$$\left(\frac{\text{CMC}}{65{,}535}\right) \text{X FSR}$$

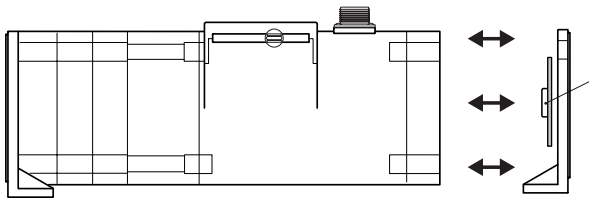
Example:

If the full stroke range is **30 inches** and the current position is **0x0FF2** (4082 Decimal) then,

$$\left(\frac{4082}{65{,}535}\right) \text{X } 30.00 \text{ inches} = 1.87 \text{ inches}$$

CANBus Controller Board and DIP Switch Location





internal dip switches & controller board

to gain access to the controller board, remove four Allen-Head Screws and remove end cover bracket.

Ordering Information:

Model Number:

PT9CN - _____ Ⓡ - ___ Ⓐ - ___ Ⓑ - J Ⓒ - ___ Ⓓ - ___ Ⓔ - ___ Ⓕ
order code:

Sample Model Number:

PT9CN - 1200 - AL - FR - J - 500 - 32 - SC5

Ⓡ	range:	1200 inches
Ⓐ	enclosure	aluminum
Ⓑ	cable exit:	front (horizontal)
Ⓒ	interface:	CANbus SAE J1939
Ⓓ	baud rate:	500 k bits/sec.
Ⓔ	node ID:	32 decimal
Ⓕ	electrical connection:	5-meter cordset with straight plug

Full Stroke Range:

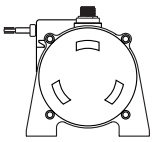
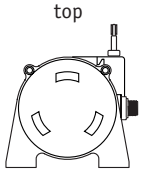
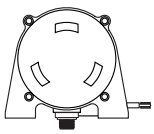
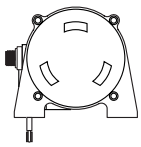
Ⓡ *order code:*	600	800	1000	1200	1500	1700
full stroke range, min:	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
cable tension (30%):	25 oz.	25 oz.	24 oz.	24 oz.	23 oz.	23 oz.
measuring cable:	.034-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless

Enclosure Material:

Ⓐ *order code:*	AL	SS
enclosure material:	powder-painted aluminum	303 stainless steel
max. acceleration:	1G	.33G
max. velocity:	60 inches/sec.	20 inches/sec.

Cable Exit:

Ⓑ *order code:*

FR	UP	BK	DN
front	top	back	down
			

Baud Rate:

Ⓓ *order code:*	125	250	500
	125 kbaud	250 kbaud	500 kbaud

Node ID:

Ⓔ *order code:*	0	1	2	3	...	61	62	63

select address (0 - 63 Decimal)

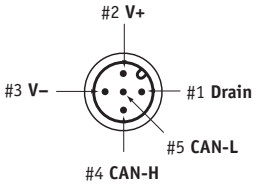
Ordering Information:

Electrical Connection:

order code:

blank

5-pin micro-connector
(no mating plug supplied)



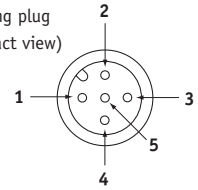
connector
(contact view)

MC5

5-pin micro-connector
w/ mating plug

0.16" - 0.32" OD Cable (THIN)

mating plug
(contact view)



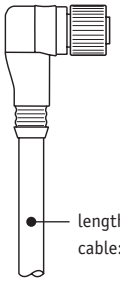
SC5

5-pin micro-connector
and 5 meter length cordset
w/straight mating plug

length: 16ft [5M]
cable: Thin

NC5

5-pin micro-connector
and 5 meter length cordset
w/90° mating plug



length: 16ft [5M]
cable: Thin

pin	signal	wire color
1	drain	brown
2	V+	white
3	V-	blue
4	Can-H	black
5	Can-L	grey

DeviceNET®
Ranges: 0-75 to 0-550 inches
Industrial Grade

PT9DN

Specification Summary:

GENERAL

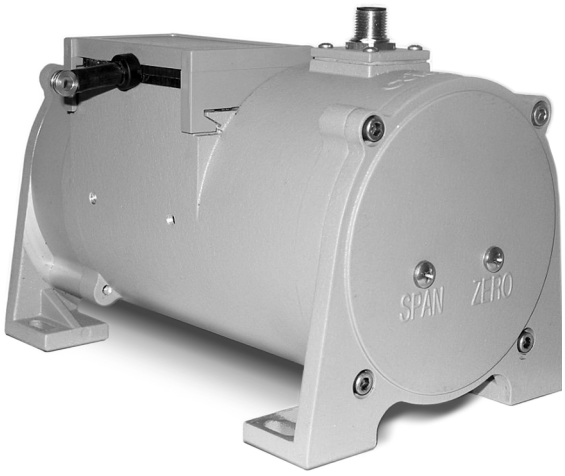
Full Stroke Range Options–*on this datasheet* ..... 0-75 to 0-550 inches
Electrical Signal Interface ..... CANbus ISO 11898
Protocol ..... DeviceNET Version 2.0
Accuracy ..... ± 0.10% full stroke
Repeatability ..... ± 0.02% full stroke
Resolution ..... ± 0.003% full stroke
Measuring Cable Options ..... nylon-coated stainless steel or thermoplastic
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... 250,000, min. –*before signal degradation can occur*
Maximum Retraction Acceleration ..... *see ordering information*
Maximum Velocity ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 8 lbs. (16 lbs.) max.

ELECTRICAL

Input Voltage ..... bus powered
Input Current ..... 40 mA
Address Setting/Node ID ..... 0...63 set via DIP switches –*default setting: 63*
Baud Rate ..... 125K, 250K or 500K set via DIP switches
EDS File ..... available @ http://www.celeso.com/download

ENVIRONMENTAL

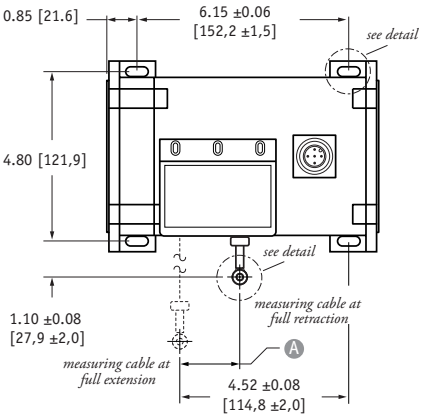
Enclosure ..... NEMA 4/4X/6, IP 67
Operating Temperature ..... -40º to 200ºF (-40º to 90ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum



The PT9DN communicates via DeviceNET protocol with programmable controllers in factories and harsh environments requiring linear position measurements in ranges up to 550".

As a member of Celesco's innovative family of NEMA 4 rated cable-extension transducers, the PT9DN installs in minutes by simply mounting it's body to a fixed surface and attaching it's cable to the movable object. Perfect parallel alignment not required.

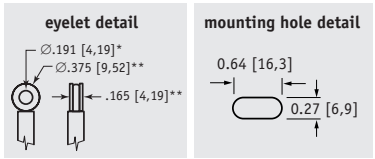
Fig. 1 – Outline Drawing (26 oz. cable tension only)

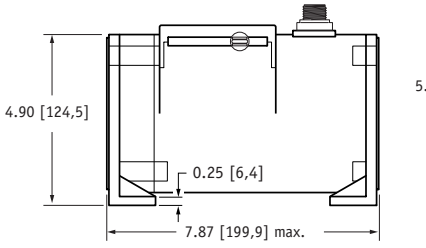


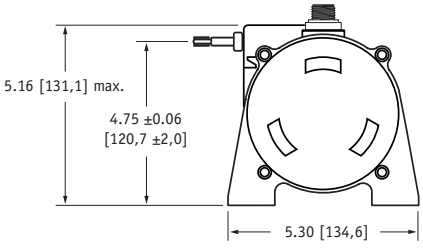
A DIMENSION (INCHES)

MEASURING CABLE

RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a



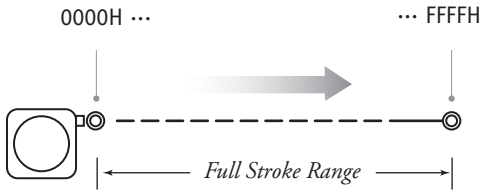




DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

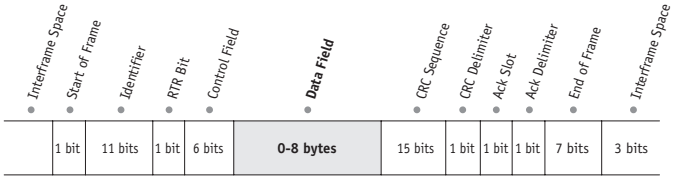
Output Signal



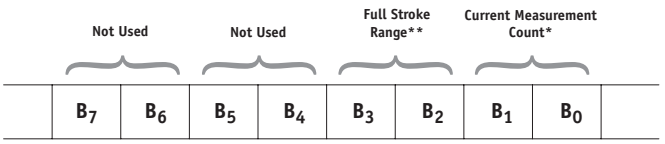
Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco.com • info@celesco.com

I/O Format:

Data Frame



Data Field



B_0 = LSB current measurement byte
B_1 = MSB current measurement byte
B_2 = LSB full stroke range byte
B_3 = MSB full stroke range byte
B_4 - B_7 = not used

***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 16-bit value that occupies the first two 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 0000H with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at FFFFH. This holds true for all ranges.

****Full Stroke Range**

The **F**ull **S**troke **R**ange **(FSR)** is a 16-bit value in the data field that expresses the full range of the sensor in inches. This value can be used to convert the actual count to units of measurement should the application require it.

The full stroke measurement range occupies the second two bytes (B_2 and B_3) of the data field.

B_2 is the LSB (least significant byte) and B_3 is the MSB (most significant byte).

This value is expressed in inches.

Example:

Hex Value	*Decimal Equivalent*	*Full Stroke Range*
001E	30	30 inches

Converting CMC to Inches

If required, the CMC can easily be converted to a linear measurement expressed in inches instead of just counts.

This is accomplished by first dividing the CMC by 65,535 (total counts over the range) and then multiplying that value by the FSR:

$$\left(\frac{\text{CMC}}{65{,}535}\right) \text{X FSR}$$

Example:

If the full stroke range is **30 inches** and the current position is **OFF2 Hex** (4082 Decimal) then,

$$\left(\frac{4082}{65{,}535}\right) \text{X } 30.00 \text{ inches} = 1.87 \text{ inches}$$

Address Setting (Node ID), Baud Rate and Bus Termination Settings

Address Setting (Node ID)

The Address Setting (Node ID) is set via 6 switches located on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
…	…	…	…	…	…	…
1	1	1	1	1	1	63

Baud Rate

The transmission baud rate may be either factory preset at the time of order or set manually at the time of installation.

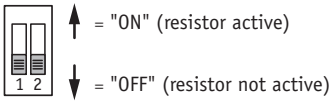
The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

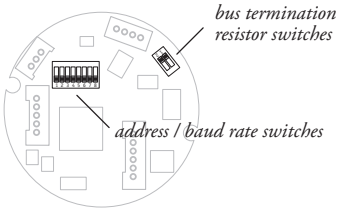
Bus Termination

The setting of the internal bus termination resistor may be specified upon order or manually changed by the end user at the time of installation.

The bus termination resistor is activated setting switches **1** & **2** on the 2-pole DIP switch (located on the internal DeviceNET controller board) to the "ON" position.

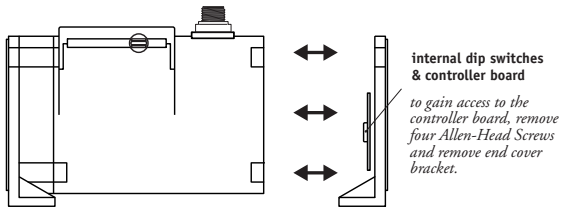


DeviceNET Controller Board and DIP Switch Location



Caution! Do Not Remove Spring-Side End Cover

removing spring-side end cover could cause spring to become unseated and permanently damaged.



Ordering Information:

Model Number:

PT9DN - _____ Ⓡ - ___ Ⓐ - ___ Ⓑ - ___ Ⓒ - ___ Ⓓ - ___ Ⓔ - ___ Ⓕ - ___ Ⓖ
order code:

Sample Model Number:

PT9DN - 200 - AL - N34 - 26 - FR - 500 - TR - SC5

Ⓡ	range:	200 inches
Ⓐ	enclosure	aluminum
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	measuring cable tension:	26 oz.
Ⓓ	cable exit:	front (horizontal)
Ⓔ	baud rate:	500 k bits/sec.
Ⓕ	terminating resistor:	yes
Ⓖ	electrical connection:	5-meter cordset with straight plug

Full Stroke Range:

Ⓡ *order code:*	**75**	**100**	**150**	**200**	**250**	**300**	**350**	**400**	**450***	**500***	**550***
full stroke range, min:	75 in.	100 in.	150 in.	200 in.	250 in.	300 in.	350 in.	400 in.	450 in.	500 in.	550 in.

** – 52 oz. cable tension strongly recommended*

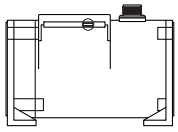
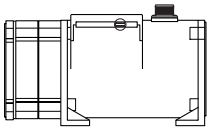
Enclosure Material:

Ⓐ *order code:*	**AL**	**SS**
	powder-painted aluminum	303 stainless

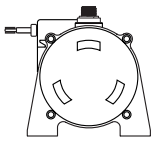
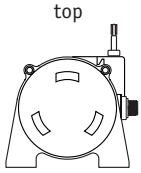
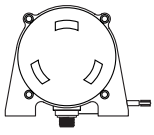
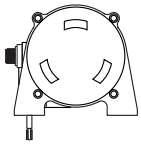
Measuring Cable:

Ⓑ *order code:*	**N34**	**S47**	**V62**
	Ø.034-inch nylon-coated stainless steel *available in **all** ranges*	Ø.047-inch stainless steel *all ranges up to **500 inches***	Ø.062-inch thermoplastic *all ranges up to **400 inches***

Measuring Cable Tension:

Ⓒ *order code:*	**26**		**52**	
tension (30%):	26 oz.		52 oz.	
enclosure material:	*aluminum*	*stainless steel*	*aluminum*	*stainless steel*
max. acceleration:	1 G	.33 G	5 G	2 G
max. velocity:	60 inches/sec	20 inches/sec	200 inches/sec	80 inches/sec
	 standard housing *see fig 1.*		 dual-spring housing *see fig 2.*	

Cable Exit:

Ⓓ *order code:*	**FR**	**UP**	**BK**	**DN**
	front	top	back	down
				

Baud Rate:

Ⓔ *order code:*	**125**	**250**	**500**
	125 kbaud	250 kbaud	500 kbaud

Ordering Information:

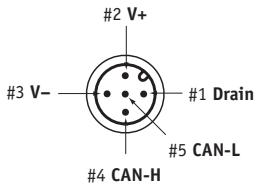
Terminating Resistor:

Ⓕ order code:	TR	NR
	terminating resistor	no terminating resistor

Electrical Connection:

Ⓒ order code:

blank — 5-pin micro-connector *(no mating plug supplied)*

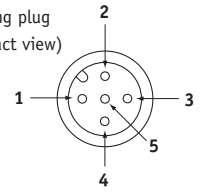


connector (contact view)

MC5 — 5-pin micro-connector w/ mating plug

0.16" - 0.32" OD Cable (THIN)

mating plug (contact view)

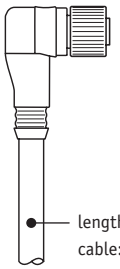


pin	signal	wire color
1	drain	brown
2	V+	white
3	V-	blue
4	Can-H	black
5	Can-L	grey

SC5 — 5-pin micro-connector and 5 meter length cordset w/straight mating plug

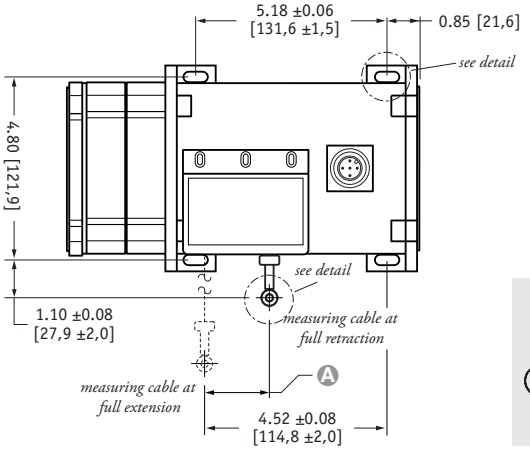
length: 16ft [5M]
cable: Thin

NC5 — 5-pin micro-connector and 5 meter length cordset w/90° mating plug



length: 16ft [5M]
cable: Thin

Fig. 2 – Outline Drawing (52 oz. cable tension only)

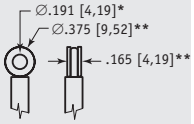


A DIMENSION (INCHES)

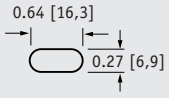
MEASURING CABLE

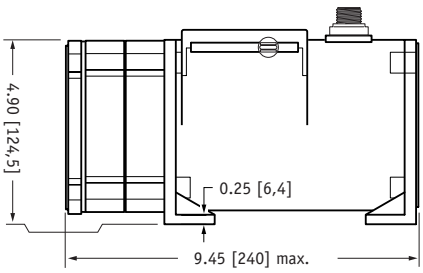
RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

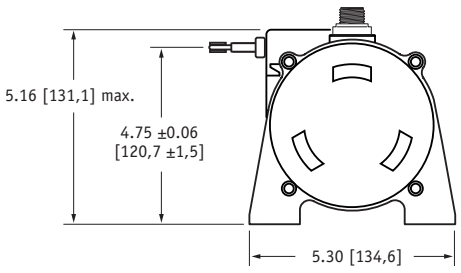
eyelet detail



mounting hole detail







DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

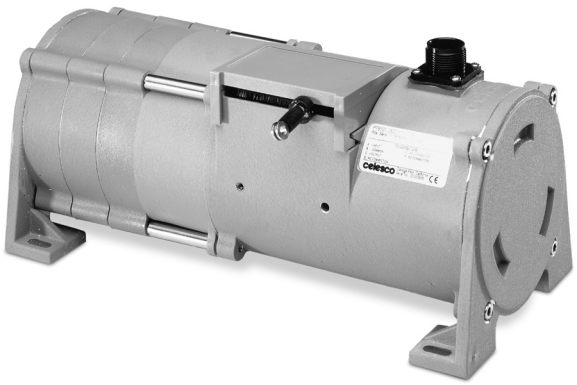
* tolerance = +.005 –.001 [+.13 –.03]
** tolerance = +.005 –.005 [+.13 –.13]

version: **5.0** last updated: **May 24, 2006**

<Extended Range>

PT9DN

DeviceNET®
Ranges: 0-600 to 0-1700 inches
Industrial Grade



Specification Summary:

GENERAL

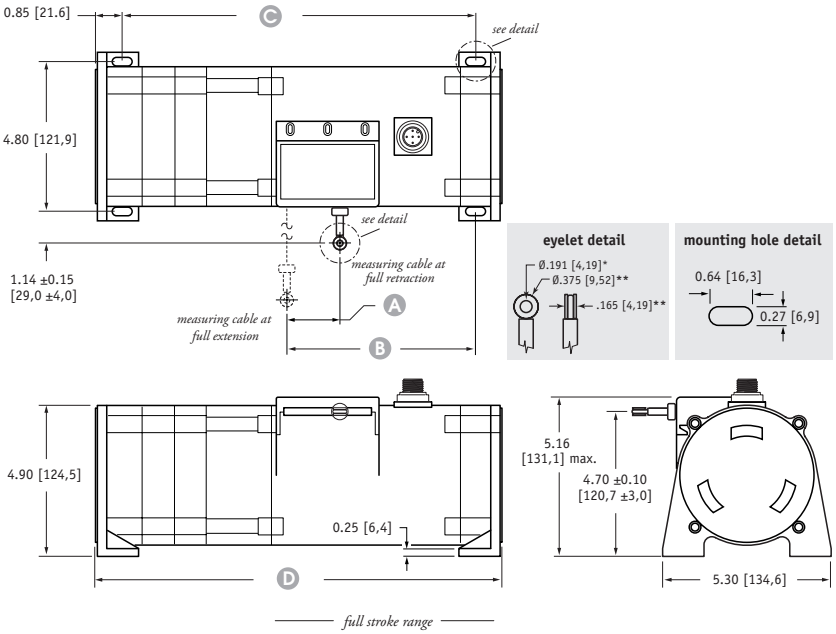
Full Stroke Range Options–*on this datasheet* ..... 0-600 to 0-1700 inches
Electrical Signal Interface ..... CANbus ISO 11898
Protocol ..... DeviceNET Version 2.0
Accuracy ..... ± 0.10% full stroke
Repeatability ..... ± 0.02% full stroke
Resolution ..... ± 0.003% full stroke
Measuring Cable ..... nylon-coated stainless steel
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... 250,000, min. –*before signal degradation can occur*
Maximum Retraction Acceleration ..... *see ordering information*
Maximum Velocity ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 14 lbs. (28 lbs.) max.

ELECTRICAL

Input Voltage ..... bus powered
Input Current ..... 40 mA
Address Setting/Node ID ..... 0...63 set via DIP switches –*default setting: 63*
Baud Rate ..... 125K, 250K or 500K set via DIP switches
EDS File ..... available @ http://www.celeso.com/download

ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67
Operating Temperature ..... -40º to 200ºF (-40º to 90ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum



	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
A	1.76 [44,7]	1.58 [40,1]	1.98 [50,2]	1.49 [37,8]	1.86 [47,2]	2.11 [53,6]
B	4.52 ±0.15 [114,8 ±4,0]	5.46 ±0.15 [138,7 ±4,0]				
C	10.40 ±0.08 [264,2 ±2,0]	11.34 ±0.08 [288,0 ±2,0]				
D	12.15 [308,6] max.	13.09 [332,5] max.				

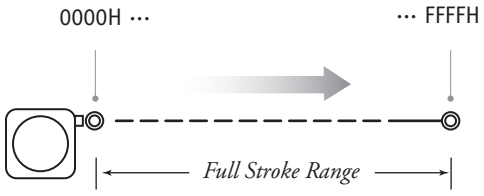
DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

The PT9DN communicates via DeviceNET protocol with programmable controllers in factories and harsh environments requiring linear position measurements in ranges up to 1700".

As a member of Celesco's innovative family of NEMA 4 rated cable-extension transducers, the PT9DN installs in minutes by simply mounting it's body to a fixed surface and attaching it's cable to the movable object. Perfect parallel alignment not required.

Output Signal



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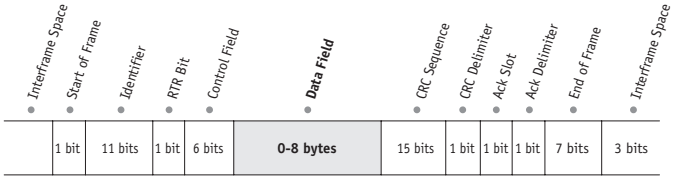
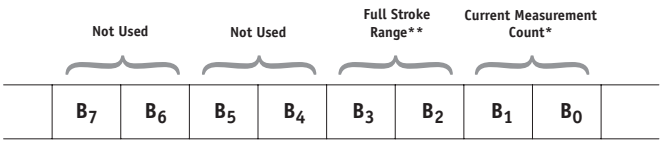
I/O Format:

Data Frame



Data Field



B_0 = LSB current measurement byte
B_1 = MSB current measurement byte
B_2 = LSB full stroke range byte
B_3 = MSB full stroke range byte
B_4 - B_7 = not used

***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 16-bit value that occupies the first two 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 0000H with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at FFFFH. This holds true for all ranges.

****Full Stroke Range**

The **F**ull **S**troke **R**ange **(FSR)** is a 16-bit value in the data field that expresses the full range of the sensor in inches. This value can be used to convert the actual count to units of measurement should the application require it.

The full stroke measurement range occupies the second two bytes (B_2 and B_3) of the data field.

B_2 is the LSB (least significant byte) and B_3 is the MSB (most significant byte).

This value is expressed in inches.

Example:

Hex Value	*Decimal Equivalent*	*Full Stroke Range*
001E	30	30 inches

Converting CMC to Inches

If required, the CMC can easily be converted to a linear measurement expressed in inches instead of just counts.

This is accomplished by first dividing the CMC by 65,535 (total counts over the range) and then multiplying that value by the FSR:

$$\left(\frac{\text{CMC}}{65{,}535}\right) \text{X FSR}$$

Example:

If the full stroke range is **30 inches** and the current position is **OFF2 Hex** (4082 Decimal) then,

$$\left(\frac{4082}{65{,}535}\right) \text{X } 30.00 \text{ inches} = 1.87 \text{ inches}$$

Address Setting (Node ID), Baud Rate and Bus Termination Settings

Address Setting (Node ID)

The Address Setting (Node ID) is set via 6 switches located on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
…	…	…	…	…	…	…
1	1	1	1	1	1	63

Baud Rate

The transmission baud rate may be either factory preset at the time of order or set manually at the time of installation.

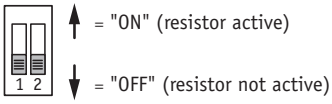
The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

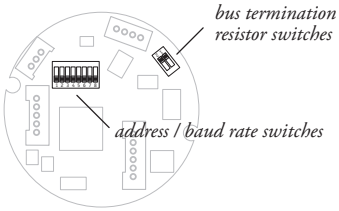
Bus Termination

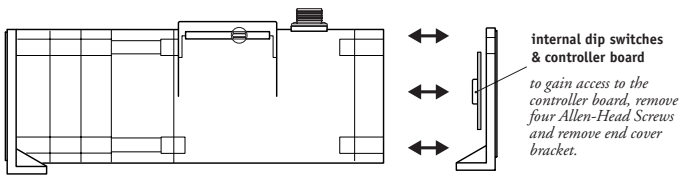
The setting of the internal bus termination resistor may be specified upon order or manually changed by the end user at the time of installation.

The bus termination resistor is activated setting switches **1** & **2** on the 2-pole DIP switch (located on the internal DeviceNET controller board) to the "ON" position.



DeviceNET Controller Board and DIP Switch Location





Ordering Information:

Model Number:

PT9DN - _____ - ___ - ___ - ___ - ___ - ___ - ___
order code: ® Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

Sample Model Number:

PT9DN - 1200 - AL - FR - 500 - TR - SC5

®	range:	1200 inches
Ⓐ	enclosure	aluminum
Ⓑ	cable exit:	front (horizontal)
Ⓒ	baud rate:	500 k bits/sec.
Ⓓ	terminating resistor:	yes
Ⓔ	electrical connection:	5-meter cordset with straight plug

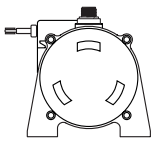
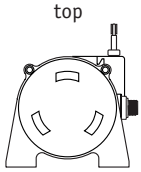
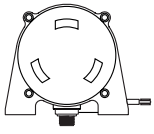
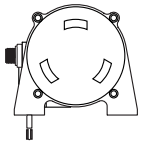
Full Stroke Range:

® order code:	600	800	1000	1200	1500	1700
full stroke range, min:	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
cable tension (30%):	25 oz.	25 oz.	24 oz.	24 oz.	23 oz.	23 oz.
measuring cable:	.034-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless

Enclosure Material:

Ⓐ order code:	AL	SS
enclosure material:	powder-painted aluminum	303 stainless steel
max. acceleration:	1G	.33G
max. velocity:	60 inches/sec.	20 inches/sec.

Cable Exit:

Ⓑ order code:	FR	UP	BK	DN
	front	top	back	down
				

Baud Rate:

Ⓒ order code:	125	250	500
	125 kbaud	250 kbaud	500 kbaud

Terminating Resistor:

Ⓓ order code:	TR	NR
	terminating resistor	no terminating resistor

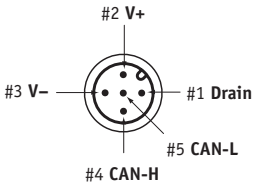
Ordering Information:

Electrical Connection:

order code:

blank

5-pin micro-connector
(no mating plug supplied)



connector
(contact view)

MC5

5-pin micro-connector
w/ mating plug

0.16" - 0.32" OD Cable (THIN)

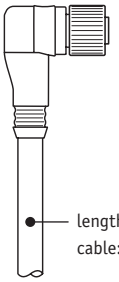
SC5

5-pin micro-connector
and 5 meter length cordset
w/straight mating plug

length: 16ft [5M]
cable: Thin

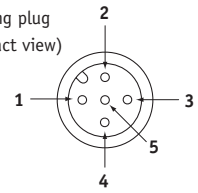
NC5

5-pin micro-connector
and 5 meter length cordset
w/90° mating plug



length: 16ft [5M]
cable: Thin

mating plug
(contact view)



pin	signal	wire color
1	drain	brown
2	V+	white
3	V-	blue
4	Can-H	black
5	Can-L	grey

Precision Potentiometric Output
Ranges: 0-75 to 0-550 inches
Industrial Grade

PT9101

CE

Specification Summary:

GENERAL

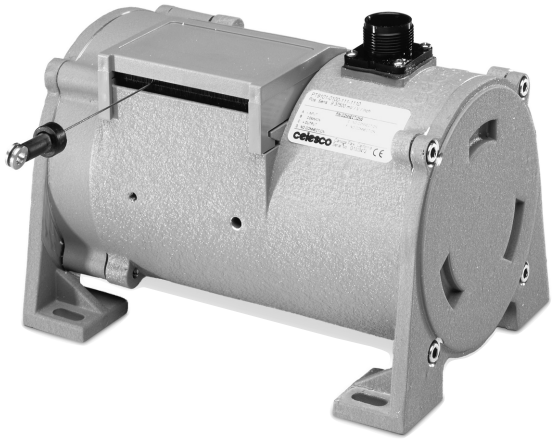
Full Stroke Range Options–*on this datasheet* ..... 0-75 to 0-550 inches
Output Signal ..... voltage divider (potentiometer)
Accuracy ..... ± 0.10% full stroke
Repeatability ..... ± 0.02% full stroke
Resolution ..... essentially infinite
Measuring Cable Options ..... nylon-coated stainless steel or thermoplastic
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... 250,000 *before signal degradation can occur*
Maximum Retraction Acceleration ..... *see ordering information*
Maximum Velocity ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 8 lbs. (16 lbs.) max.

ELECTRICAL

Input Resistance Options ..... 500, 1K, 5K, 10K Ω, bridge, *see ordering information*
Power Rating, Watts ..... 2.0 at 70°F derated to 0 at 250° F
Recommended Maximum Input Voltage ..... 30V (AC/DC)
Output Signal Change Over Full Stroke Range ..... 94% ±4% of input voltage

ENVIRONMENTAL

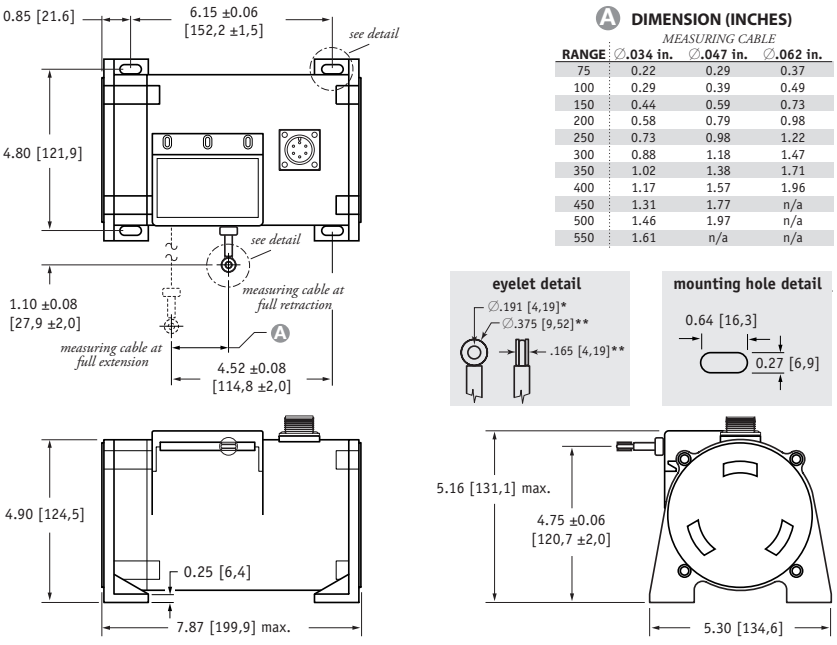
Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration ..... up to 10 G's to 2000 Hz maximum



The PT9101 is a work-horse for demanding long-range applications requiring a linear position measurements in ranges up to 1700 inches. Available with either a 500, 1K, 5K, or 10K ohm potentiometer, the PT9101 operates with any basic panel meter or programmable controller.

As a member of Celesco's innovative family of NEMA 4 rated cable-extension transducers, the PT9101 offers numerous benefits. It installs in minutes, works without perfect parallel alignment, and when it's stainless-steel cable is retracted, it measures only 6".

Fig. 1 – Outline Drawing (26 oz. cable tension only)



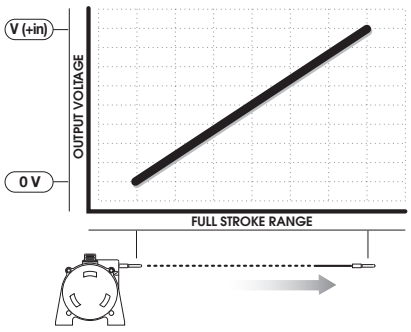
A DIMENSION (INCHES)
MEASURING CABLE

RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

Output Signal



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celesco
celesco.com • info@celesco.com

Ordering Information:

Model Number:

PT9101- ____ Ⓡ **-** ____ Ⓐ ____ Ⓑ ____ Ⓒ **-** ____ Ⓓ **1** Ⓔ ____ Ⓕ **0** Ⓖ

order code:

Sample Model Number:

PT9101 - 0500 - 111 - 1110

Ⓡ	range:	500 inches
Ⓐ	enclosure/cable tension:	aluminum/26 oz.
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	cable exit:	front
Ⓓ	output signal:	500 ohm potentiometer
Ⓕ	electrical connection:	6-pin plastic connector

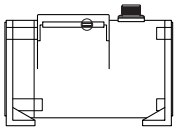
Full Stroke Range:

Ⓡ order code:	0075	0100	0150	0200	0250	0300	0350	0400	0450*	0500*	0550*
full stroke range, min:	75 in.	100 in.	150 in.	200 in.	250 in.	300 in.	350 in.	400 in.	450 in.	500 in.	550 in.

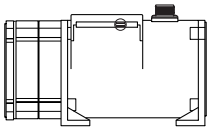
** – 52 oz. cable tension strongly recommended*

Enclosure Material and Measuring Cable Tension:

Ⓐ order code:	1	3	2	4
tension (±30%):	26 oz.		52 oz.	
enclosure material:	*powder-painted aluminum*	*303 stainless steel*	*powder-painted aluminum*	*303 stainless steel*
max. acceleration:	1 G	.33 G	5 G	2 G
max. velocity:	60 inches/sec	20 inches/sec	200 inches/sec	80 inches/sec



standard housing
see fig 1.



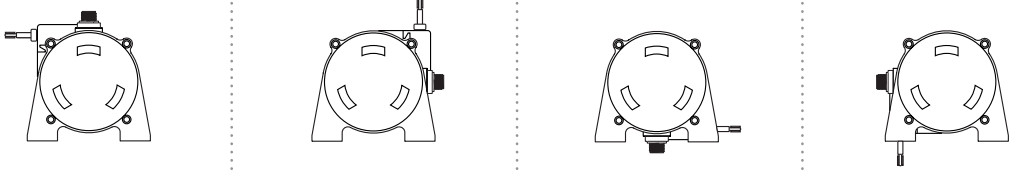
dual-spring housing
see fig 2.

Measuring Cable:

Ⓑ order code:	1	2	3
	∅.034-inch nylon-coated stainless steel *available in **all** ranges*	∅.047-inch stainless steel *all ranges up to **500 inches***	∅.062-inch thermoplastic *all ranges up to **400 inches***

Cable Exit:

Ⓒ *order code:* **1** front **2** top **3** back **4** down

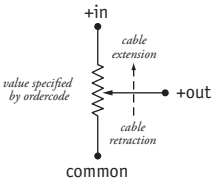


Output Signals:

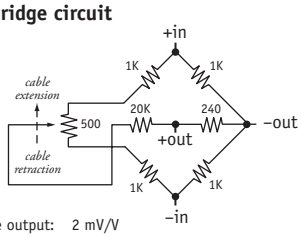
Ⓓ order code:	1	2	3	4	5	6
	500 ohm*	1000 ohm*	5000 ohm*	10,000 ohm*	fixed bridge (2 mV/V)	adjustable bridge (0...30 mV/V)

**tolerance = ±10%*

circuit, options 1-4

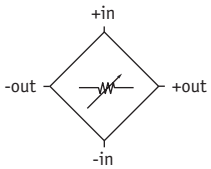


fixed bridge circuit



full scale output: 2 mV/V
zero adjust: not available

adjustable bridge cicuit

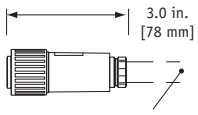
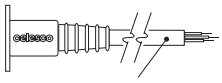
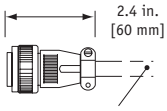
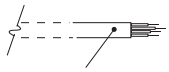


full scale output: adjustable from 0 to 30mV/V
zero adjust: from factory set zero to 50% of full stroke

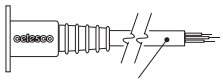
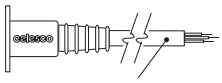
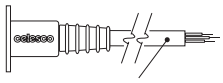
Ordering Information:

Electrical Connection:

F *order code:*

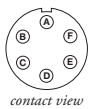
1	2	3	4
6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
			
1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

F *order code:*

5	6	7
100-ft. [30 M] waterproof cable	10-ft. [3 M] **pressure tested*** waterproof cable	100-ft. [30 M] **pressure tested*** waterproof cable
IP 67, NEMA 4X,6**	**IP 68, NEMA 4X**, 6P**	**IP 68, NEMA 4X**, 6P**
		
100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	standard	bridge
A	+ in	+ in
B	common	– in
C	+ out	– out
D	-	+ out



contact view

Waterproof Cable

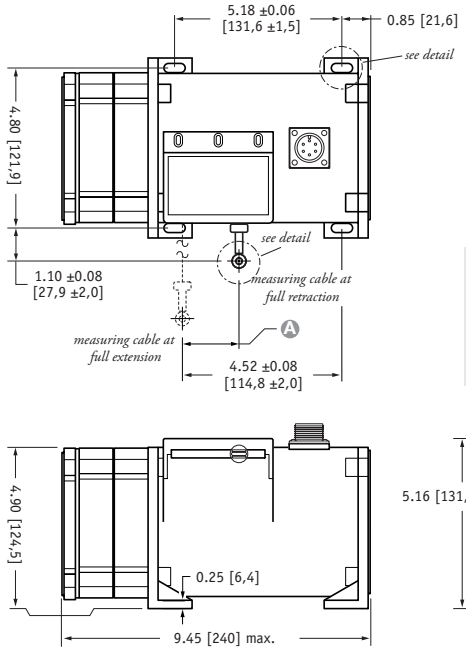
color code	standard	bridge
WHITE	+ in	n/a
BLACK	common	n/a
GREEN	+ out	n/a

Instrumentation Cable

color code	standard	bridge
RED	+ in	+ in
BLACK	common	– in
GREEN	+ out	+ out
WHITE	-	– out

*Notes: *–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours. **–NEMA 4X applies to stainless steel enclosure only.*

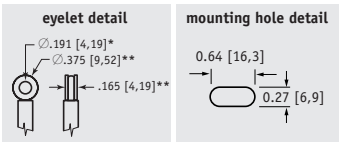
Fig. 2 – Outline Drawing (52 oz. cable tension only)



A DIMENSION (INCHES)

MEASURING CABLE

RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a



DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

Precision Potentiometric Output Ranges: 0-600 to 0-1700 inches Industrial Grade

< Extended Range >

PT9101

CE

Specification Summary:

GENERAL

Full Stroke Range Options–*on this datasheet* ..... 0-600 to 0-1700 inches
Output Signal ..... voltage divider (potentiometer)
Accuracy ..... ± 0.10% full stroke
Repeatability ..... ± 0.02% full stroke
Resolution ..... essentially infinite
Measuring Cable ..... nylon-coated stainless steel
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... 250,000 *before signal degradation can occur*
Maximum Retraction Acceleration ..... *see ordering information*
Maximum Velocity ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 14 lbs. (28 lbs.) max.

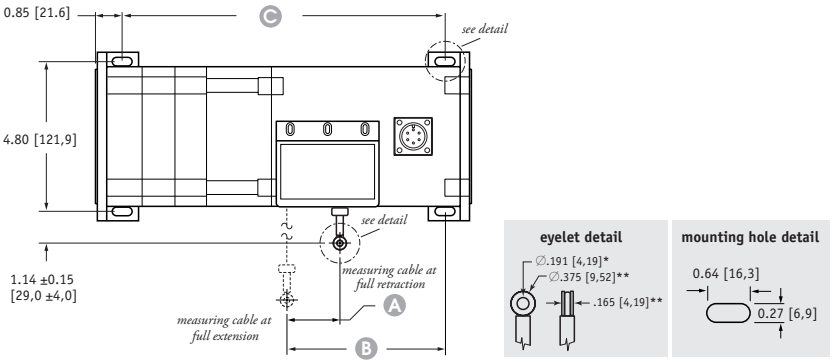
ELECTRICAL

Input Resistance Options ..... 500, 1K, 5K, 10K Ω, bridge, *see ordering information*
Power Rating, Watts ..... 2.0 at 70°F derated to 0 at 250° F
Recommended Maximum Input Voltage ..... 30V (AC/DC)
Output Signal Change Over Full Stroke Range ..... 94% ±4% of input voltage

ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration ..... up to 10 G's to 2000 Hz maximum

Fig. 1 - Outline Drawing for Output Signal Options 1-4 (500-10K ohms)

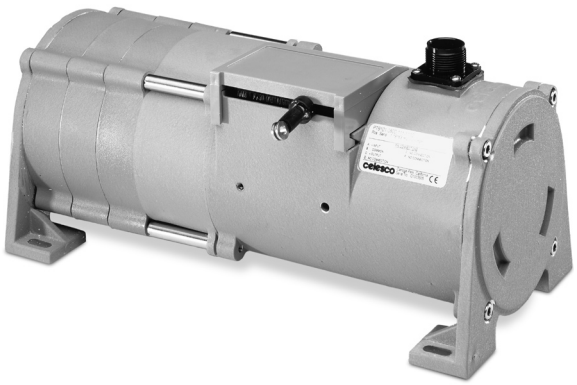


full stroke range

	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
A	1.76 [44,7]	1.58 [40,1]	1.98 [50,2]	1.49 [37,8]	1.86 [47,2]	2.11 [53,6]
B	4.52 ±0.15 [114,8 ±4,0]					
C	10.40 ±0.08 [264,2 ±2,0]					
D	12.15 [308,6] max.					

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

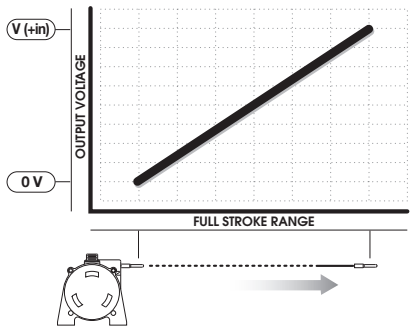
* tolerance = +.005 –.001 [+.13 –.03]
** tolerance = +.005 –.005 [+.13 –.13]



The PT9101 is a work-horse for demanding long-range applications requiring a linear position measurements in ranges up to 1700 inches. Available with either a 500, 1K, 5K, or 10K ohm potentiometer, the PT9101 operates with any basic panel meter or programmable controller.

As a member of Celesco's innovative family of NEMA 4 rated cable-extension transducers, the PT9101 offers numerous benefits. It installs in minutes, works without perfect parallel alignment, and when it's stainless-steel cable is retracted, it measures only 6".

Output Signal



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

Ordering Information:

Model Number:

PT9101- ____ - ____ **1** ____ - ____ **1** ____ **0**
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:

PT9101 - 1200 - 111 - 1110

Ⓡ	range:	1200 inches
Ⓐ	enclosure:	aluminum
Ⓒ	cable exit:	front
Ⓓ	output signal:	500 ohm potentiometer
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

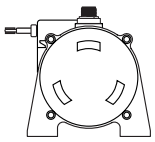
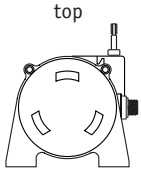
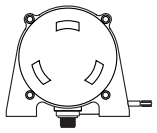
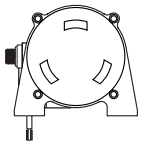
Ⓡ order code:	0600	0800	1000	1200	1500	1700
full stroke range, min:	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
cable tension (30%):	25 oz.	25 oz.	24 oz.	24 oz.	23 oz.	23 oz.
measuring cable:	.034-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless

Enclosure Material:

Ⓐ order code:	1	3
enclosure material:	powder-painted aluminum	303 stainless steel
max. acceleration:	1G	.33G
max. velocity:	60 inches/sec.	20 inches/sec.

Cable Exit:

Ⓒ order code:

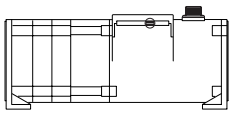
1	2	3	4
front	top	back	down
			

Output Signals:

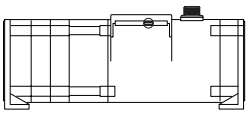
Ⓓ order code:

1	2	3	4	5	6
500 ohm*	1000 ohm*	5000 ohm*	10,000 ohm*	fixed bridge (2 mV/V)	adjustable bridge (0...30 mV/V)

tolerance = ±10%

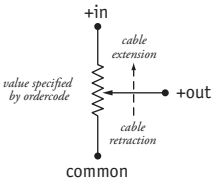


enclosure outline drawing *see fig 1.*

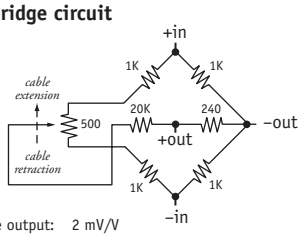


enclosure outline drawing *see fig 2.*

circuit, options 1-4

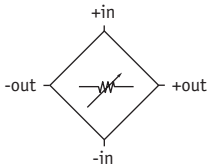


fixed bridge circuit



full scale output: 2 mV/V
zero adjust: not available

adjustable bridge cicuit

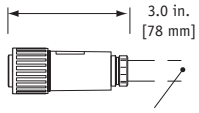
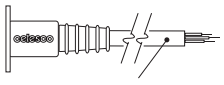
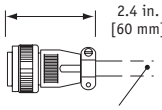
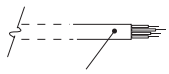


full scale output: adjustable from 0 to 30mV/V
zero adjust: from factory set zero to 50% of full stroke

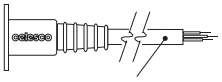
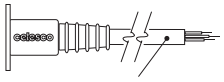
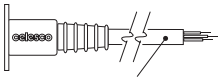
Ordering Information:

Electrical Connection:

F *order code:*

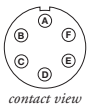
1	2	3	4
6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
			
1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

F *order code:*

5	6	7
100-ft. [30 M] waterproof cable	10-ft. [3 M] **pressure tested*** waterproof cable	100-ft. [30 M] **pressure tested*** waterproof cable
IP 67, NEMA 4X,6**	**IP 68, NEMA 4X**, 6P**	**IP 68, NEMA 4X**, 6P**
		
100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	standard	bridge
A	+ in	+ in
B	common	– in
C	+ out	– out
D	-	+ out



contact view

Waterproof Cable

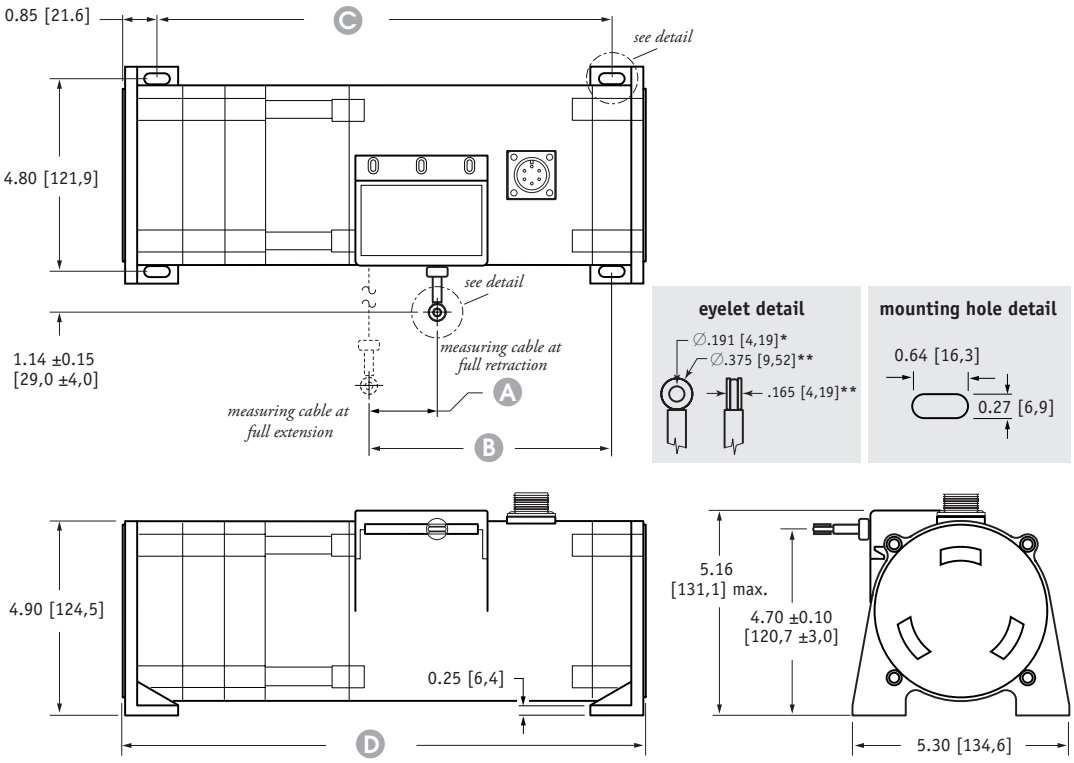
color code	standard	bridge
WHITE	+ in	n/a
BLACK	common	n/a
GREEN	+ out	n/a

Instrumentation Cable

color code	standard	bridge
RED	+ in	+ in
BLACK	common	– in
GREEN	+ out	+ out
WHITE	-	– out

*Notes: *–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours. **–NEMA 4X applies to stainless steel enclosure only.*

Fig. 2 – Outline Drawing for Output Signal Options 5-6 (bridge, adj. bridge)



full stroke range

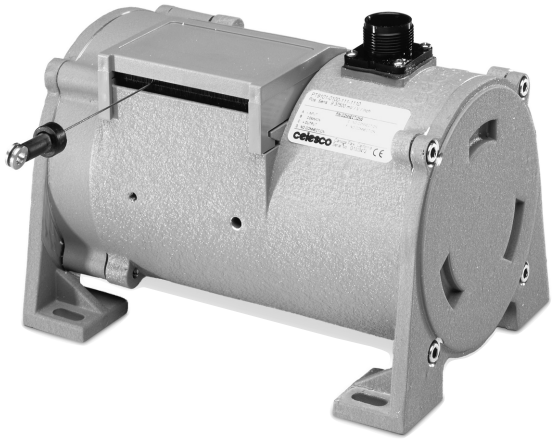
	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
A	1.76 [44,7]	1.58 [40,1]	1.98 [50,2]	1.49 [37,8]	1.86 [47,2]	2.11 [53,6]
B	4.52 ±0.15 [114,8 ±4,0]	5.46 ±0.15 [138,7 ±4,0]				
C	10.40 ±0.08 [264,2 ±2,0]	11.34 ±0.08 [288,0 ±2,0]				
D	12.15 [308,6] max.	13.09 [332,5] max.				

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

Incremental Encoder Output
Ranges: 0-75 to 0-550 inches
Industrial Grade

PT9150



With its incremental optical encoder and industrial design this rugged transducer provides the highest accuracy and longest life of any measurement device of its kind. This model is available in a wide variety of resolutions and output stages to fit virtually any requirement.

It can measure up to 1700", yet when its cable is retracted it is only 6" long. Its small size and low-cost-to-measurement ratio offers remarkable flexibility and value.

Specification Summary:

GENERAL

Full Stroke Range Options–*on this datasheet* ..... 0-75 to 0-550 inches
Output Signal ..... incremental encoder (quadrature)
Output Driver Options..... TTL/CMOS, open collector or line driver
Accuracy ..... 0.04% full stroke *contact factory for higher accuracy*
Repeatability..... ± 0.02% full stroke ±1/2 pulse max.
Resolution Options..... 10 to 250 pulses per inch
Measuring Cable Options..... nylon-coated stainless steel or thermoplastic
Enclosure Material..... powder-painted aluminum or stainless steel
Sensor ..... optical incremental encoder
Maximum Retraction Acceleration ..... *see ordering information*
Maximum Velocity ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 8 lbs. (16 lbs.) max.

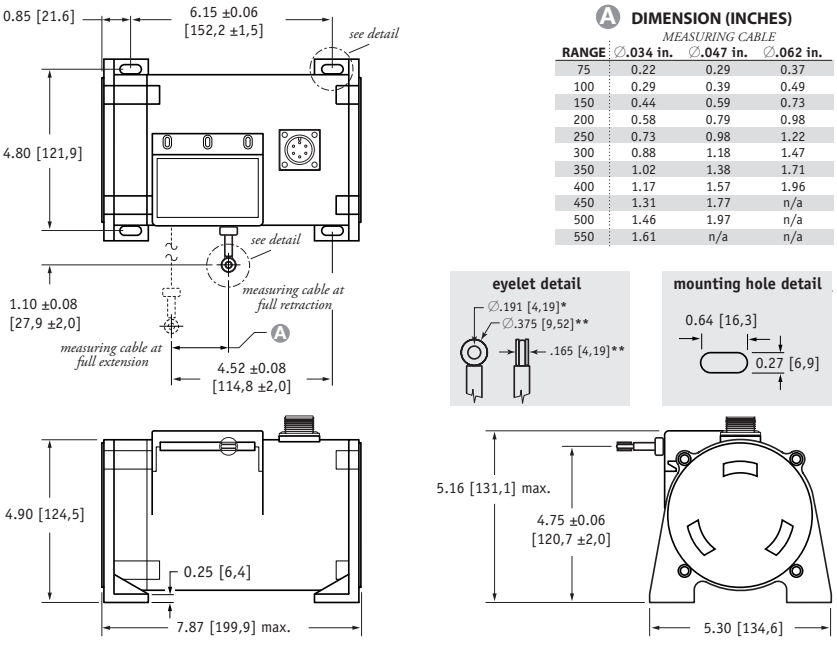
ELECTRICAL

Input Voltage ..... *see ordering information*
Input Current..... *see ordering information*

ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... 0º to 160ºF (-17º to 71ºC)
Vibration..... up to 10 G's to 2000 Hz maximum

Fig. 1 – Outline Drawing (26 oz. cable tension only)



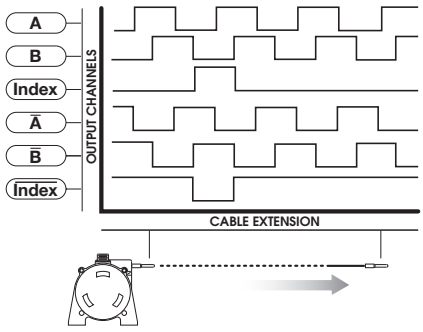
Ⓐ DIMENSION (INCHES)
MEASURING CABLE

RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

Output Signal



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

Ordering Information:

Model Number:

PT9150- ____ **-** ____ ____ ____ **-** ____ ____ ____ **0**

order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:

PT9150 - 0500 - 111 - 1110

Ⓡ	range:	500 inches
Ⓐ	enclosure/cable tension:	aluminum/26 oz.
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	cable exit:	front
Ⓓ	output signal:	TTL/CMOS driver
Ⓔ	resolution:	100 ±2 pulses per inch
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

english ranges

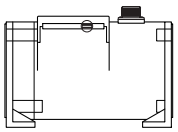
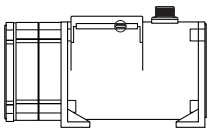
Ⓡ order code:	0075	0100	0150	0200	0250	0300	0350	0400	0450*	0500*	0550*
full stroke range, min:	75 in.	100 in.	150 in.	200 in.	250 in.	300 in.	350 in.	400 in.	450 in.	500 in.	550 in.

metric ranges

Ⓡ order code:	2500	3750	5000	6250	7500	8750	10000	11250	12500*	13750*
full stroke range, min:	2500 mm	3750 mm	5000 mm	6250 mm	7500 mm	8750 mm	10000 mm	11250 mm	12500 mm	13750 mm

** – 52 oz. cable tension strongly recommended*

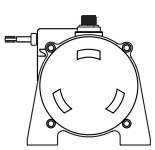
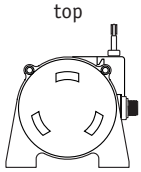
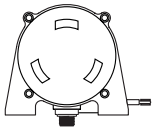
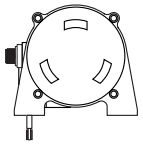
Enclosure Material and Measuring Cable Tension:

Ⓐ order code:	1	3	2	4
tension (±30%):	26 oz.		52 oz.	
enclosure material:	*powder-painted aluminum*	*303 stainless steel*	*powder-painted aluminum*	*303 stainless steel*
max. acceleration:	1 G	.33 G	5 G	2 G
max. velocity:	60 inches/sec	20 inches/sec	200 inches/sec	80 inches/sec
	 standard housing *see fig 1.*		 dual-spring housing *see fig 2.*	

Measuring Cable:

Ⓑ order code:	1	2	3
	∅.034-inch nylon-coated stainless steel *available in **all** ranges*	∅.047-inch stainless steel *all ranges up to **500 in. [12500 mm]***	∅.062-inch thermoplastic *all ranges up to **400 in. [10000 mm]***

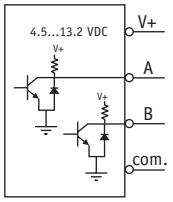
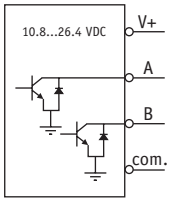
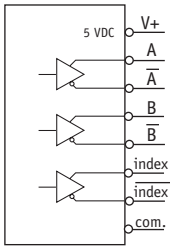
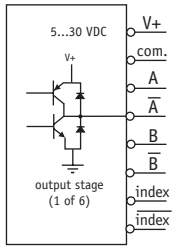
Cable Exit:

Ⓒ order code:	1	2	3	4
	front	top	back	down
				

Ordering Information:

Output Signals:

Ⓓ *order code:*

output driver:	1	2	3	4
	TTL - CMOS	Open Collector	5 V - Line Driver	Universal Line Driver
	Input voltage (V+): 4.5...13.2 Vdc Sink current: 20 mA max. Input current: 80 mA max.	Input voltage (V+): 10.8...26.4 Vdc Sink current: 20 mA max. Input current: 80 mA max.	Input voltage (V+): 5 Vdc Sink current: 20 mA max. Input current: 150 mA max.	Input voltage (V+): 5...30 VDC Source/Sink: 20 mA max. Input current: 100 mA max, no load
				

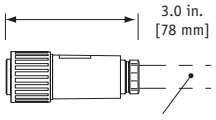
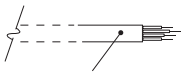
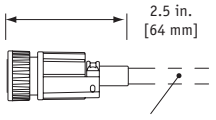
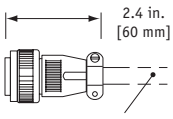
Resolution:

Ⓔ *order code:*

	1	2	3	4
english ranges:	100 ±2 pulses per in.	200 ±4 pulses per in.	250 ±5 pulses per in.	10 ±0.2 pulses per in.
metric ranges:	5 ±0,1 pulses per mm	10 ±0,2 pulses per mm	12,5 ±0,25 pulses per mm	0,5 ±0,01 pulses per mm

Electrical Connection:

Ⓕ *order code:*

	1	2	3	4
	6-pin plastic connector with mating plug **IP 67, NEMA 4X*,6**	25-ft. instrumentation cable 24 AWG, shielded **IP 67, NEMA 6**	18-pin plastic connector with mating plug **IP 65, NEMA 4**	6-pin metal connector with mating plug **IP 67, NEMA 6**
				
	.30 – .39 in. [8 – 10 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded	.26 – .30 in. [6,6 – 7,6 mm] cable dia. 20 – 24 AWG conductor size connector: Conxall 14282-18PG-300-K mating plug: Conxall 13282-18SG-326-K	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S

6-pin mating plug:

pin	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
A	input voltage	input voltage
B	common	common
C	channel A	channel A
D	channel B	channel B
E	-	channel A'
F	-	channel B'

contact view

18-pin mating plug:

pin	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
1	input voltage	input voltage
2	common	common
3	channel B	channel B
6	channel A	channel A
7	-	index
11	-	channel B'
12	-	channel A'
15	-	index'

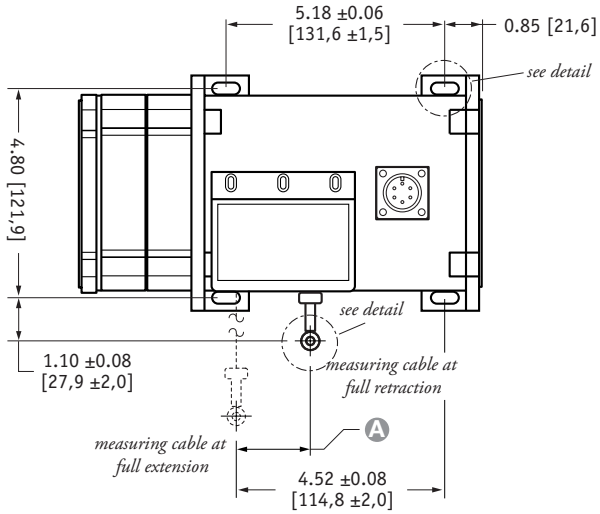
contact view

25-ft. instrumentation cable:

color	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
red	input voltage	input voltage
black	common	common
green	channel A	channel A
white	channel B	channel B
blue	-	channel A'
brown	-	channel B'
yellow	-	index
orange	-	index'

** –applies to stainless steel enclosure only.*

Fig. 2 – Outline Drawing (52 oz. cable tension only)

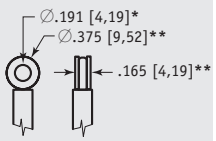


A DIMENSION (INCHES)

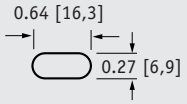
MEASURING CABLE

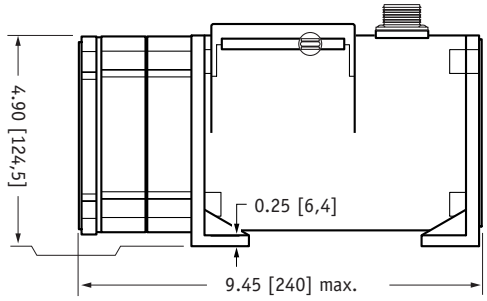
RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

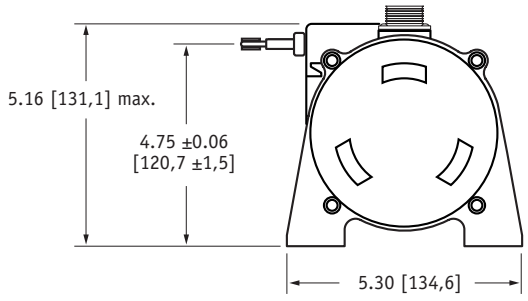
eyelet detail



mounting hole detail







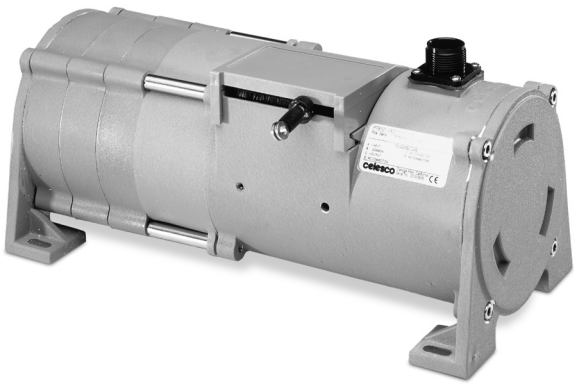
DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

Incremental Encoder Output
Ranges: 0-600 to 0-1700 inches
Industrial Grade

<Extended Range>

PT9150



With its incremental optical encoder and industrial design this rugged transducer provides the highest accuracy and longest life of any measurement device of its kind. This model is available in a wide variety of resolutions and output stages to fit virtually any requirement.

It can measure up to 1700", yet when its cable is retracted it is only 6" long. Its small size and low-cost-to-measurement ratio offers remarkable flexibility and value.

Specification Summary:

GENERAL

Full Stroke Range Options–*on this datasheet* ..... 0-600 to 0-1700 inches
Output Signal ..... incremental encoder (quadrature)
Output Driver Options..... TTL/CMOS, open collector or line driver
Accuracy ..... 0.04% full stroke *contact factory for higher accuracy*
Repeatability..... ± 0.02% full stroke
Resolution Options..... 10 to 250 pulses per inch
Measuring Cable ..... nylon-coated stainless steel
Enclosure Material..... powder-painted aluminum or stainless steel
Sensor ..... optical incremental encoder
Maximum Retraction Acceleration ..... *see ordering information*
Maximum Velocity ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 14 lbs. (28 lbs.) max.

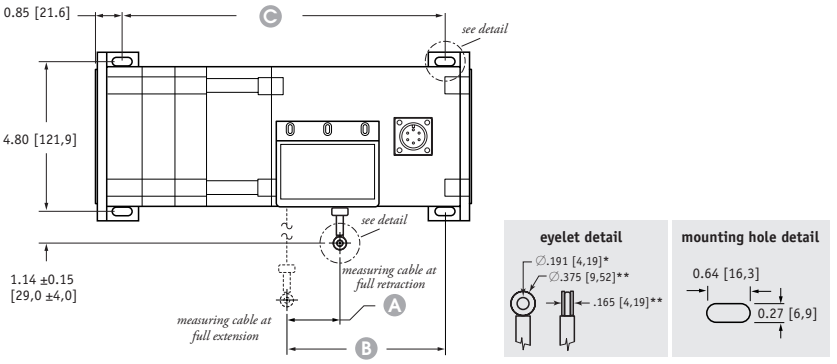
ELECTRICAL

Input Voltage ..... *see ordering information*
Input Current..... *see ordering information*

ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... 0º to 160ºF (-17º to 71ºC)
Vibration..... up to 10 G's to 2000 Hz maximum

Outline Drawing



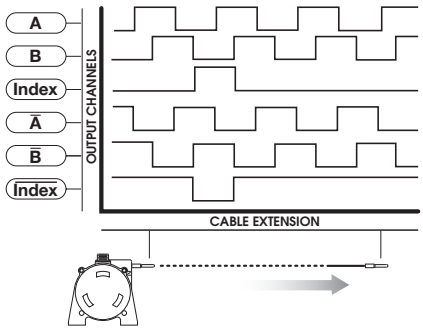
full stroke range

	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
A	1.76 [44,7]	1.58 [40,1]	1.98 [50,2]	1.49 [37,8]	1.86 [47,2]	2.11 [53,6]
B	4.52 ±0.15 [114,8 ±4,0]					
C	10.40 ±0.08 [264,2 ±2,0]					
D	12.15 [308,6] max.					

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

Output Signal



celesco
celesco.com • info@celesco.com

Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

Ordering Information:

Model Number:

PT9150- ____ (R) - __ (A) 1 (B) __ (C) - __ (D) __ (E) __ (F) 0 (G)

order code:

Sample Model Number:

PT9150 - 0800 - 111 - 1110

(R)	range:	500 inches
(A)	enclosure:	aluminum
(C)	cable exit:	front
(D)	output signal:	TTL/CMOS driver
(E)	resolution:	100 ±2 pulses per inch
(F)	electrical connection:	6-pin plastic connector

Full Stroke Range:

english ranges

(R) order code:	0600	0800	1000	1200	1500	1700
full stroke range, min:	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
cable tension (30%):	25 oz.	25 oz.	24 oz.	24 oz.	23 oz.	23 oz.
measuring cable:	.034-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless

metric ranges

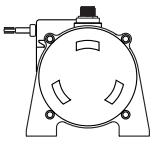
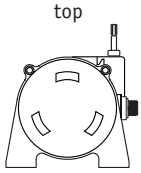
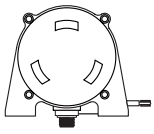
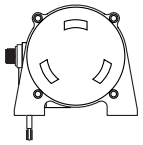
(R) order code:	15000	20000	25000	30000	35000	40000
full stroke range, min:	15.000 mm	20.000 mm	25.000 mm	30.000 mm	35.000 mm	40.000 mm
cable tension (30%):	7,0 N	7,0 N	6,7 N	6,7 N	6,4 N	6,4 N
measuring cable:	0,86-mm dia. nylon-coated stainless	0,48-mm dia. nylon-coated stainless	0,48-mm dia. nylon-coated stainless	0,48-mm dia. nylon-coated stainless	0,36-mm dia. non-coated stainless	0,36-mm dia. non-coated stainless

Enclosure Material:

(A) order code:	1	3
enclosure material:	powder-painted aluminum	303 stainless steel
max. acceleration:	1G	.33G
max. velocity:	60 inches/sec.	20 inches/sec.

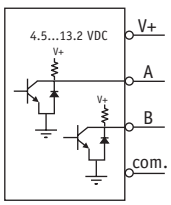
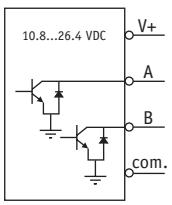
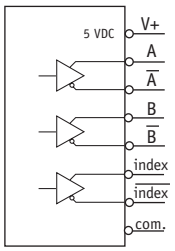
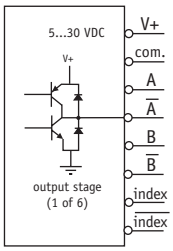
Cable Exit:

(C) order code:

1	2	3	4
front	top	back	down
			

Output Signals:

(D) order code:

	1	2	3	4
output driver:	TTL - CMOS	Open Collector	5 V - Line Driver	Universal Line Driver
	Input voltage (V+): 4.5...13.2 Vdc Sink current: 20 mA max. Input current: 80 mA max.	Input voltage (V+): 10.8...26.4 Vdc Sink current: 20 mA max. Input current: 80 mA max.	Input voltage (V+): 5 Vdc Sink current: 20 mA max. Input current: 150 mA max.	Input voltage (V+): 5...30 VDC Source/Sink: 20 mA max. Input current: 100 mA max, no load
				

Ordering Information:

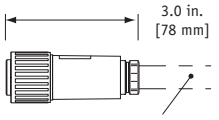
Resolution:

E order code:	1	2	3	4
english ranges:	100 ±2 pulses per in.	200 ±4 pulses per in.	250 ±5 pulses per in.	10 ±0.2 pulses per in.
metric ranges:	5 ±0,1 pulses per mm	10 ±0,2 pulses per mm	12,5 ±0,25 pulses per mm	0,5 ±0,01 pulses per mm

Electrical Connection:

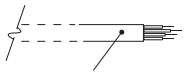
F order code:

1 — 6-pin plastic connector with mating plug
IP 67, NEMA 4X*,6



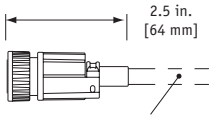
.30 – .39 in. [8 – 10 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

2 — 25-ft. instrumentation cable 24 AWG, shielded
IP 67, NEMA 6



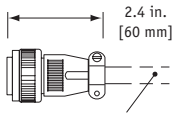
25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

3 — 18-pin plastic connector with mating plug
IP 65, NEMA 4



.26 – .30 in. [6,6 – 7,6 mm] cable dia.
20 – 24 AWG conductor size
connector: Conxall 14282-18PG-300-K
mating plug: Conxall 13282-18SG-326-K

4 — 6-pin metal connector with mating plug
IP 67, NEMA 6



3/8-in. [9 mm] max cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

6-pin mating plug:

pin	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
A	input voltage	input voltage
B	common	common
C	channel A	channel A
D	channel B	channel B
E	-	channel A'
F	-	channel B'

contact view

18-pin mating plug:

pin	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
1	input voltage	input voltage
2	common	common
3	channel B	channel B
6	channel A	channel A
7	-	index
11	-	channel B'
12	-	channel A'
15	-	index'

contact view

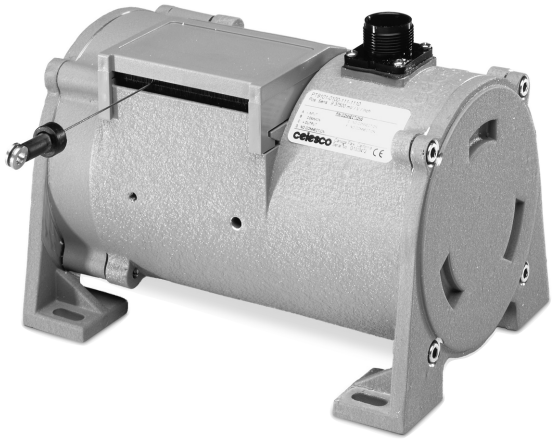
25-ft. instrumentation cable:

color	TTL/CMOS Open Collector	5 V Line Driver Universal Line Driver
red	input voltage	input voltage
black	common	common
green	channel A	channel A
white	channel B	channel B
blue	-	channel A'
brown	-	channel B'
yellow	-	index
orange	-	index'

** –applies to stainless steel enclosure only.*

RS232 Data Communication
Ranges: 0-75 to 0-550 inches
Industrial Grade

PT9232



Specification Summary:

GENERAL

Full Stroke Ranges ..... 0-75 to 0-550 inches
Electrical Interface RS232
Format ..... HEX
Accuracy ..... ± 0.10% full stroke
Repeatability ..... ± 0.02% full stroke
Resolution ..... ± 0.003% full stroke
Measuring Cable ..... stainless steel, nylon-coated or thermoplastic
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... 250,000 cycles *before signal degradation may occur*
Maximum Retraction Acceleration ..... *see ordering information*
Maximum Velocity ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 8 lbs. (16 lbs.), max.

ELECTRICAL

Input Voltage ..... 9...22 VDC
Input Current ..... 40 mA
Baud Rate ..... 9600 (selectable to 38.4K)
Update Rate ..... 32 msec

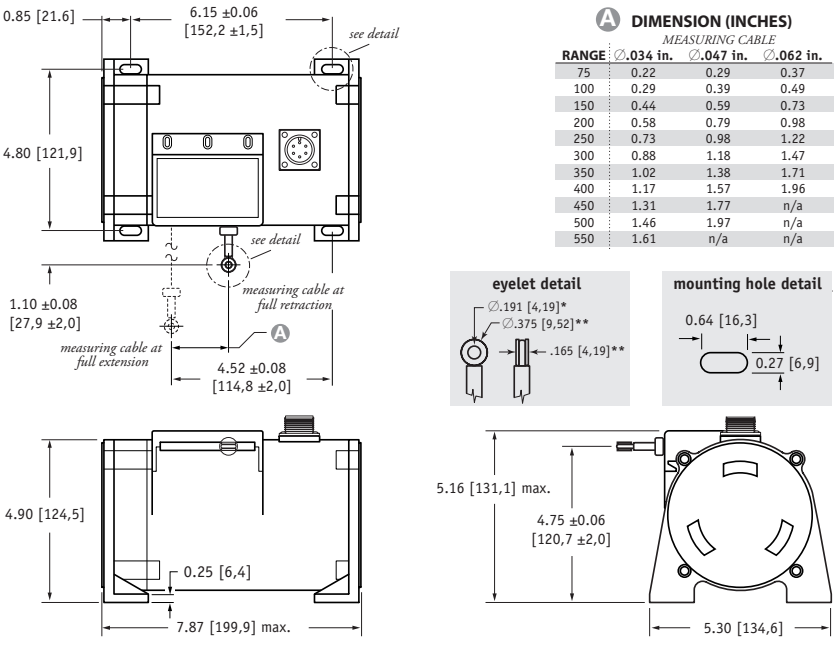
ENVIRONMENTAL

Environmental Suitability ..... NEMA 4X/6, IP 67
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration ..... up to 10 G's to 2000 Hz maximum

The PT9232 delivers position feedback via RS232 serial communication to your data acquisition or controller system. The PT9232 sends a raw 16-bit count from 0000H to FFFFH. Additionally this device can be set to continuously send data or send data only when polled.

As the internal position sensing element is a precision potentiometer, this transducer maintains current accurate position even during power loss and does not need to be reset to a "home" position.

Fig. 1 – Outline Drawing



A DIMENSION (INCHES)
MEASURING CABLE

RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

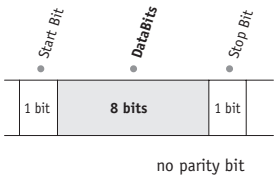
* tolerance = +.005 –.001 [+.13 –.03]
** tolerance = +.005 –.005 [+.13 –.13]

Output Signal

Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco.com • info@celesco.com

I/O Format:

Data Format



Data Frame

6 byte Hex string:

	STX	CMD	B_0	B_1	B_2	ETX	

STX = 0x02 **CMD** = Command Code* **B_0 - B_2** = Data Field* **ETX** = 0x03

** –see below*

Important! All communications to/from the transducer are in **HEX**!

User Commands:

	User Command				Sensor Response			
Description	**<CMD>**	**<B_0>**	**<B_1>**	**<B_2>**	**<CMD>**	**<B_0>**	**<B_1>**	**<B_2>**
Get Sensor Info	0x05	0x00	0x00	0x00	0x05	version(4)	date(5)	date(5)
Get Serial Number	0x15	0x00	0x00	0x00	0x15	serial number(3)		
Start Continuous Data	0x25	0x00	0x00	0x00	0x25	0x00	0x00	0x00
Stop Continuous Data	0x35	0x00	0x00	0x00	0x35	0x00	0x00	0x00
Get Position Data	0x45	0x00	0x00	0x00	0x45	CMC(1)	CMC(1)	status(2)

(1)CMC - Current Measurement Count (Position)

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 16-bit value that occupies the first two bytes (B_0 and B_1) of the data field. B_0 is the MSB (most significant byte) and B_1 is the LSB (least significant byte).

The CMC starts at 0000H with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at FFFFH. This holds true for all ranges.

(2)Status

The status byte is used as a flag to indicate the validity of the position signal that the internal electronics receives from the potentiometer.

Flags are as follows:
0x00 = GREEN, 0x55 = YELLOW, 0xAA = RED

A "green" flag shows everything OK. A "yellow" or "red" flag indicates that the sensor has either been extended beyond its range or that there is a problem with the potentiometer.

(3)Serial Number

Each sensor has it's own unique serial number. This information can be retrieved by sending the sensor the "Get Serial Number" command.

The serial number is a 3 byte value from which ranges from 0 to 9999999 (decimal).

(4)Version

This is a single byte value (0-255 decimal) which indicates the currently installed firmware version of the sensor.

(5)Date

This is a 2 byte value showing the date of currently installed firmware. This value ranges from 01011 - 12319 (decimal). Format is MMDDY. While the month and day are expressed as two digit numbers the year is expressed in a single digit only.

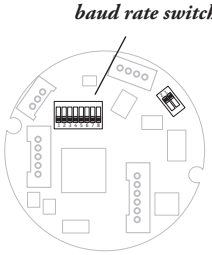
Example: 08054 = August 5, 2004

Baud Rate

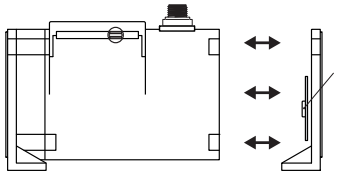
The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the rs232 controller board located inside the transducer.

DIP-7	DIP-8	baud rate
0	0	9600
1	0	19200
0	1	38400
1	1	9600

RS232 Controller Board and DIP Switch Location



Caution! Do Not Remove Spring-Side End Cover
removing spring-side end cover could cause spring to become unseated and permanently damaged.



Ordering Information:

Model Number:

PT9232 - _____ - ___ - ___ - ___ - ___ - ___
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

Sample Model Number:

PT9232 - 200 - AL - N34 - 26 - FR - M6

Ⓡ	range:	200 inches
Ⓐ	enclosure	aluminum
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	measuring cable tension:	26 oz.
Ⓓ	cable exit:	front (horizontal)
Ⓔ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ order code:	75	100	150	200	250	300	350	400	450*	500*	550*
full stroke range, min:	75 in.	100 in.	150 in.	200 in.	250 in.	300 in.	350 in.	400 in.	450 in.	500 in.	550 in.

** – 52 oz. cable tension strongly recommended*

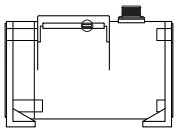
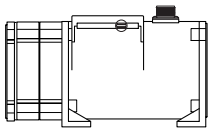
Enclosure Material:

Ⓐ order code:	AL	SS
	powder-painted aluminum	303 stainless

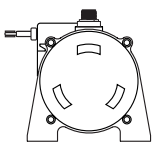
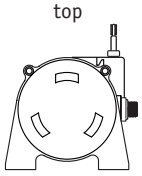
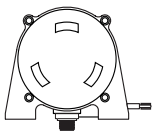
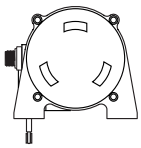
Measuring Cable:

Ⓑ order code:	N34	S47	V62
	Ø.034-inch nylon-coated stainless steel *available in **all** ranges*	Ø.047-inch stainless steel *all ranges up to **500 inches***	Ø.062-inch thermoplastic *all ranges up to **400 inches***

Measuring Cable Tension:

Ⓒ order code:	26		52	
tension (30%):	26 oz.		52 oz.	
enclosure material:	*aluminum*	*stainless steel*	*aluminum*	*stainless steel*
max. acceleration:	1 G	.33 G	5 G	2 G
max. velocity:	60 inches/sec	20 inches/sec	200 inches/sec	80 inches/sec
	 standard housing *see fig 1.*		 dual-spring housing *see fig 2.*	

Cable Exit:

Ⓓ order code:	FR	UP	BK	DN
	front	top	back	down
				

Ordering Information:

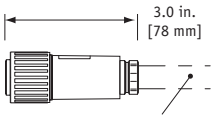
Electrical Connection:

Ⓑ *order code:*

M6

6-pin plastic connector with mating plug

IP 67, NEMA 6, NEMA 4X (stainless enclosure only)



.30 – .39 in. [8 – 10 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

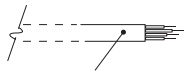
contact view

pin	signal
A	9...22 VDC
B	common
C	–
D	Transmitted Data
E	Received Data
F	common

C25

25-ft. instrumentation cable 24 AWG, shielded

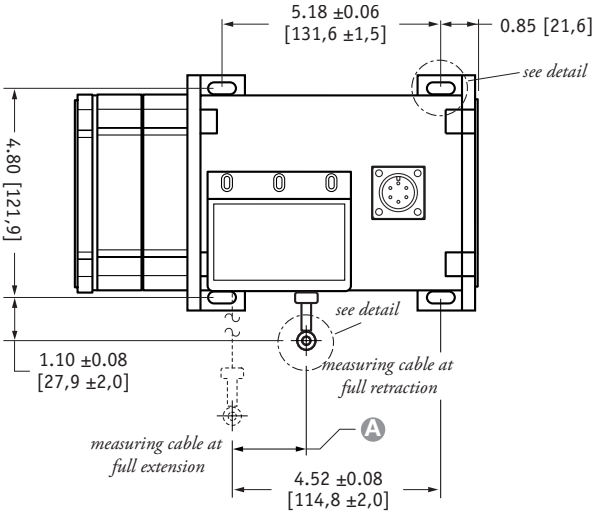
IP 67, NEMA 6



25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

color code	signal
Red	9...22 VDC
Black	common
White	–
Green	Transmitted Data
Blue	Received Data
Brown	common

Fig. 2– Outline Drawing (52 oz. cable tension only)

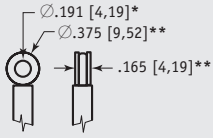


A DIMENSION (INCHES)

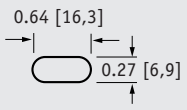
MEASURING CABLE

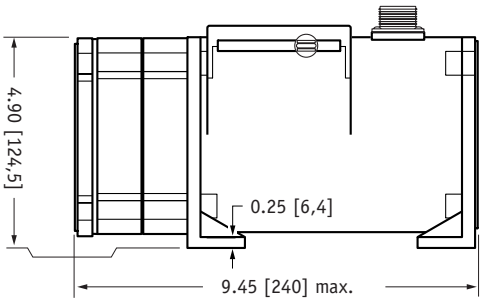
RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

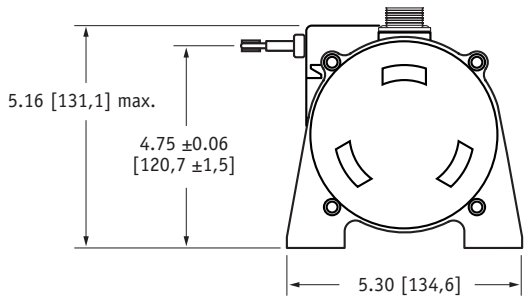
eyelet detail



mounting hole detail







DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

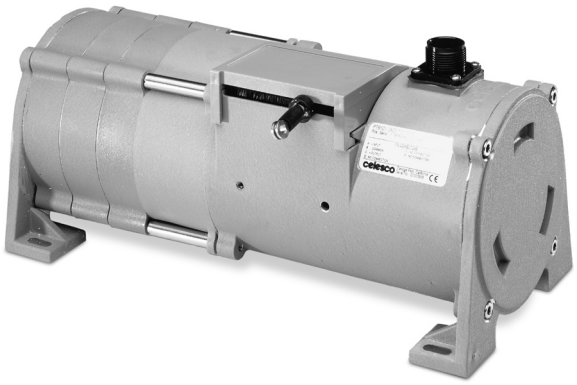
* tolerance = +.005 –.001 [+.13 –.03]
** tolerance = +.005 –.005 [+.13 –.13]

version: **6.0** last updated: **July 11, 2008**

RS232 Data Communication
Ranges: 0-600 to 0-1700 inches
Industrial Grade

<Extended Range>

PT9232



Specification Summary:

GENERAL

Full Stroke Ranges ..... 0-600 to 0-1700 inches
Electrical Interface RS232
Format ..... HEX
Accuracy ..... ± 0.10% full stroke
Repeatability ..... ± 0.02% full stroke
Resolution ..... ± 0.003% full stroke
Measuring Cable ..... nylon-coated stainless steel
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... 250,000 cycles *before signal degradation may occur*
Maximum Retraction Acceleration ..... *see ordering information*
Maximum Velocity ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 8 lbs. (16 lbs.), max.

ELECTRICAL

Input Voltage ..... 9...22 VDC
Input Current ..... 40 mA
Baud Rate ..... 9600 (selectable to 38.4K)
Update Rate 32msec

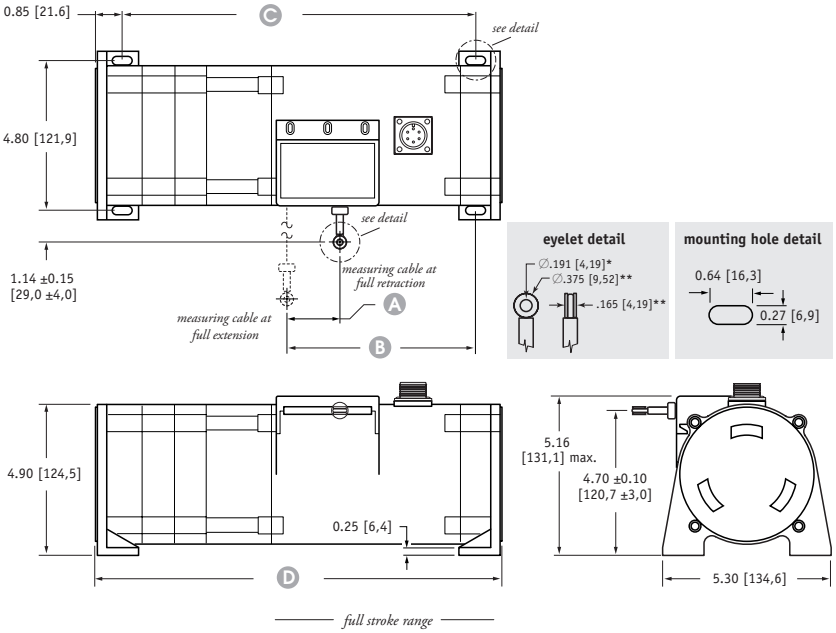
ENVIRONMENTAL

Environmental Suitability ..... NEMA 4X/6, IP 67
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration ..... up to 10 G's to 2000 Hz maximum

The PT9232 delivers position feedback via RS232 serial communication to your data acquisition or controller system. The PT9232 sends a raw 16-bit count from 0000H to FFFFH. Additionally this device can be set to continuously send data or send data only when polled.

As the internal position sensing element is a precision potentiometer, this transducer maintains current accurate position even during power loss and does not need to be reset to a "home" position.

Outline Drawing

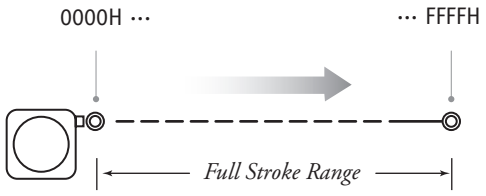


	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
A	1.76 [44,7]	1.58 [40,1]	1.98 [50,2]	1.49 [37,8]	1.86 [47,2]	2.11 [53,6]
B	4.52 ±0.15 [114,8 ±4,0]	5.46 ±0.15 [138,7 ±4,0]				
C	10.40 ±0.08 [264,2 ±2,0]	11.34 ±0.08 [288,0 ±2,0]				
D	12.15 [308,6] max.	13.09 [332,5] max.				

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

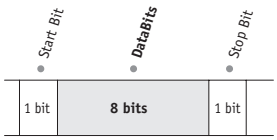
Output Signal



Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco.com • info@celesco.com

I/O Format:

Data Format



Data Frame

6 byte Hex string:

STX	CMD	B_0	B_1	B_2	ETX

STX = 0x02 **CMD** = Command Code* **B_0 - B_2** = Data Field* **ETX** = 0x03

** –see below*

Important! All communications to/from the transducer are in **HEX**!

User Commands:

	User Command				Sensor Response			
Description	**<CMD>**	**<B_0>**	**<B_1>**	**<B_2>**	**<CMD>**	**<B_0>**	**<B_1>**	**<B_2>**
Get Sensor Info	0x05	0x00	0x00	0x00	0x05	version(4)	date(5)	date(5)
Get Serial Number	0x15	0x00	0x00	0x00	0x15	serial number(3)		
Start Continuous Data	0x25	0x00	0x00	0x00	0x25	0x00	0x00	0x00
Stop Continuous Data	0x35	0x00	0x00	0x00	0x35	0x00	0x00	0x00
Get Position Data	0x45	0x00	0x00	0x00	0x45	CMC(1)	CMC(1)	status(2)

(1)CMC - Current Measurement Count (Position)

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 16-bit value that occupies the first two bytes (B_0 and B_1) of the data field. B_0 is the MSB (most significant byte) and B_1 is the LSB (least significant byte).

The CMC starts at 0000H with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at FFFFH. This holds true for all ranges.

(2)Status

The status byte is used as a flag to indicate the validity of the position signal that the internal electronics receives from the potentiometer.

Flags are as follows:
0x00 = GREEN, 0x55 = YELLOW, 0xAA = RED

A "green" flag shows everything OK. A "yellow" or "red" flag indicates that the sensor has either been extended beyond its range or that there is a problem with the potentiometer.

(3)Serial Number

Each sensor has it's own unique serial number. This information can be retrieved by sending the sensor the "Get Serial Number" command.

The serial number is a 3 byte value from which ranges from 0 to 9999999 (decimal).

(4)Version

This is a single byte value (0-255 decimal) which indicates the currently installed firmware version of the sensor.

(5)Date

This is a 2 byte value showing the date of currently installed firmware. This value ranges from 01011 - 12319 (decimal). Format is MMDDY. While the month and day are expressed as two digit numbers the year is expressed in a single digit only.

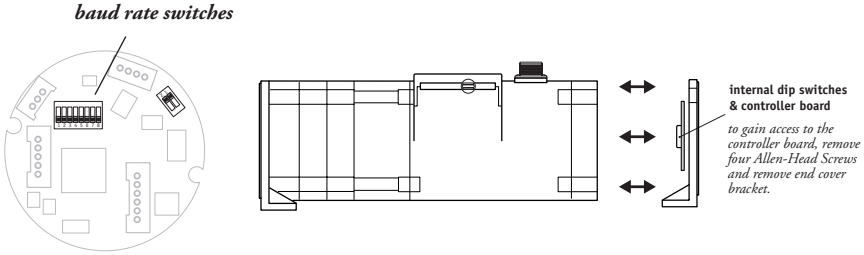
Example: 08054 = August 5, 2004

Baud Rate

The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the rs232 controller board located inside the transducer.

DIP-7	DIP-8	baud rate
0	0	9600
1	0	19200
0	1	38400
1	1	9600

RS232 Controller Board and DIP Switch Location



Ordering Information:

Model Number:

PT9232 - ____ - ____ - ____ - ____
order code: Ⓡ Ⓐ Ⓑ Ⓒ

Sample Model Number:

PT9232 - 1200 - AL - FR - M6

Ⓡ	range:	1200 inches
Ⓐ	enclosure	aluminum
Ⓑ	cable exit:	front (horizontal)
Ⓒ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ order code:	600	800	1000	1200	1500	1700
full stroke range, min:	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
cable tension (30%):	25 oz.	25 oz.	24 oz.	24 oz.	23 oz.	23 oz.
measuring cable:	.034-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless

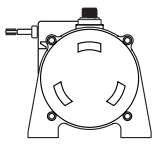
Enclosure Material:

Ⓐ order code:	AL	SS
enclosure material:	powder-painted aluminum	303 stainless steel
max. acceleration:	1G	.33G
max. velocity:	60 inches/sec.	20 inches/sec.

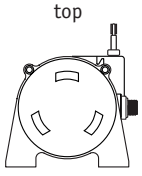
Cable Exit:

Ⓑ order code:

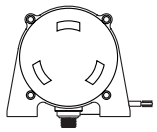
FR front



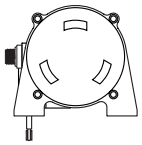
UP top



BK back



DN down



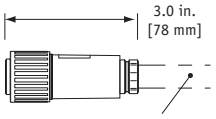
Electrical Connection:

Ⓒ order code:

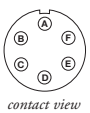
M6

6-pin plastic connector with mating plug

IP 67, NEMA 6, NEMA 4X (stainless enclosure only)



.30 – .39 in. [8 – 10 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S



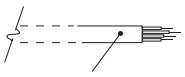
contact view

pin	signal
A	9...22 VDC
B	common
C	–
D	Transmitted Data
E	Received Data
F	common

C25

25-ft. instrumentation cable 24 AWG, shielded

IP 67, NEMA 6



25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

color code	signal
Red	9...22 VDC
Black	common
White	–
Green	Transmitted Data
Blue	Received Data
Brown	common

Position and Velocity Output Signals
Ranges: 0-75 to 0-550 inches
Industrial Grade

PT9301

Specification Summary:

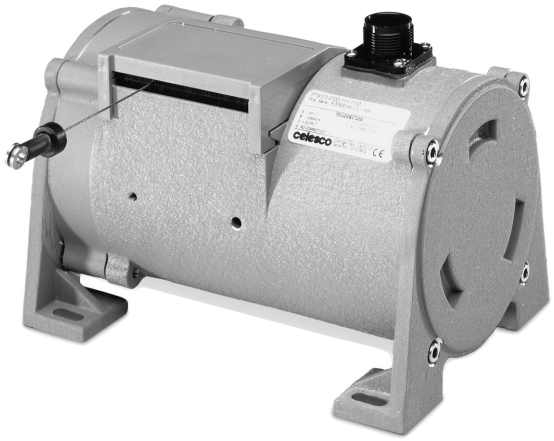
GENERAL
Full Stroke Range Options–*on this datasheet* ..... 0-75 to 0-550 inches

POSITION
Output Signal ..... voltage divider (potentiometer)
Accuracy ..... ± 0.10% full stroke
Repeatability ..... ± 0.02% full stroke
Resolution ..... *essentially infinite*
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... 250,000, min. *–before signal degradation can occur*
Input Resistance Options ..... 500, 1K, 5K or 10K Ω *–see ordering information*
Power Rating, Watts ..... 2.0 at 70°F derated to 0 at 250° F
Recommended Maximum Input Voltage ..... 30V (AC/DC)
Output Signal Change Over Full Stroke Range ..... 94% ±4% of input voltage

VELOCITY
Output Signal ..... DC tachometer output
Linearity ..... better than ±0.10% of output at any velocity
Repeatability ..... ±0.10% of reading
Maximum Velocity • Retraction Acceleration ..... *see ordering information*
Sensor ..... tach generator
Input Voltage ..... none required
Output Voltage @ 100 inches per minute ..... 361 mV ±3%
Output Impedance ..... 350 ohms ±10%
Output Ripple (for velocity ≥ 1.29 inches per second) ..... ±3% rms

GENERAL
Measuring Cable Options ..... nylon-coated stainless steel or thermoplastic
Enclosure Material ..... powder-painted aluminum or stainless steel
Weight, Aluminum (Stainless Steel) Enclosure ..... 8 lbs. (16 lbs.) max.

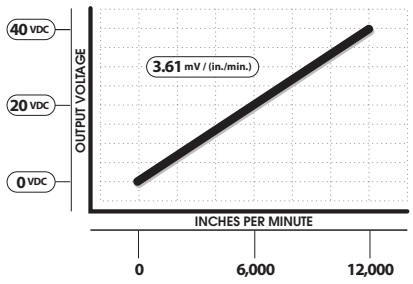
ENVIRONMENTAL
Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration ..... up to 10 G's to 2000 Hz maximum



The PT9301 is a combination position and velocity transducer for demanding long-range applications requiring a linear position measurements in ranges up to 1700". A precision plastic-hybrid potentiometer provides accurate position feedback while a self-generating DC tachometer provides a velocity signal that is proportional to the speed of the traveling stainless-steel measuring cable.

As a member of Celesco's innovative family of NEMA-4 rated cable-extension transducers, the PT9301 offers numerous benefits. It installs in minutes, functions properly without perfectly parallel alignment, and when its cable is retracted, it measures only 6".

Velocity Output Signal



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

Ordering Information:

Model Number:

PT9301-_____ - ____ ____ ____ - ____ 1 ____ 0
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:

PT9301 - 0500 - 111 - 1110

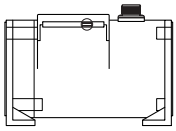
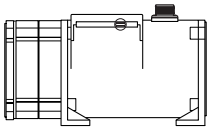
Ⓡ	range:	500 inches
Ⓐ	enclosure/cable tension:	aluminum/26 oz.
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	cable exit:	front
Ⓓ	output signal:	500 ohm position / DC tachometer velocity
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ order code:	0075	0100	0150	0200	0250	0300	0350	0400	0450*	0500*	0550*
full stroke range, min:	75 in.	100 in.	150 in.	200 in.	250 in.	300 in.	350 in.	400 in.	450 in.	500 in.	550 in.

** – 52 oz. cable tension strongly recommended*

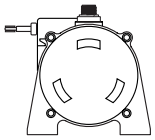
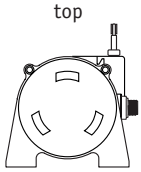
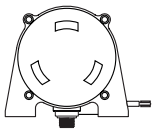
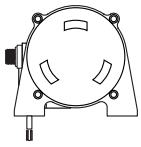
Enclosure Material and Measuring Cable Tension:

Ⓐ order code:	1	3	2	4
tension (±30%):	26 oz.		52 oz.	
enclosure material:	*powder-painted aluminum*	*303 stainless steel*	*powder-painted aluminum*	*303 stainless steel*
max. acceleration:	1 G	.33 G	5 G	2 G
max. velocity:	60 inches/sec	20 inches/sec	200 inches/sec	80 inches/sec
	 standard housing *see fig 1.*		 dual-spring housing *see fig 2.*	

Measuring Cable:

Ⓑ order code:	1	2	3
	∅.034-inch nylon-coated stainless steel *available in **all** ranges*	∅.047-inch stainless steel *all ranges up to **500 inches***	∅.062-inch thermoplastic *all ranges up to **400 inches***

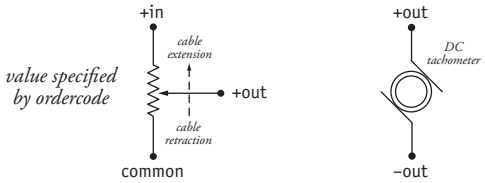
Cable Exit:

Ⓒ order code:	1	2	3	4
	front	top	back	down
				

Output Signals:

Ⓓ order code:	1	2	3	4
position sensing potentiometer:	500 ohms*	1000 ohms*	5000 ohms*	10,000 ohms*

position sensing circuit **velocity sensing circuit**

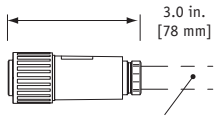
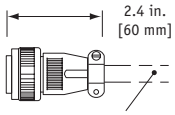
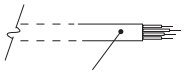


**–tolerance = ±10%*

Ordering Information:

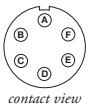
Electrical Connection:

Ⓕ *order code:*

1	3	4
6-pin plastic connector with mating plug **IP 67, NEMA 4X*,6**	6-pin metal connector with mating plug **IP 65, NEMA 4**	25-ft. instrumentation cable 24 AWG, shielded **IP 67, NEMA 6**
		
1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

6-pin mating plug:

pin	signal	
A	+ in	position
B	common	position
C	+ out	position
D	-	
E	+ out	velocity
F	- out	velocity



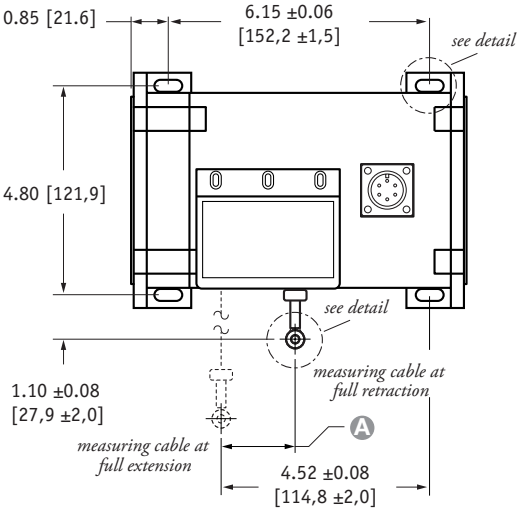
contact view

25-ft. instrumentation cable:

color	signal	
red	+ in	position
black	common	position
green	+ out	position
white	+ out	velocity
brown	- out	velocity

**–applies to stainless steel enclosure only*

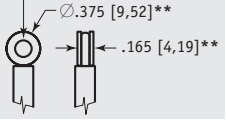
Fig. 1 – Outline Drawing (26 oz. cable tension only)



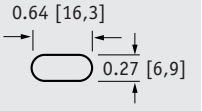
Ⓐ **DIMENSION (INCHES)**

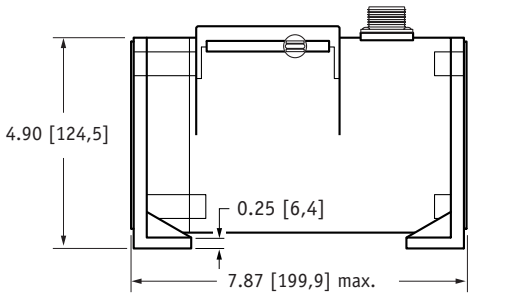
RANGE	*MEASURING CABLE* ∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

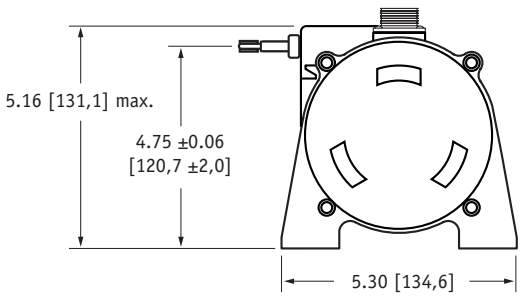
eyelet detail



mounting hole detail



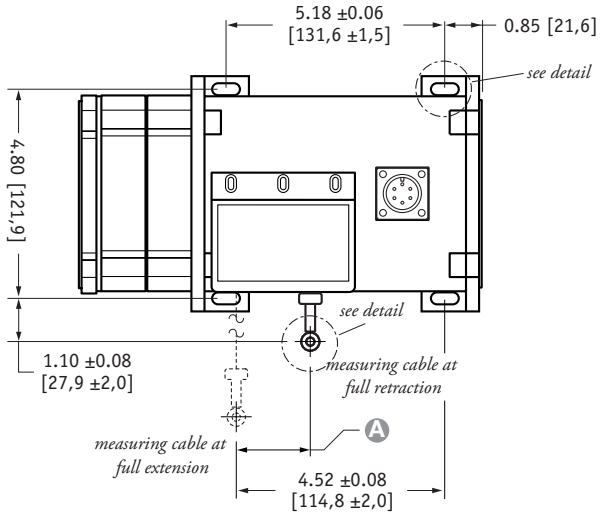




DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

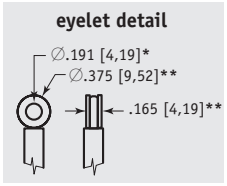
* tolerance = +.005 –.001 [+.13 –.03]
** tolerance = +.005 –.005 [+.13 –.13]

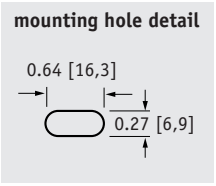
Fig. 2 – Outline Drawing (52 oz. cable tension only)

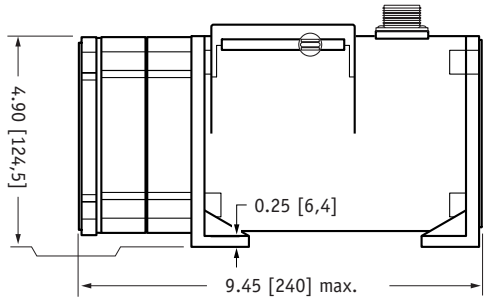


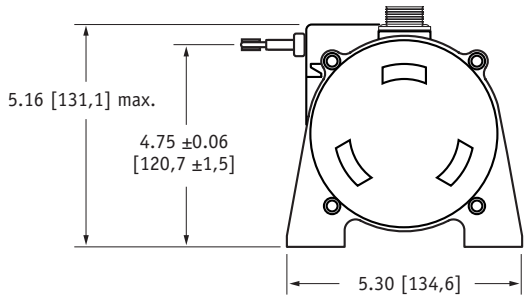
A DIMENSION (INCHES)

RANGE	MEASURING CABLE ∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a









DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

Position and Velocity Output Signals
Ranges: 0-600 to 0-1700 inches
Industrial Grade

<Extended Range>

PT9301

Specification Summary:

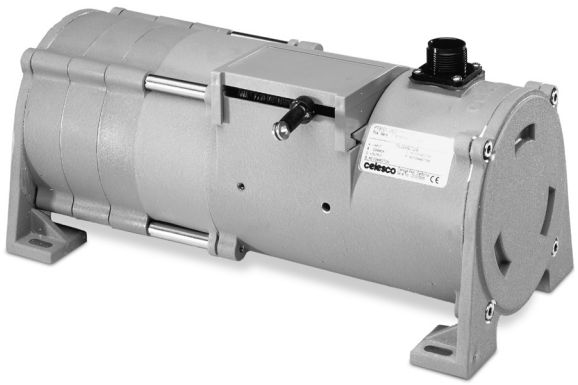
GENERAL
Full Stroke Range Options–*on this datasheet* . . . . . 0-600 to 1700 inches

POSITION
Output Signal . . . . . voltage divider (potentiometer)
Accuracy . . . . . ± 0.10% full stroke
Repeatability . . . . . ± 0.02% full stroke
Resolution . . . . . *essentially infinite*
Sensor . . . . . plastic-hybrid precision potentiometer
Potentiometer Cycle Life . . . . . 250,000, min. *–before signal degradation can occur*
Input Resistance Options . . . . . 500, 1K, 5K or 10K Ω *–see ordering information*
Power Rating, Watts . . . . . 2.0 at 70ºF derated to 0 at 250º F
Recommended Maximum Input Voltage . . . . . 30V (AC/DC)
Output Signal Change Over Full Stroke Range . . . . . 94% ±4% of input voltage

VELOCITY
Output Signal . . . . . DC tachometer output
Linearity . . . . . better than ±0.10% of output at any velocity
Repeatability . . . . . ±0.10% of reading
Maximum Velocity • Retraction Acceleration . . . . . *see ordering information*
Sensor . . . . . tach generator
Input Voltage . . . . . none required
Output Voltage @ 100 inches per minute . . . . . 361 mV ±3%
Output Impedance . . . . . 350 ohms ±10%
Output Ripple (for velocity ≥ 1.29 inches per second) . . . . . ±3% rms

GENERAL
Measuring Cable . . . . . nylon-coated stainless steel
Enclosure Material . . . . . powder-painted aluminum or stainless steel
Weight, Aluminum (Stainless Steel) Enclosure . . . . . 14 lbs. (28 lbs.) max.

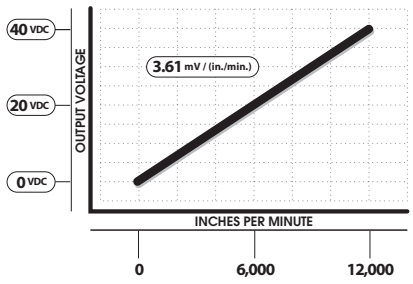
ENVIRONMENTAL
Enclosure . . . . . NEMA 4/4X/6, IP 67/68
Operating Temperature . . . . . -40º to 200ºF (-40º to 90ºC)
Vibration . . . . . up to 10 G's to 2000 Hz maximum



The PT9301 is a combination position and velocity transducer for demanding long-range applications requiring a linear position measurements in ranges up to 1700". A precision plastic-hybrid potentiometer provides accurate position feedback while a self-generating DC tachometer provides a velocity signal that is proportional to the speed of the traveling stainless-steel measuring cable.

As a member of Celesco's innovative family of NEMA-4 rated cable-extension transducers, the PT9301 offers numerous benefits. It installs in minutes, functions properly without perfectly parallel alignment, and when its cable is retracted, it measures only 6".

Velocity Output Signal



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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

Ordering Information:

Model Number:

PT9301-_____ - ____ - ____ - ____

order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:

PT9301 - 1200 - 111 - 1110

Ⓡ	range:	1200 inches
Ⓐ	enclosure	aluminum
Ⓒ	cable exit:	front
Ⓓ	output signal:	500 ohm position / DC tachometer velocity
Ⓕ	electrical connection:	6-pin plastic connector

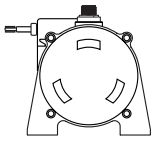
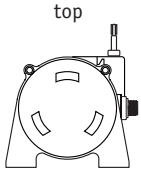
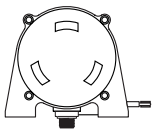
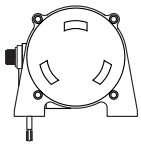
Full Stroke Range:

Ⓡ order code:	0600	0800	1000	1200	1500	1700
full stroke range, min:	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
cable tension (30%):	25 oz.	25 oz.	24 oz.	24 oz.	23 oz.	23 oz.
measuring cable:	.034-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless

Enclosure Material:

Ⓐ order code:	1	3
enclosure material:	powder-painted aluminum	303 stainless steel
max. acceleration:	1G	.33G
max. velocity:	60 inches/sec.	20 inches/sec.

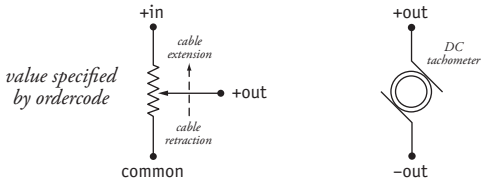
Cable Exit:

Ⓒ order code:	1	2	3	4
	front	top	back	down
				

Output Signals:

Ⓓ order code:	1	2	3	4
position sensing potentiometer:	500 ohms*	1000 ohms*	5000 ohms*	10,000 ohms*

position sensing circuit **velocity sensing circuit**

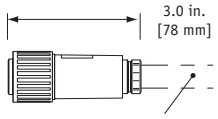
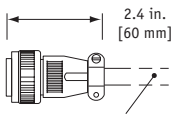
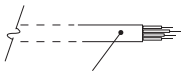


–tolerance = ±10%

Ordering Information:

Electrical Connection:

Ⓕ *order code:*

1	3	4
6-pin plastic connector with mating plug **IP 67, NEMA 4X*,6**	6-pin metal connector with mating plug **IP 65, NEMA 4**	25-ft. instrumentation cable 24 AWG, shielded **IP 67, NEMA 6**
		
1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

6-pin mating plug:

pin	signal	
A	+ in	} *position*
B	common	
C	+ out	
D	-	
E	+ out	} *velocity*
F	- out	

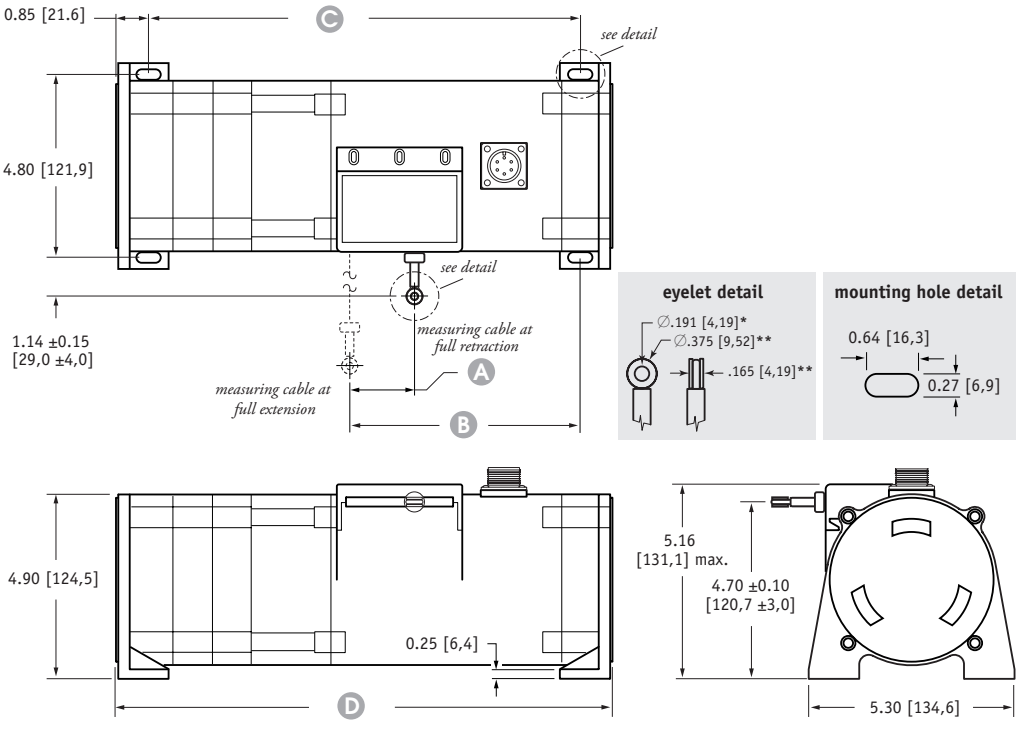
contact view

25-ft. instrumentation cable:

color	signal	
red	+ in	} *position*
black	common	
green	+ out	
white	+ out	} *velocity*
brown	- out	

** –applies to stainless steel enclosure only*

Outline Drawing



full stroke range

	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
A	1.76 [44,7]	1.58 [40,1]	1.98 [50,2]	1.49 [37,8]	1.86 [47,2]	2.11 [53,6]
B	4.52 ±0.15 [114,8 ±4,0]	5.46 ±0.15 [138,7 ±4,0]				
C	10.40 ±0.08 [264,2 ±2,0]	11.34 ±0.08 [288,0 ±2,0]				
D	12.15 [308,6] max.	13.09 [332,5] max.				

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

version: **3.0** last updated: **January 24, 2007**

0/4...20 mA Output • Hazardous Area Certification
Ranges: 0-75 to 0-550 inches
Industrial Grade

PT9420

Specification Summary:

GENERAL

Full Stroke Range Options–*on this datasheet*	0-75 to 0-550 inches
Output Signal Options	4...20 mA (2-wire) and 0...20 mA (3-wire)
Accuracy	± 0.12% full stroke
Repeatability	± 0.05% full stroke
Resolution	essentially infinite
Measuring Cable Options	nylon-coated stainless steel or thermoplastic
Enclosure Material	powder-painted aluminum or 303 stainless steel
Sensor	plastic-hybrid precision potentiometer
Potentiometer Cycle Life	250,000, min. –*before signal degradation can occur*
Maximum Retraction Acceleration/ Velocity	*see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure	8 lbs. (16 lbs.) max.

ELECTRICAL

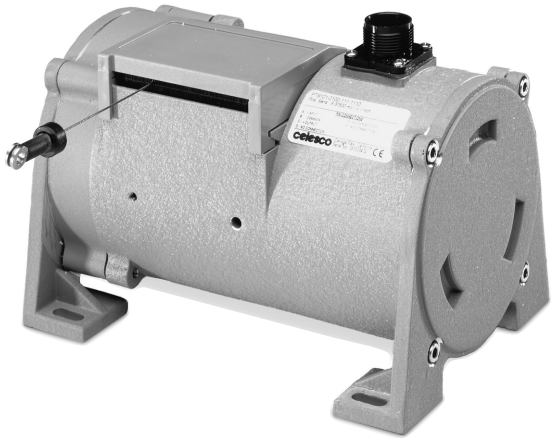
Input Voltage	*see ordering information*
Input Current	20 mA max.
Maximum Loop Resistance (Load)	(loop supply voltage – 8)/0.020
Circuit Protection	38 mA max.
Impedance	100M ohms @ 100 VDC, min.
Output Signal Adjustment	
Zero Adjustment	from factory set zero to 50% of full stroke range
Span Adjustment	to 50% of factory set span

ENVIRONMENTAL

Enclosure	NEMA 4/4X/6, IP 67/68
Hazardous Area Certification	*see ordering information*
Operating Temperature	-40º to 200ºF (-40º to 90ºC)
Vibration	up to 10 G's to 2000 Hz maximum
Thermal Effects	
Zero	0.01% f.s./ºF, max.
Span	0.01%/ºF, max.

EMC COMPLIANCE PER DIRECTIVE 89/336/EEC

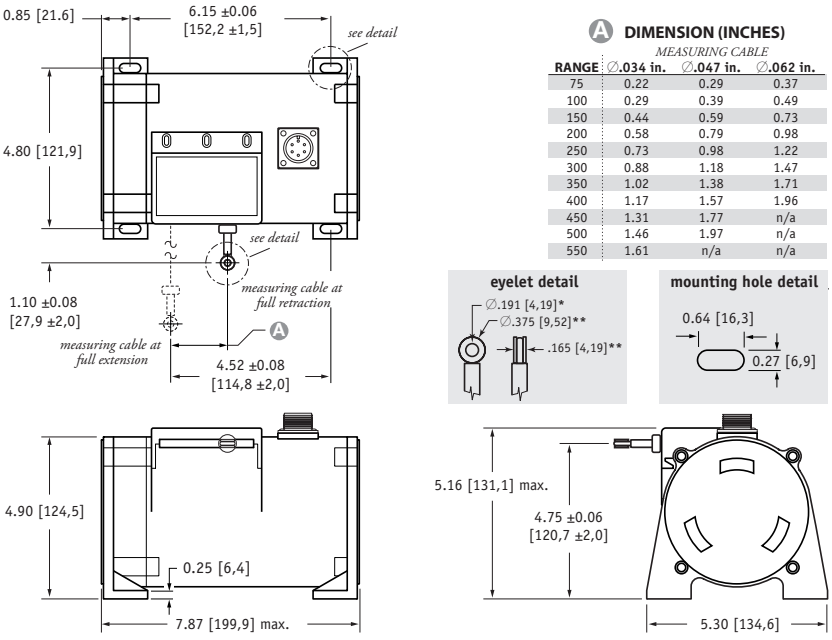
Emission / Immunity	EN50081-2 / EN50082-2



The PT9420 is a great value for demanding long-range applications requiring a 4 - 20 mA linear position feedback signal. Sealed to meet NEMA 4 standards, this Cable-Extension Transducer will perform even under the harshest of environmental conditions.

As a member of Celesco's innovative family of NEMA-4 rated cable-extension transducers, the PT9420 offers numerous benefits. It installs in minutes, functions properly without perfectly parallel alignment, and when its cable is retracted, it measures only 6".

Fig. 1 – Outline Drawing (26 oz. cable tension only)



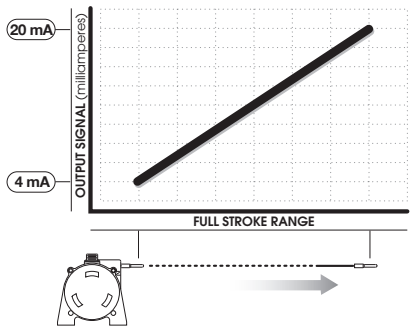
A DIMENSION (INCHES)

RANGE	MEASURING CABLE ∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

Output Signal



Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco.com • info@celesco.com

Ordering Information:

Model Number:

PT9420- ____ Ⓡ **-** __ Ⓐ __ Ⓑ __ Ⓒ **-** 1 Ⓓ __ Ⓔ __ Ⓕ 0 Ⓖ
order code:

Sample Model Number:

PT9420 - 0500 - 111 - 1110

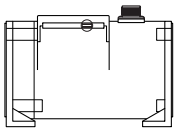
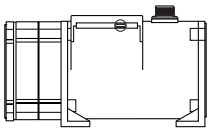
Ⓡ	range:	500 inches
Ⓐ	enclosure/cable tension:	aluminum/26 oz.
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	cable exit:	front
Ⓔ	output signal:	4...20 mA, 2-wire
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ *order code:*	0075	0100	0150	0200	0250	0300	0350	0400	0450*	0500*	0550*
full stroke range, min:	75 in.	100 in.	150 in.	200 in.	250 in.	300 in.	350 in.	400 in.	450 in.	500 in.	550 in.

** – 52 oz. cable tension strongly recommended*

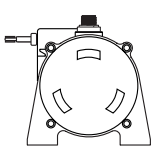
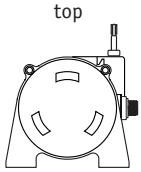
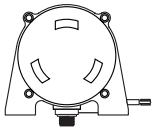
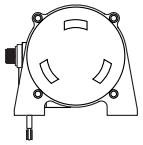
Enclosure Material and Measuring Cable Tension:

Ⓐ *order code:*	1	3	2	4
tension (±30%):	26 oz.		52 oz.	
enclosure material:	*powder-painted aluminum*	*303 stainless steel*	*powder-painted aluminum*	*303 stainless steel*
max. acceleration:	1 G	.33 G	5 G	2 G
max. velocity:	60 inches/sec	20 inches/sec	200 inches/sec	80 inches/sec
	 standard housing *see fig 1.*		 dual-spring housing *see fig 2.*	

Measuring Cable:

Ⓑ *order code:*	1	2	3
	∅.034-inch nylon-coated stainless steel *available in **all** ranges*	∅.047-inch stainless steel *all ranges up to **500 inches***	∅.062-inch thermoplastic *all ranges up to **400 inches***

Cable Exit:

Ⓒ *order code:*	1	2	3	4
	front	top	back	down
				

Ordering Information:

Output Signals:

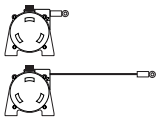
Ⓔ order code:	1	2	3	4	5*	6*
output signal options:	4...20 mA (4 → 20)	20...4 mA (20 → 4)	0...20 mA (0 → 20)	20...0 mA (20 → 0)	4...20 mA (4 → 20)	20...4 mA (20 → 4)
sensitivity:	16 mA/full stroke ±0.25%		20 mA/full stroke ±0.25%		16 mA/full stroke ±0.25%	
wiring configuration:	2 – wire		3 – wire		2 – wire	
input voltage:	8 – 40 vdc		14 – 29 vdc		14 – 32 vdc	
hazardous area certification:	not certified				CSA • Cenelec	

Output Signal Example:

ordercode = **1** = 4...20 mA

4 mA =

20 mA =



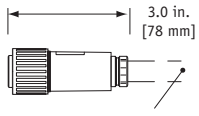
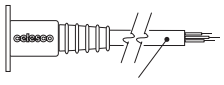
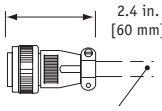
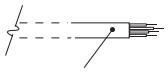
Hazardous Area Certifications:

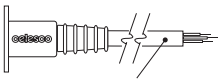
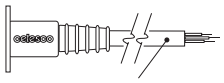
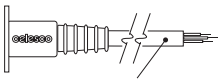
CSA Standard 22.2
Class 1
Groups A, B, C and D

Cenelec
LCIE EEx
ia IIc T4

***IMPORTANT:** intrinsically safe when powered from a CSA certified zener barrier rated 28 VDC max, 110 mA max per installation drawing#677984*

Electrical Connection:

Ⓕ order code:	1	2	3	4
	6-pin plastic connector w/mating plug **IP 67, NEMA 4X**,6**	10-ft. [3 M] waterproof cable **IP 67, NEMA 4X**, 6**	6-pin metal connector w/mating plug **IP 65, NEMA 4**	25-ft. [7.5 M] instrumentation cable **IP 67, NEMA 6**
				
	1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

Ⓕ order code:	5	6	7
	100-ft. [30 M] waterproof cable **IP 67, NEMA 4X**,6**	10-ft. [3 M] **pressure tested*** waterproof cable **IP 68, NEMA 4X**, 6P**	100-ft. [30 M] **pressure tested*** waterproof cable **IP 68, NEMA 4X**, 6P**
			
	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	2-wire	3-wire
A	8...40 vdc***	14...29 vdc
B	4...20 mA out	common
C	–	0...20 mA out
D	case ground	–

contact view

Waterproof Cable

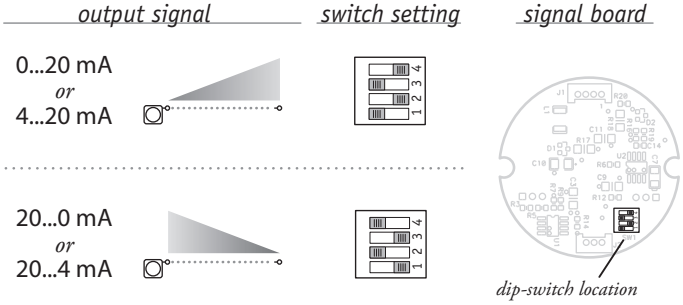
color code	2-wire	3-wire
WHITE	8...40 vdc***	14...29 vdc
BLACK	4...20 mA out	common
GREEN	case ground	0...20 mA out

Instrumentation Cable

color code	2-wire	3-wire
RED	8...40 vdc***	14...29 vdc
BLACK	4...20 mA out	common
WHITE	n/a	n/a
GREEN	case ground	0...20 mA out

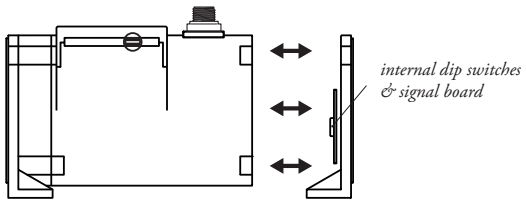
Notes:
- * *–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours.*
- ** *–NEMA 4X applies to stainless steel enclosure only.*
- *** *–14-32 VDC for hazardous area option.*

Output Signal Selection:



The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.

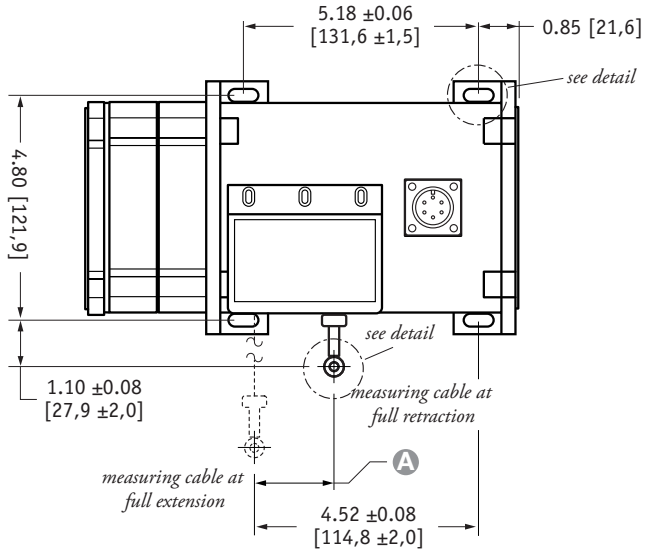
To gain access to the signal board, remove four Allen-Head Screws and remove end cover bracket.



Caution! Do Not Remove Spring-Side End Cover

Removing spring-side end cover could cause spring to become unseated and permanently damaged.

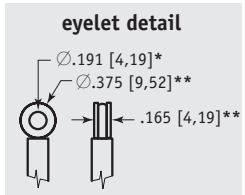
Fig. 2 – Outline Drawing (52 oz. cable tension only)

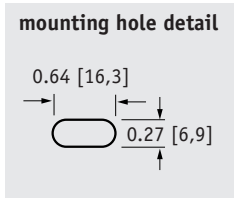


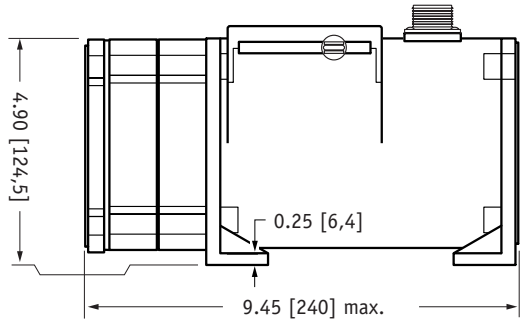
A DIMENSION (INCHES)

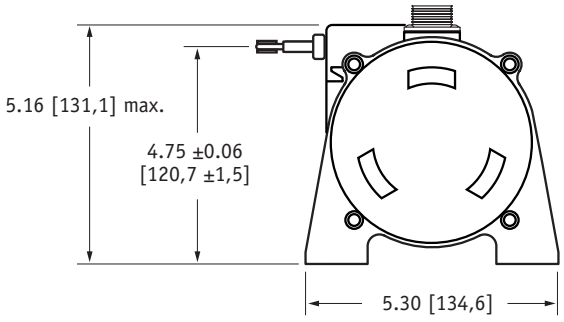
MEASURING CABLE

RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a









DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

0/4...20 mA Output • Hazardous Area Certification
Ranges: 0-600 to 0-1700 inches
Industrial Grade

<Extended Range>

PT9420

Specification Summary:

GENERAL

Full Stroke Range Options–*on this datasheet* ..... 0-600 to 0-1700 inches
Output Signal Options..... 4...20 mA (2-wire) and 0...20 mA (3-wire)
Accuracy .....± 0.12% full stroke
Repeatability..... ± 0.05% full stroke
Resolution .....essentially infinite
Measuring Cable ..... nylon-coated stainless steel
Enclosure Material.....powder-painted aluminum or 303 stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... 250,000, min. –*before signal degradation can occur*
Maximum Retraction Acceleration/ Velocity.....*see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 14 lbs. (28 lbs.) max.

ELECTRICAL

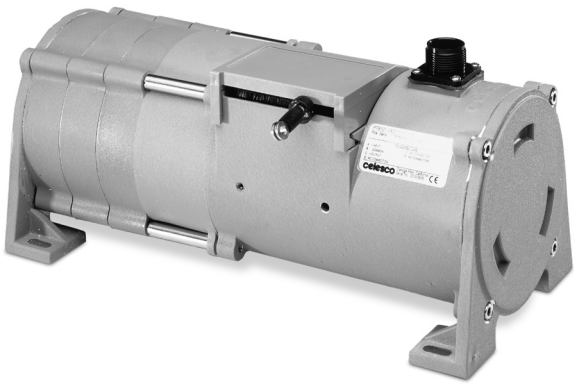
Input Voltage .....*see ordering information*
Input Current..... 20 mA max.
Maximum Loop Resistance (Load) ..... (loop supply voltage – 8)/0.020
Circuit Protection..... 38 mA max.
Impedance..... 100M ohms @ 100 VDC, min.
Output Signal Adjustment
Zero Adjustment ..... from factory set zero to 50% of full stroke range
Span Adjustment..... to 50% of factory set span

ENVIRONMENTAL

Enclosure .....NEMA 4/4X/6, IP 67/68
Hazardous Area Certification .....*see ordering information*
Operating Temperature ..... -40º to 200ºF (-40º to 90ºC)
Vibration..... up to 10 G's to 2000 Hz maximum
Thermal Effects
Zero ..... 0.01% f.s./ºF, max.
Span ..... 0.01%/ºF, max.

EMC COMPLIANCE PER DIRECTIVE 89/336/EEC

Emission / Immunity.....EN50081-2 / EN50082-2



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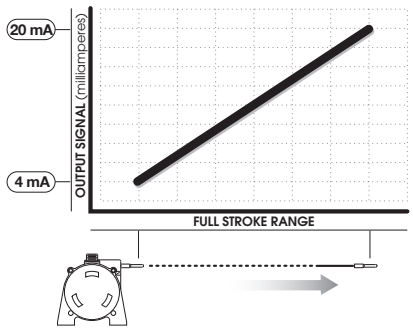
As a member of Celesco's innovative family of NEMA-4 rated cable-extension transducers, the PT9420 offers numerous benefits. It installs in minutes, functions properly without perfectly parallel alignment, and when its cable is retracted, it measures only 6".

Output Signal



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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco
celesco.com • info@celesco.com

Ordering Information:

Model Number:

PT9420- ____ Ⓡ **-** __ Ⓐ **1** Ⓑ __ Ⓒ **-** **1** Ⓓ __ Ⓔ __ Ⓕ **0** Ⓖ

order code:

Sample Model Number:

PT9420 - 1200 - 111 - 1110

Ⓡ	range:	1200 inches
Ⓐ	enclosure/cable tension:	aluminum
Ⓒ	cable exit:	front
Ⓔ	output signal:	4...20 mA, 2-wire
Ⓕ	electrical connection:	6-pin plastic connector

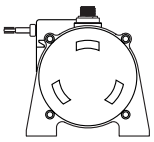
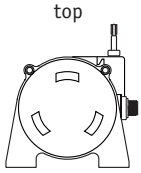
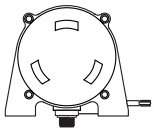
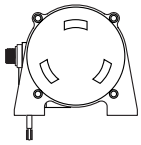
Full Stroke Range:

Ⓡ *order code:*	0600	0800	1000	1200	1500	1700
full stroke range, min:	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
cable tension (30%):	25 oz.	25 oz.	24 oz.	24 oz.	23 oz.	23 oz.
measuring cable:	.034-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless

Enclosure Material:

Ⓐ *order code:*	1	3
enclosure material:	powder-painted aluminum	303 stainless steel
max. acceleration:	1G	.33G
max. velocity:	60 inches/sec.	20 inches/sec.

Cable Exit:

Ⓒ *order code:*	1	2	3	4
	front	top	back	down
				

Output Signals:

Ⓑ *order code:*	1	2	3	4	5*	6*
output signal options:	4...20 mA (4 ▲ 20)	20...4 mA (20 ▼ 4)	0...20 mA (0 ▲ 20)	20...0 mA (20 ▼ 0)	4...20 mA (4 ▲ 20)	20...4 mA (20 ▼ 4)
sensitivity:	16 mA/full stroke ±0.25%		20 mA/full stroke ±0.25%		16 mA/full stroke ±0.25%	
wiring configuration:	2 – wire		3 – wire		2 – wire	
input voltage:	8 – 40 vdc		14 – 29 vdc		14 – 32 vdc	
hazardous area certification:	not certified				CSA • Cenelec	

Output Signal Example:

ordercode = **1** = 4...20 mA ➡ 4 mA = 

20 mA = 

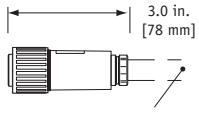
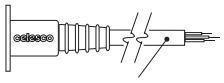
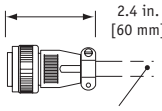
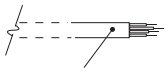
Hazardous Area Certifications:

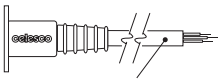
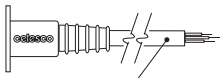
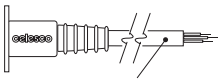
CSA Standard 22.2 Class 1 Groups A, B, C and D	Cenelec LCIE EEx ia IIc T4

**IMPORTANT: intrinsically safe when powered from a CSA certified zener barrier rated 28 VDC max, 110 mA max per installation drawing#677984*

Ordering Information:

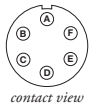
Electrical Connection:

order code:	1	2	3	4
	6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
	IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
				
	1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

order code:	5	6	7
	100-ft. [30 M] waterproof cable	10-ft. [3 M] **pressure tested*** waterproof cable	100-ft. [30 M] **pressure tested*** waterproof cable
	IP 67, NEMA 4X,6**	**IP 68, NEMA 4X**, 6P**	**IP 68, NEMA 4X**, 6P**
			
	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	2-wire	3-wire
A	8...40 vdc***	14...29 vdc
B	4...20 mA out	common
C	–	0...20 mA out
D	case ground	–



contact view

Waterproof Cable

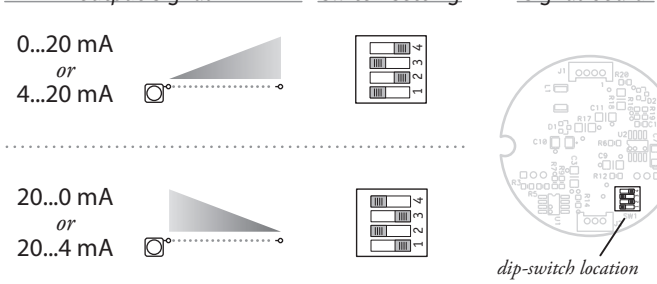
color code	2-wire	3-wire
WHITE	8...40 vdc***	14...29 vdc
BLACK	4...20 mA out	common
GREEN	case ground	0...20 mA out

Instrumentation Cable

color code	2-wire	3-wire
RED	8...40 vdc***	14...29 vdc
BLACK	4...20 mA out	common
WHITE	n/a	n/a
GREEN	case ground	0...20 mA out

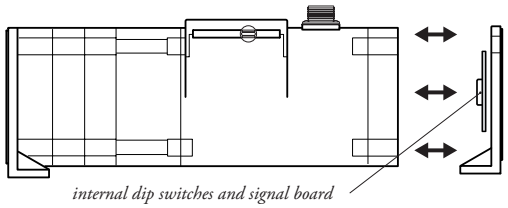
Notes:
- * *–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours.*
- ** *–NEMA 4X applies to stainless steel enclosure only.*
- *** *–14-32 VDC for hazardous area option.*

Output Signal Selection:



The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.

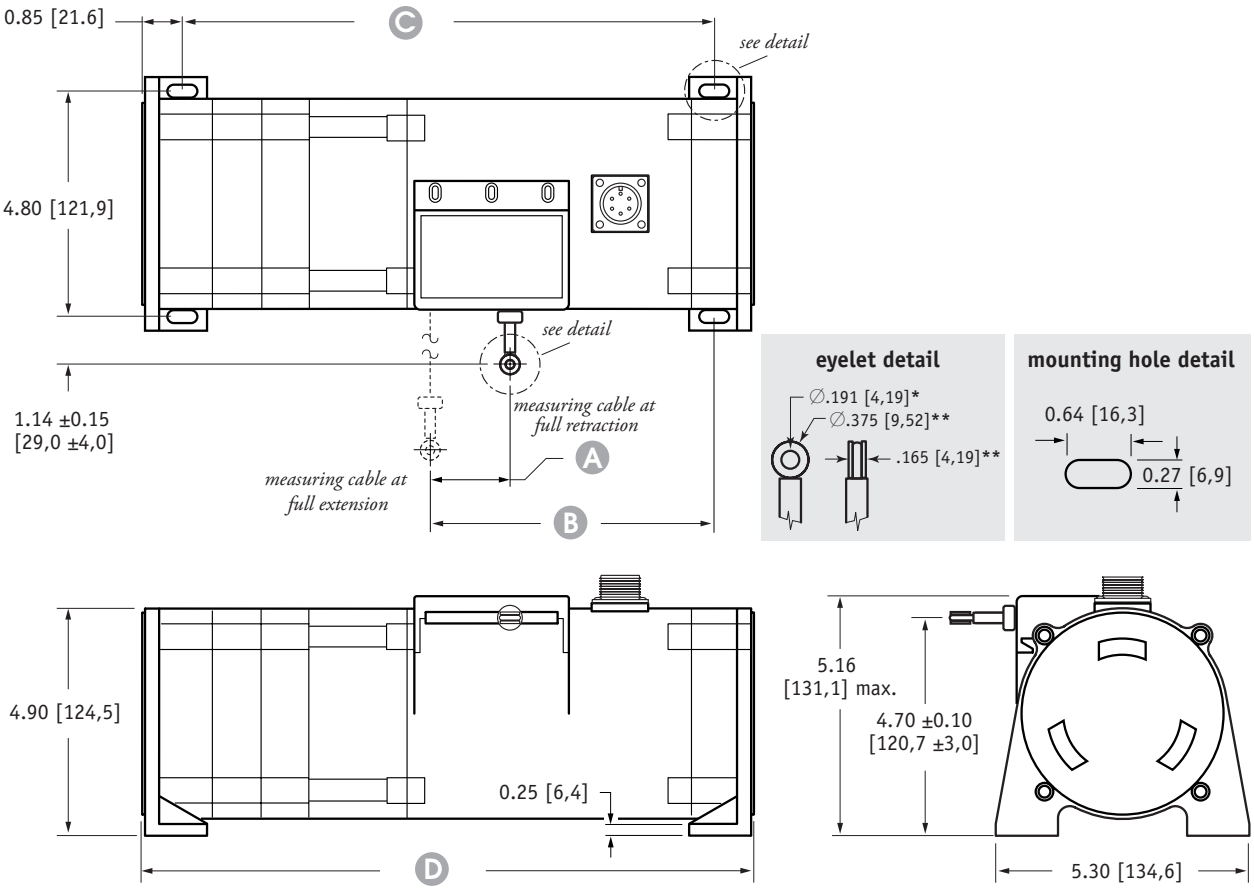
To gain access to the signal board, remove four Allen-Head Screws and remove end cover bracket.


internal dip switches and signal board

Caution! Do Not Remove Spring-Side End Cover

Removing spring-side end cover could cause spring to become unseated and permanently damaged.

Outline Drawing



full stroke range

	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
A	1.76 [44,7]	1.58 [40,1]	1.98 [50,2]	1.49 [37,8]	1.86 [47,2]	2.11 [53,6]
B	4.52 ±0.15 [114,8 ±4,0]	5.46 ±0.15 [138,7 ±4,0]				
C	10.40 ±0.08 [264,2 ±2,0]	11.34 ±0.08 [288,0 ±2,0]				
D	12.15 [308,6] max.	13.09 [332,5] max.				

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

0...5, 0...10, –5...+5, –10...+10 VDC Output Options
Ranges: 0-75 to 0-550 inches
Industrial Grade

PT9510

CE

Specification Summary:

GENERAL

Full Stroke Range Options–*on this datasheet* ..... 0-75 to 0-550 inches
Output Signal Options. ..... 0...10, 0...5, -5...+5, -10...+10 VDC
Accuracy ..... ± 0.12% full stroke
Repeatability. ..... ± 0.05% full stroke
Resolution ..... essentially infinite
Measuring Cable Options. ..... nylon-coated stainless steel or thermoplastic
Enclosure Material. ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... 250,000, min. –*before signal degradation can occur*
Maximum Retraction Acceleration ..... *see ordering information*
Maximum Velocity ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 8 lbs. (16 lbs.) max.

ELECTRICAL

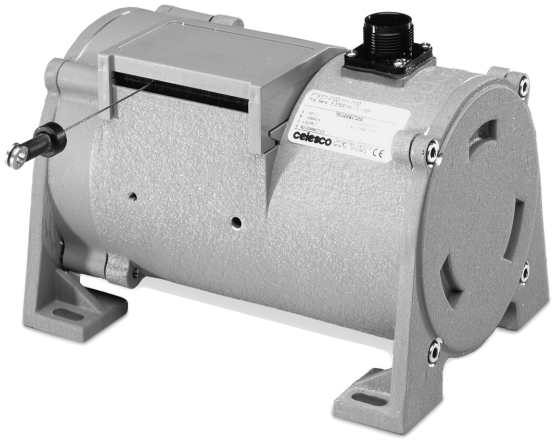
Input Voltage ..... 14.5-40VDC (10.5-40VDC for 0-5 volt output)
Input Current. ..... 10 mA maximum
Output Impedance ..... 1000 ohms
Maximum Output Load. ..... 5000 ohms
Zero and Span Adjustment ..... *see ordering information*

ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... -40º to 200ºF (-40º to 90ºC)
Vibration. ..... up to 10 G's to 2000 Hz maximum

EMC COMPLIANCE PER DIRECTIVE 89/336/EEC

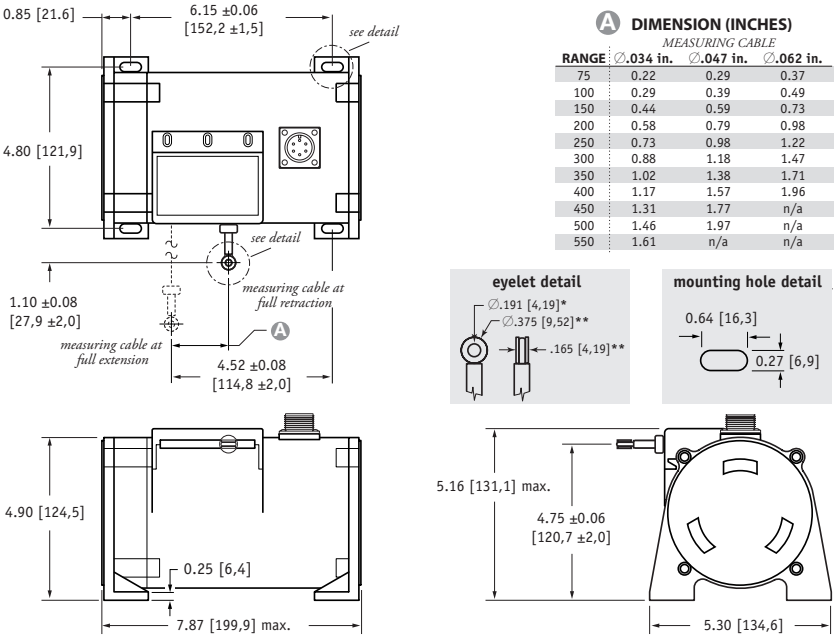
Emission / Immunity. ..... EN50081-2 / EN50082-2



The PT9510 can operate from an unregulated 14.5 to 40 VDC power supply while providing a regulated output signal over it's full extended range of up to 1700". It provides a 0 - 10 VDC position feedback signal proportional to the linear movement of it's stainless steel measuring cable.

As a member of Celesco's innovative family of NEMA-4 rated cable-extension transducers, the PT9510 offers numerous benefits. It installs in minutes, functions properly without perfectly parallel alignment, and when its cable is retracted, it measures only 6".

Fig. 1 – Outline Drawing (26 oz. cable tension only)



A DIMENSION (INCHES)

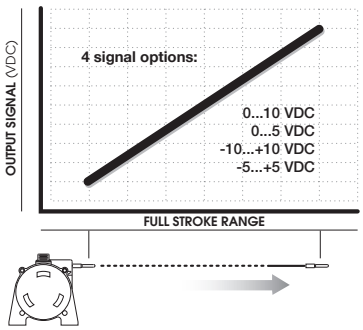
MEASURING CABLE

RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

Output Signal



Celesco Transducer Products, Inc.
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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco
celesco.com • info@celesco.com

Ordering Information:

Model Number:

PT9510- _____ (R) - ___ (A) ___ (B) ___ (C) - 1 (D) ___ (E) ___ (F) 0 (G)

order code:

Sample Model Number:

PT9510 - 0500 - 111 - 1110

(R)	range:	500 inches
(A)	enclosure/cable tension:	aluminum/26 oz.
(B)	measuring cable:	.034 nylon-coated stainless
(C)	cable exit:	front
(E)	output signal:	0...10 vdc
(F)	electrical connection:	6-pin plastic connector

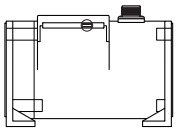
Full Stroke Range:

(R) order code:	0075	0100	0150	0200	0250	0300	0350	0400	0450*	0500*	0550*
full stroke range, min:	75 in.	100 in.	150 in.	200 in.	250 in.	300 in.	350 in.	400 in.	450 in.	500 in.	550 in.

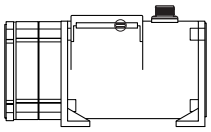
** – 52 oz. cable tension strongly recommended*

Enclosure Material and Measuring Cable Tension:

(A) order code:	1	3	2	4
tension (±30%):	26 oz.		52 oz.	
enclosure material:	*powder-painted aluminum*	*303 stainless steel*	*powder-painted aluminum*	*303 stainless steel*
max. acceleration:	1 G	.33 G	5 G	2 G
max. velocity:	60 inches/sec	20 inches/sec	200 inches/sec	80 inches/sec



standard housing
see fig 1.



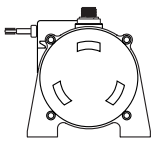
dual-spring housing
see fig 2.

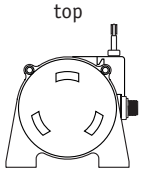
Measuring Cable:

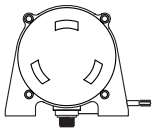
(B) order code:	1	2	3
	∅.034-inch nylon-coated stainless steel *available in **all** ranges*	∅.047-inch stainless steel *all ranges up to **500 inches***	∅.062-inch thermoplastic *all ranges up to **400 inches***

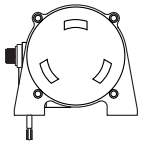
Cable Exit:

(C) order code:	1	2	3	4
	front	top	back	down









Output Signals:

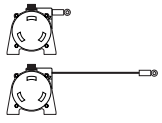
(E) order code:	1	2	3	4	5	6	7	8
output signal options:	0...10 VDC	10...0 VDC	0...5 VDC	5...0 VDC	-10...+10 VDC	+10...-10 VDC	-5...+5 VDC	+5...-5 VDC
input voltage:	14.5 – 40 vdc		10.5 – 40 vdc		14.5 – 40 vdc		10.5 – 40 vdc	
span adjustment:	to 50% of full stroke range				to 75% of full stroke range			
zero adjustment:	from factory set zero to 50% of full stroke range				from factory set zero to 25% of full stroke range			

example:

ordercode = **1** = 0...10 VDC

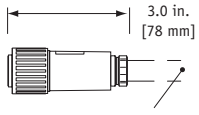
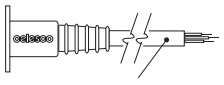
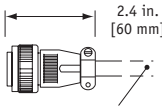
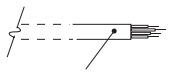
0 vdc =

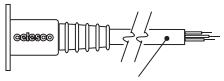
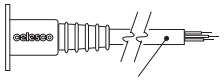
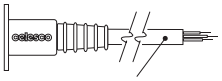
10 vdc =



Ordering Information:

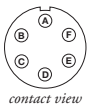
Electrical Connection:

Ⓕ order code:	1	2	3	4
	6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
	IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
				
	1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

Ⓕ order code:	5	6	7
	100-ft. [30 M] waterproof cable	10-ft. [3 M] **pressure tested*** waterproof cable	100-ft. [30 M] **pressure tested*** waterproof cable
	IP 67, NEMA 4X,6**	**IP 68, NEMA 4X**, 6P**	**IP 68, NEMA 4X**, 6P**
			
	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	signal
A	input voltage
B	output signal
C	common



contact view

Waterproof Cable

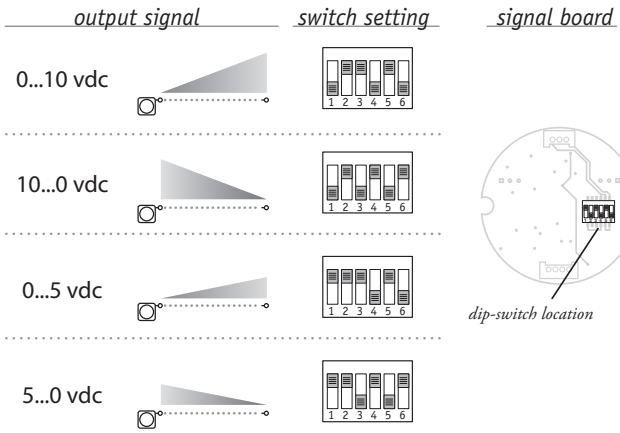
color code	signal
WHITE	input voltage
GREEN	output signal
BLACK	common

Instrumentation Cable

color code	signal
RED	input voltage
GREEN	output signal
BLACK	common

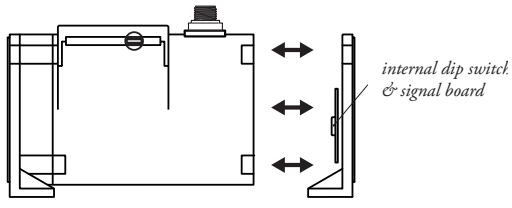
Notes: { * *–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours.*
** *–NEMA 4X applies to stainless steel enclosure only.*

Output Signal Selection (does not apply to -5...+5 & -10...+10 vdc options)



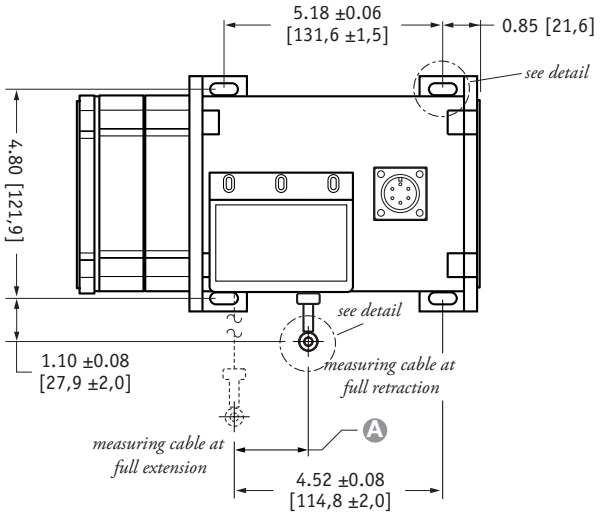
The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.

To gain access to the signal board, remove four Allen-Head Screws and remove end cover bracket.



Caution! Do Not Remove Spring-Side End Cover
Removing spring-side end cover could cause spring to become unseated and permanently damaged.

Fig. 2 – Outline Drawing (52 oz. cable tension only)

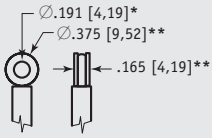


A DIMENSION (INCHES)

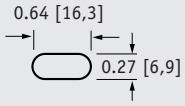
MEASURING CABLE

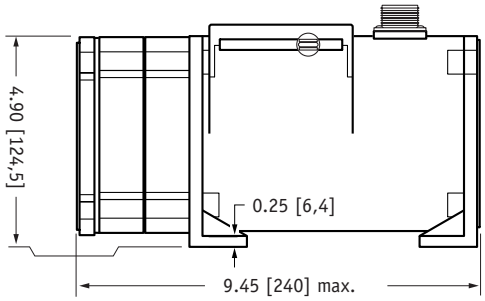
RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

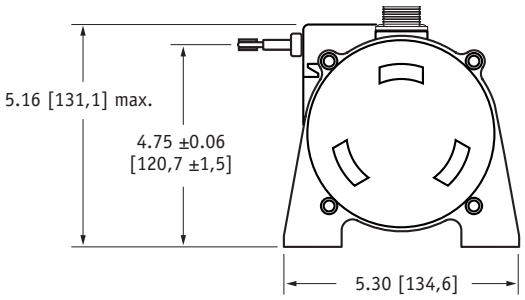
eyelet detail



mounting hole detail







DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

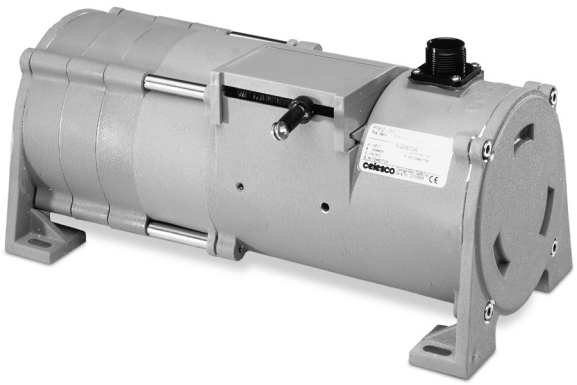
* tolerance = +.005 –.001 [+.13 –.03]
** tolerance = +.005 –.005 [+.13 –.13]

0...5, 0...10, –5...+5, –10...+10 VDC Output Options
Ranges: 0-600 to 0-1700 inches
Industrial Grade

CE

<Extended Range>

PT9510



Specification Summary:

GENERAL

Full Stroke Range Options–*on this datasheet* ..... 0-600 to 0-1700 inches
Output Signal Options ..... 0...10, 0...5, -5...+5, -10...+10 VDC
Accuracy ..... ± 0.12% full stroke
Repeatability ..... ± 0.05% full stroke
Resolution ..... essentially infinite
Measuring Cable ..... nylon-coated stainless steel
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... 250,000, min. –*before signal degradation can occur*
Maximum Retraction Acceleration ..... *see ordering information*
Maximum Velocity ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 8 lbs. (16 lbs.) max.

ELECTRICAL

Input Voltage ..... 14.5-40VDC (10.5-40VDC for 0-5 volt output)
Input Current ..... 10 mA maximum
Output Impedance ..... 1000 ohms
Maximum Output Load ..... 5000 ohms
Zero and Span Adjustment ..... *see ordering information*

ENVIRONMENTAL

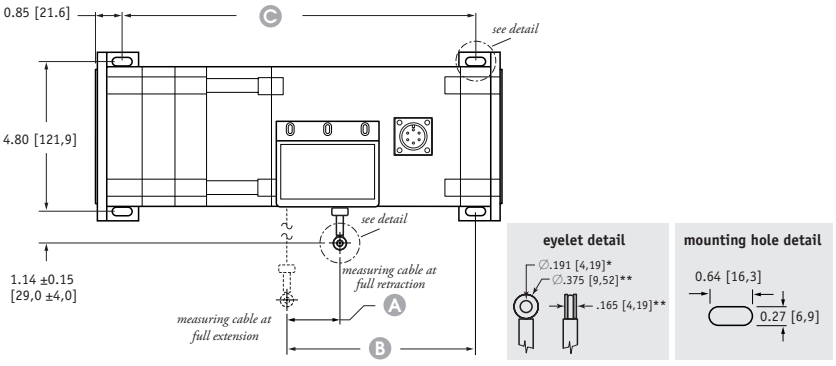
Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... -40º to 200ºF (-40º to 90ºC)
Vibration ..... up to 10 G's to 2000 Hz maximum

EMC COMPLIANCE PER DIRECTIVE 89/336/EEC

Emission / Immunity ..... EN50081-2 / EN50082-2

The PT9510 can operate from an unregulated 14.5 to 40 VDC power supply while providing a regulated output signal over it's full extended range of up to 1700". It provides a 0 - 10 VDC position feedback signal proportional to the linear movement of it's stainless steel measuring cable.

As a member of Celesco's innovative family of NEMA-4 rated cable-extension transducers, the PT9510 offers numerous benefits. It installs in minutes, functions properly without perfectly parallel alignment, and when its cable is retracted, it measures only 6".

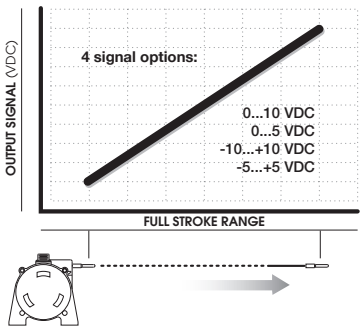


	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
A	1.76 [44,7]	1.58 [40,1]	1.98 [50,2]	1.49 [37,8]	1.86 [47,2]	2.11 [53,6]
B	4.52 ±0.15 [114,8 ±4,0]	5.46 ±0.15 [138,7 ±4,0]				
C	10.40 ±0.08 [264,2 ±2,0]	11.34 ±0.08 [288,0 ±2,0]				
D	12.15 [308,6] max.	13.09 [332,5] max.				

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

Output Signal



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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco
celesco.com • info@celesco.com

Ordering Information:

Model Number:

PT9510-_____ **-** ___ **1** ___ **-** **1** ___ ___ **0**
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:

PT9510 - 1200 - 111 - 1110

Ⓡ	range:	500 inches
Ⓐ	enclosure/cable tension:	aluminum
Ⓒ	cable exit:	front
Ⓔ	output signal:	0...10 vdc
Ⓕ	electrical connection:	6-pin plastic connector

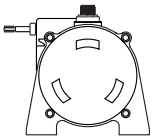
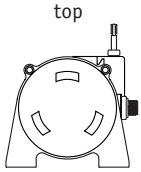
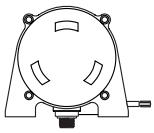
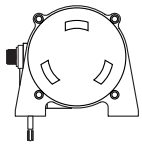
Full Stroke Range:

Ⓡ *order code:*	0600	0800	1000	1200	1500	1700
full stroke range, min:	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
cable tension (30%):	25 oz.	25 oz.	24 oz.	24 oz.	23 oz.	23 oz.
measuring cable:	.034-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless

Enclosure Material:

Ⓐ *order code:*	1	3
enclosure material:	powder-painted aluminum	303 stainless steel
max. acceleration:	1G	.33G
max. velocity:	60 inches/sec.	20 inches/sec.

Cable Exit:

Ⓒ *order code:*	1	2	3	4
	front	top	back	down
				

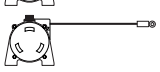
Output Signals:

Ⓑ *order code:*	1	2	3	4	5	6	7	8
output signal options:	0...10 VDC	10...0 VDC	0...5 VDC	5...0 VDC	-10...+10 VDC	+10...-10 VDC	-5...+5 VDC	+5...-5 VDC
								
input voltage:	14.5 – 40 vdc		10.5 – 40 vdc		14.5 – 40 vdc		10.5 – 40 vdc	
span adjustment:	to 50% of full stroke range				to 75% of full stroke range			
zero adjustment:	from factory set zero to 50% of full stroke range				from factory set zero to 25% of full stroke range			

example:

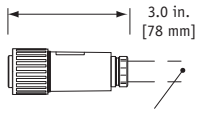
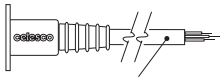
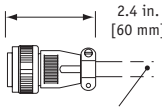
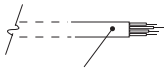
ordercode = **1** = 0...10 VDC

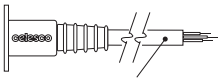
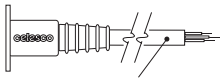
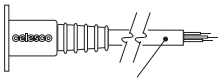
0 vdc = 

10 vdc = 

Ordering Information:

Electrical Connection:

order code:	1	2	3	4
	6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
	IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
				
	1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

order code:	5	6	7
	100-ft. [30 M] waterproof cable	10-ft. [3 M] **pressure tested*** waterproof cable	100-ft. [30 M] **pressure tested*** waterproof cable
	IP 67, NEMA 4X,6**	**IP 68, NEMA 4X**, 6P**	**IP 68, NEMA 4X**, 6P**
			
	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	signal
A	input voltage
B	output signal
C	common

contact view

Waterproof Cable

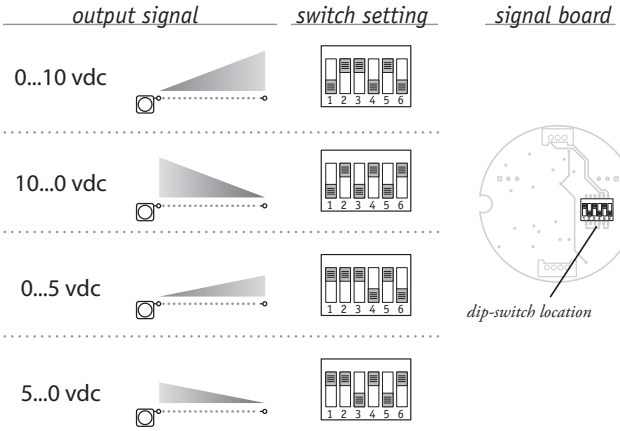
color code	signal
WHITE	input voltage
GREEN	output signal
BLACK	common

Instrumentation Cable

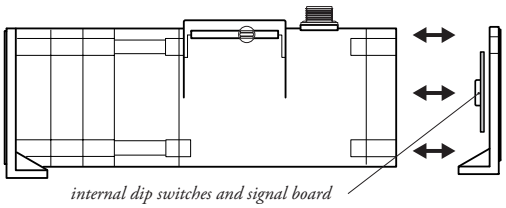
color code	signal
RED	input voltage
GREEN	output signal
BLACK	common

Notes: { * *–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours.*
** *–NEMA 4X applies to stainless steel enclosure only.*

Output Signal Selection (does not apply to -5...+5 & -10...+10 vdc options)



To gain access to the signal board, remove four Allen-Head Screws and remove end cover bracket.


internal dip switches and signal board

Caution! Do Not Remove Spring-Side End Cover
Removing spring-side end cover could cause spring to become unseated and permanently damaged.

The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.

Mates to Virtually Any Encoder
Ranges: 0-75 to 0-550 inches
Available With or Without Encoder

PT9600

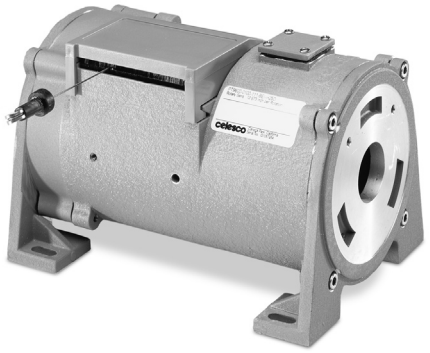
Specification Summary:

GENERAL

Full Stroke Range Options–*on this datasheet* ..... 0-75 to 0-550 inches
Motion Conversion Ratio ..... 12.6 inches per turn, *see ordering information*
Accuracy
Typical ..... the lesser of 0.02% f.s. or 0.04% of measurement ±1/2 pulse max.
Best ..... not less than 0.001 in. (0.03 mm)
Repeatability ..... ± 0.02% of measurement ±1/2 pulse max.
Measuring Cable Options ..... nylon-coated stainless steel or thermoplastic
Enclosure Material Options ..... powder-painted aluminum or stainless steel
Encoder Shaft Coupling ..... aluminum flexible coupling
Maximum Allowable Rotational Sensor Torque ..... 1.0 in-lbs.
Maximum Retraction Acceleration ..... *see ordering information*
Maximum Velocity ..... *see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 8 lbs. (16 lbs.) max.

ENVIRONMENTAL

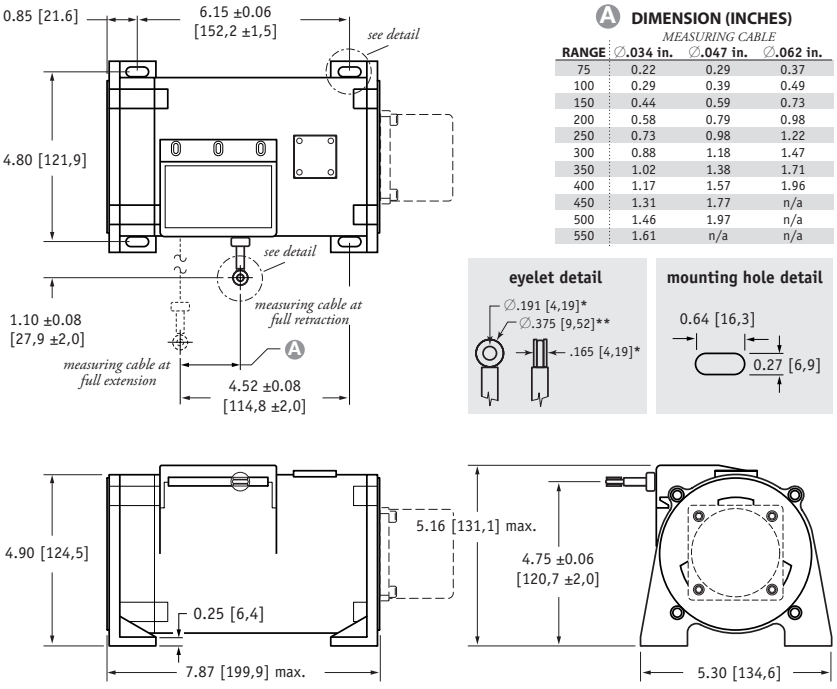
Operating Temperature ..... -40° to 200°F (-40° to 90°C)



Our unique string encoder module mates to virtually any encoder, giving you a cost-effective long-range linear position measurement solution that precisely fits your requirements.

This modular approach delivers the ultimate in flexibility. To order, simply select the measurement range, the cable tension and encoder mounting style—it's that easy! We even supply all the necessary encoder mounting tools and attaching hardware. If you can't find your encoder mounting style or you want us to provide the encoder, please give us a call.

Fig. 1 – Outline Drawing (26 oz. cable tension only)

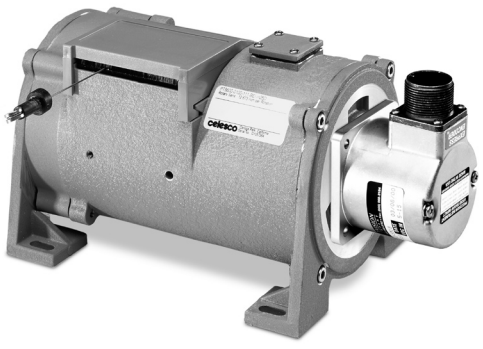


A DIMENSION (INCHES)
MEASURING CABLE

RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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



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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

Ordering Information:

Model Number:

PT9600- _____ Ⓡ **-** ____ Ⓐ ____ Ⓑ ____ Ⓒ **-** _____ Ⓓ
order code:

Sample Model Number:

PT9600 - 0200 - 111 - F01

Ⓡ	range:	200 inches
Ⓐ	enclosure / cable tension:	aluminum / 26 oz.
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	cable exit:	front
Ⓓ	rotational sensor mounting style:	F01 (2.5-in. sq. flange)

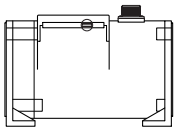
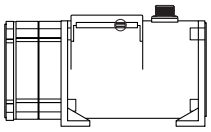
» Trying to reorder but can't find your existing model number? Please contact factory for help.

Full Stroke Range:

Ⓡ *order code:*	0075	0100	0150	0200	0250	0300	0350	0400	0450*	0500*	0550*
full stroke range, min:	75 in.	100 in.	150 in.	200 in.	250 in.	300 in.	350 in.	400 in.	450 in.	500 in.	550 in.

** – 52 oz. cable tension strongly recommended*

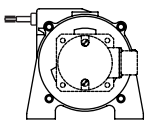
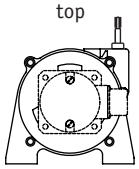
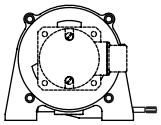
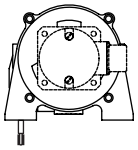
Enclosure Material and Measuring Cable Tension:

Ⓐ *order code:*	1	3	2	4
tension (±30%):	26 oz.		52 oz.	
enclosure material:	*powder-painted aluminum*	*303 stainless steel*	*powder-painted aluminum*	*303 stainless steel*
max. acceleration:	1 G	.33 G	5 G	2 G
max. velocity:	60 inches/sec	20 inches/sec	200 inches/sec	80 inches/sec
	 standard housing *see fig 1.*		 dual-spring housing *see fig 2.*	

Measuring Cable / Conversion Ratio:

Ⓑ *order code:*	1	2	3
measuring cable:	.034 nylon-coated stainless steel	.047 stainless steel	.062 thermoplastic
conversion ratio, aluminum enclosure:	1 turn = 12.673 ± 0.010 in.	1 turn = 12.714 ± 0.010 in.	1 turn = 12.755 ± 0.010 in.
conversion ratio, stainless enclosure:	1 turn = 12.579 ± 0.010 in.	1 turn = 12.620 ± 0.010 in.	1 turn = 12.661 ± 0.010 in.
	*available in **all** ranges*	*all ranges up to **500 inches***	*all ranges up to **400 inches***

Cable Exit:

Ⓒ *order code:*	1	2	3	4
	front	top	back	down
				

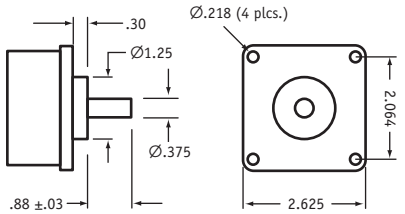
Ordering Information:

Rotational Sensor Mounting Style:

order code:	F01	F02	S01	S02	S04
	2.5-in. Flange Mount 3/8-inch shaft	2-in. Flange Mount 3/8-inch shaft	Face-Mount 6 mm shaft M4 mounting screws	Face-Mount 10 mm shaft M4 mounting screws	Face-Mount 10 mm shaft M3 mounting screws

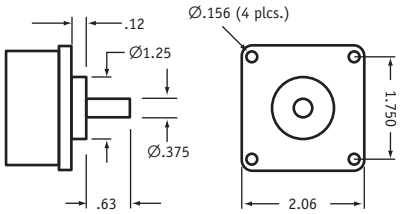
Note: If you don't see your encoder style, please contact factory. All encoder types supported.

F01 - 2½-inch Sq. Flange Mount (3/8-inch shaft)



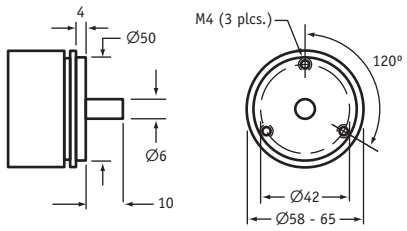
*all dimensions are in **inches***

F02 - 2-inch Sq. Flange Mount (3/8-inch shaft)



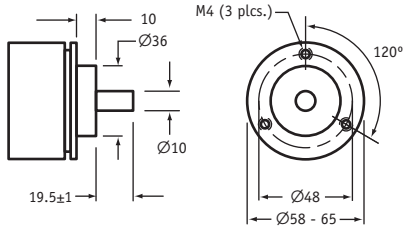
*all dimensions are in **inches***

S01 - Face-Mount (6mm shaft/M4 screws)



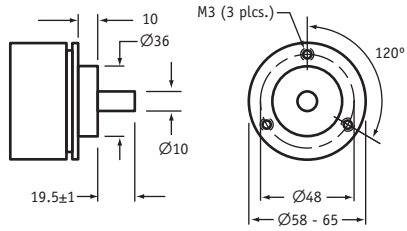
*all dimensions are in **mm***

S02 - Face-Mount (10mm shaft/M4 screws)



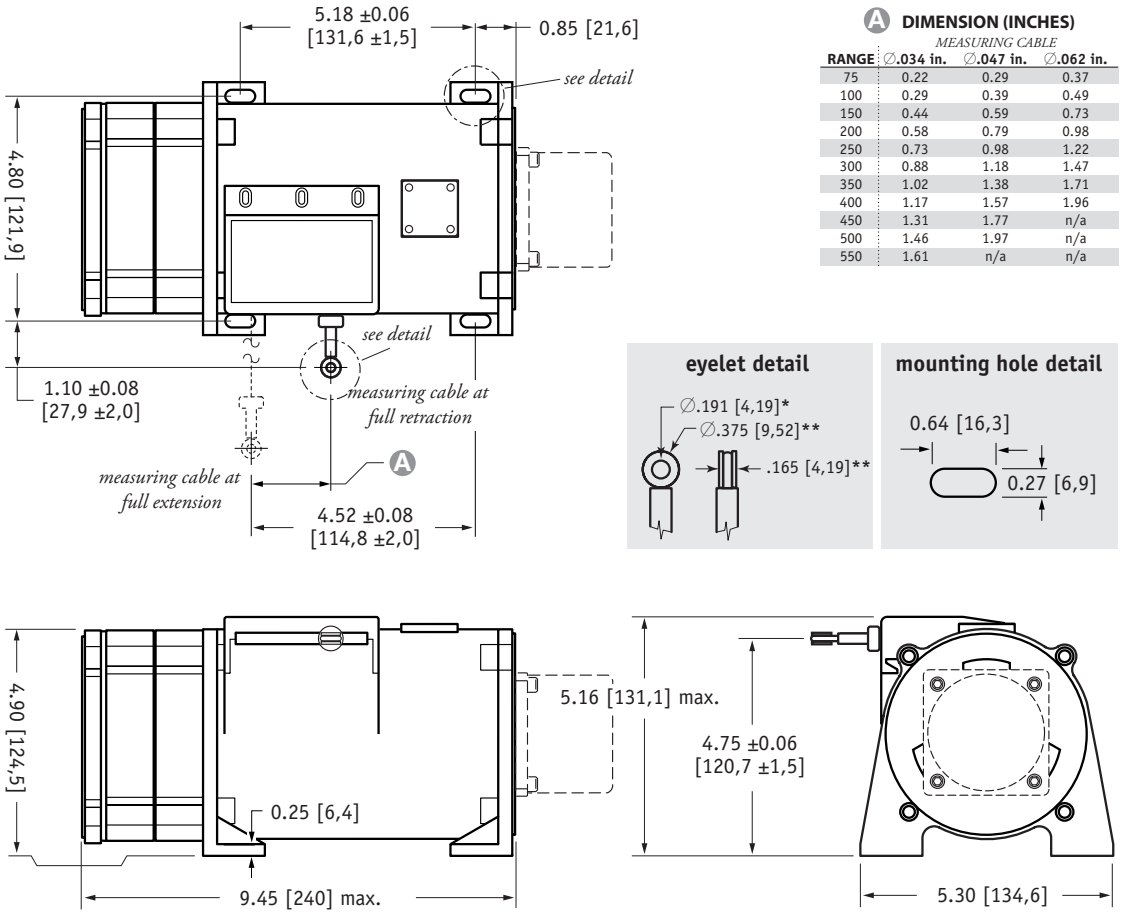
*all dimensions are in **mm***

S04 - Face-Mount (10mm shaft/M3 screws)



*all dimensions are in **mm***

Fig. 2 – Outline Drawing (42 oz. cable tension only)



A DIMENSION (INCHES)

MEASURING CABLE

RANGE	∅.034 in.	∅.047 in.	∅.062 in.
75	0.22	0.29	0.37
100	0.29	0.39	0.49
150	0.44	0.59	0.73
200	0.58	0.79	0.98
250	0.73	0.98	1.22
300	0.88	1.18	1.47
350	1.02	1.38	1.71
400	1.17	1.57	1.96
450	1.31	1.77	n/a
500	1.46	1.97	n/a
550	1.61	n/a	n/a

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

Mates To Virtually Any Encoder
Ranges: 0-600 to 0-1700 inches
Available With or Without Encoder

<Extended Range>

PT9600

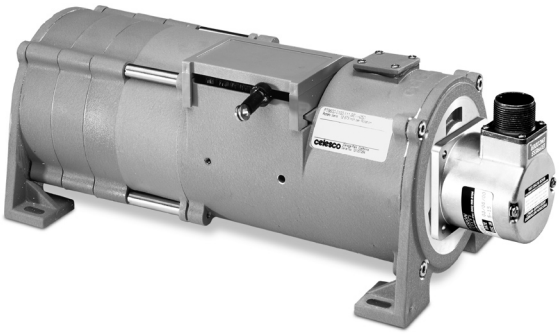
Specification Summary:

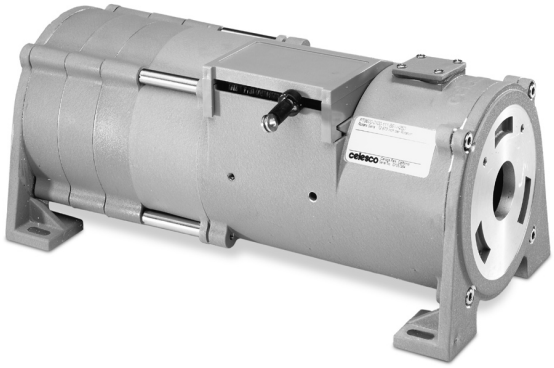
GENERAL

Full Stroke Range Options–*on this datasheet* ..... 0-600 to 0-1700 inches
Motion Conversion Ratio ..... 12.6 inches per turn, *see ordering information*
Accuracy
Typical .....the lesser of 0.02% f.s. or 0.04% of measurement ±1/2 pulse max.
Best.....not less than 0.001 in. (0.03 mm)
Repeatability.....± 0.02% of measurement ±1/2 pulse max.
Measuring Cable ..... nylon-coated stainless steel
Enclosure Material.....powder-painted aluminum
Encoder Shaft Coupling ..... aluminum flexible coupling
Maximum Allowable Rotational Sensor Torque..... 1.0 in-lbs.
Maximum Retraction Acceleration .....*see ordering information*
Maximum Velocity .....*see ordering information*
Weight, Aluminum (Stainless Steel) Enclosure ..... 14 lbs. (28 lbs.) max.

ENVIRONMENTAL

Operating Temperature ..... -40° to 200°F (-40° to 90°C)





Our unique string encoder module mates to virtually any encoder, giving you a cost-effective long-range linear position measurement solution that precisely fits your requirements.

This modular approach delivers the ultimate in flexibility. To order, simply select the measurement range, the cable tension and encoder mounting style—it's that easy! We even supply all the necessary encoder mounting tools and attaching hardware. If you can't find your encoder mounting style or you want us to provide the encoder, please give us a call.

Ordering Information:

Model Number:

PT9600- ____ Ⓡ **-** ___ Ⓐ **1** ___ Ⓑ ___ Ⓒ **-** ____ Ⓓ
order code:

Sample Model Number:

PT9600 - 1500 - 111 - F01

Ⓡ	range:	1500 inches
Ⓐ	enclosure:	aluminum
Ⓒ	cable exit:	front
Ⓓ	rotational sensor mounting style:	F01 (2.5-in. sq. flange)

» Trying to reorder but can't find your existing model number? Please contact factory for help.

Full Stroke Range /Conversion Ratio:

Ⓡ *order code:*	0600	0800	1000	1200	1500	1700
full stroke range, min:	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
cable tension (±30%):	25 oz.	25 oz.	24 oz.	24 oz.	23 oz.	23 oz.
measuring cable:	.034-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.019-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless	.014-in. dia. nylon-coated stainless
aluminum enclosure, 1 turn =	12.673 ± .010 in.	12.626 ± .010 in.	12.626 ± .010 in.	12.626 ± .010 in.	12.613 ± .010 in.	12.613 ± .010 in.
stainless steel enclosure, 1 turn =	12.579 ± .010 in.	12.532 ± .010 in.	12.532 ± .010 in.	12.532 ± .010 in.	12.519 ± .010 in.	12.519 ± .010 in.

celesco
celesco.com • info@celesco.com

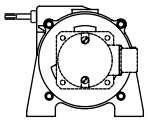
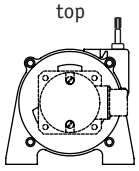
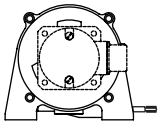
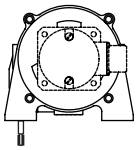
Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

Enclosure Material:

Ⓐ order code:	1	3
enclosure material:	powder-painted aluminum	303 stainless steel
max. acceleration:	1G	.33G
max. velocity:	60 inches/sec.	20 inches/sec.

Cable Exit:

Ⓒ order code:

1	2	3	4
front	top	back	down
			

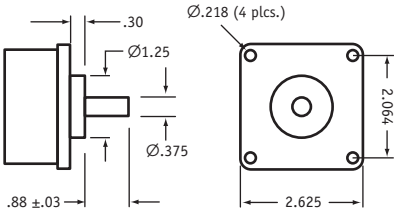
Rotational Sensor Mounting Style:

Ⓓ order code:

F01	F02	S01	S02	S04
2.5-in. Flange Mount 3/8-inch shaft	2-in. Flange Mount 3/8-inch shaft	Face-Mount 6 mm shaft M4 mounting screws	Face-Mount 10 mm shaft M4 mounting screws	Face-Mount 10 mm shaft M3 mounting screws

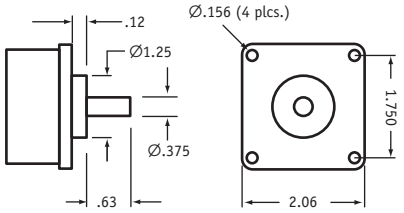
Note: If you don't see your encoder style, please contact factory. All encoder types supported.

F01 - 2½-inch Sq. Flange Mount (3/8-inch shaft)



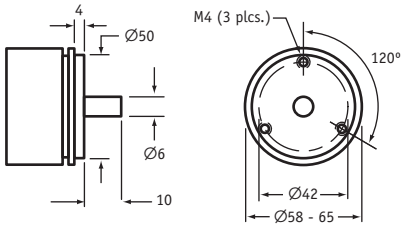
*all dimensions are in **inches***

F02 - 2-inch Sq. Flange Mount (3/8-inch shaft)



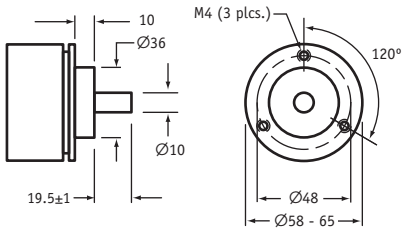
*all dimensions are in **inches***

S01 - Face-Mount (6mm shaft/M4 screws)



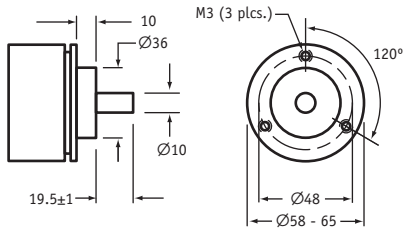
*all dimensions are in **mm***

S02 - Face-Mount (10mm shaft/M4 screws)



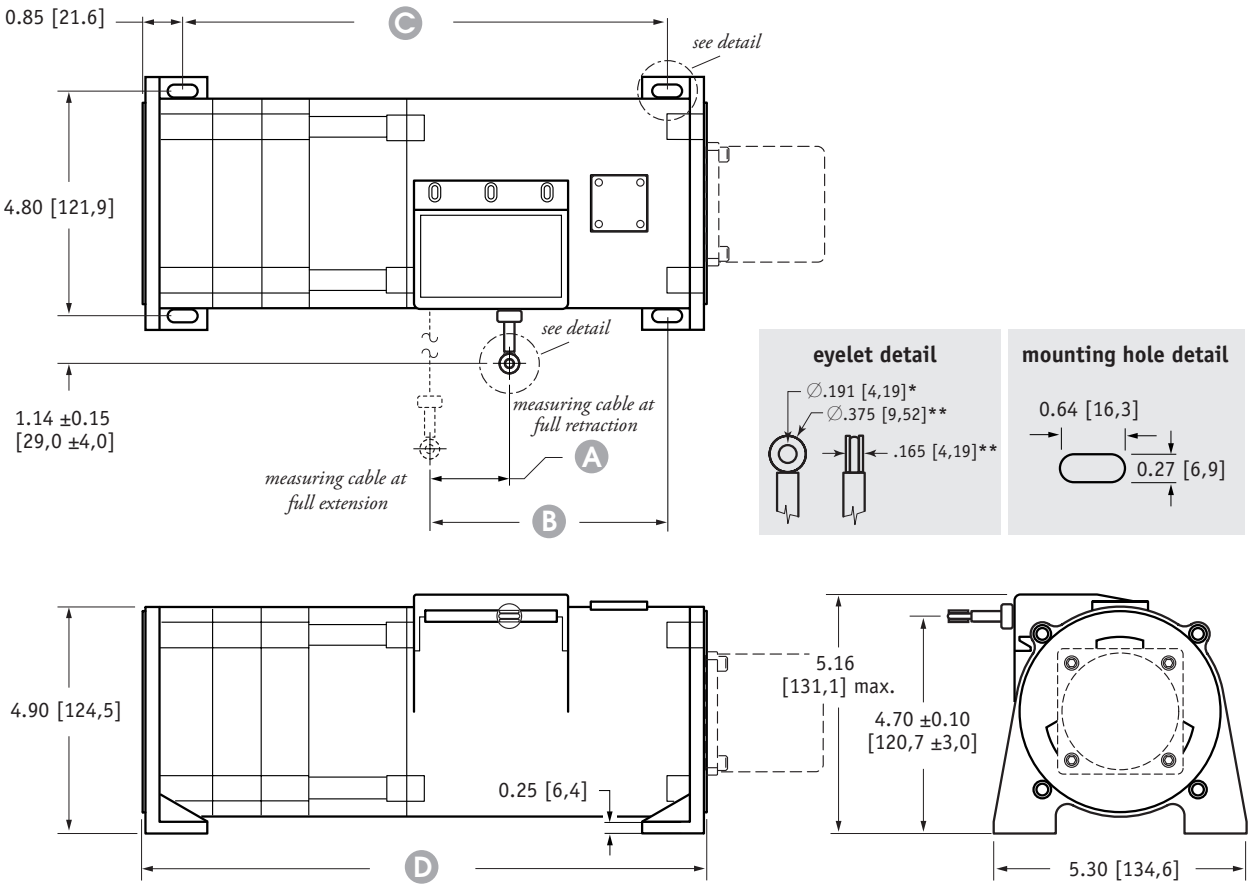
*all dimensions are in **mm***

S04 - Face-Mount (10mm shaft/M3 screws)



*all dimensions are in **mm***

Outline Drawing



full stroke range

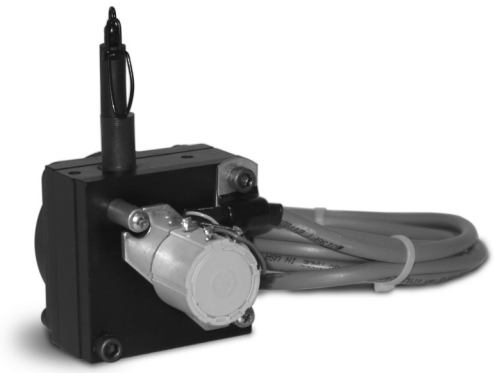
	600 in.	800 in.	1000 in.	1200 in.	1500 in.	1700 in.
A	1.76 [44,7]	1.58 [40,1]	1.98 [50,2]	1.49 [37,8]	1.86 [47,2]	2.11 [53,6]
B	4.52 ±0.15 [114,8 ±4,0]					
C	10.40 ±0.08 [264,2 ±2,0]					
D	12.15 [308,6] max.					

DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

Precision Potentiometric Output
Ranges: 0-2 to 0-100 inches
Compact Size • OEM Applications

PTX101



The PTX101 is a low cost, compact and easy-to-use cable-extension transducer. It is available with full-scale measurement ranges from 2 to 100 inches. The PTX101 provides a voltage feedback signal that is proportional to the linear movement of a traveling stainless-steel extension cable.

Simply mount the body of the transducer to a fixed surface and attach the extension cable to the moving object. The PTX101 is recommended for applications where space and money is limited.

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-2 to 0-100 inches
Output Signal Options..... voltage divider (potentiometer)
Accuracy..... ± 0.25% to ±0.10% full stroke *see ordering information*
Repeatability..... ± 0.02% full stroke
Resolution ..... essentially infinite
Measuring Cable
with standard cable tension ..... .019-in. dia. nylon-coated stainless steel
with increased or high tension ..... .024-in. dia. nylon-coated stainless steel
Enclosure Material..... anodized aluminum
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Maximum Retraction Acceleration ..... *see ordering information*
Weight..... 2 lbs. max.

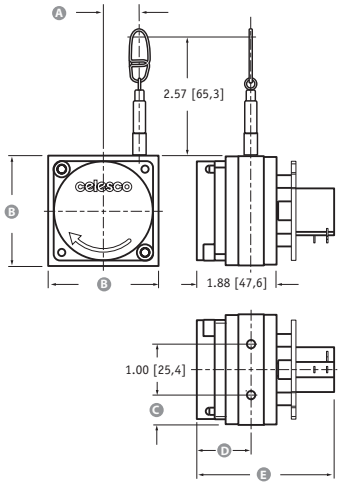
ELECTRICAL

Input Resistance Options ..... 500, 1K, 5K, 10K ohms, *see ordering information*
Maximum Input Voltage..... *see ordering information*
Power Rating..... *see ordering information*
Output Signal Change Over Full Stroke Range..... 94% ±4% of input voltage

ENVIRONMENTAL

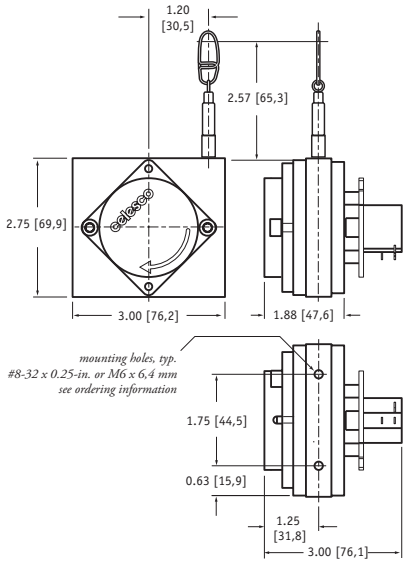
Enclosure ..... NEMA 1
Temperature Coefficient of Sensing Element ..... 88 PPM/°F
Humidity..... 100% RH @ 90°F (32 C)
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration..... up to 10 G's to 2000 Hz maximum

2 to 60-inch Ranges

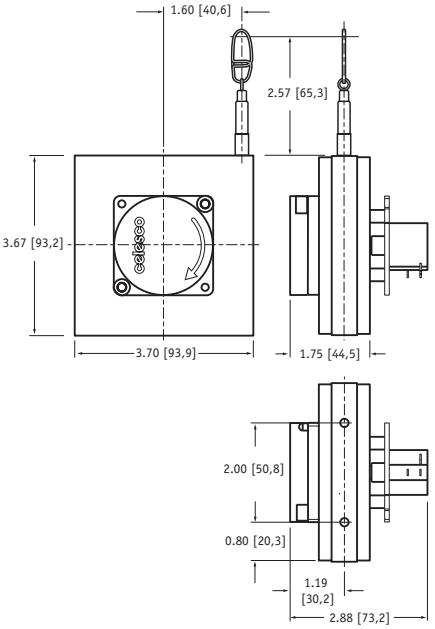


Range	A	B	C	D	E
2", 10", 20"	.34 [8.6]	2.00 [50,8]	.50 [12,7]	.87 [22,0]	2.52 [64,1]
5", 25", 50"	.83 [21,1]	2.00 [50,8]	.50 [12,7]	.87 [22,0]	2.52 [64,1]
15", 30"	.56 [14,2]	2.00 [50,8]	.50 [12,7]	.87 [22,0]	2.52 [64,1]
40"	.64 [16,2]	2.00 [50,8]	.50 [12,7]	.87 [22,0]	2.52 [64,1]
60"	.97 [24,6]	2.50 [63,5]	.75 [19,1]	1.25 [31,6]	3.00 [76,1]

75-inch Range



100-inch Range



All Dimensions are in INCHES [MM] tolerances are ±0.03 in. [0,8 mm]

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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco
celesco.com • info@celesco.com

Ordering Information:

Model Number:

PTX101 - ____ Ⓡ **-** ____ Ⓐ **1** Ⓑ ____ Ⓒ **-** ____ Ⓓ **1** Ⓔ ____ Ⓕ **0** Ⓖ

order code:

Sample Model Number:

PTX101 - 0025 - 111 - 1110

Ⓡ	range:	25 inches
Ⓐ	measuring cable tension:	standard - 5 oz.
Ⓒ	mounting holes:	8-32 x .25 in. threaded
Ⓓ	sensing circuit:	500 ohms
Ⓕ	electrical connection:	solder terminals

Full Stroke Range:

Ⓡ *order code:*	0002	0005	0010	0015	0020	0025	0030	0040	0050	0060	0075	0100
full stroke range, min:	2 in.	5 in.	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.	75 in.	100 in.
accuracy (% of f.s.):	0.25%	0.25%	0.15%	0.15%	0.10%	0.15%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	5×10^5	5×10^5	5×10^5	5×10^5	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

**–1 cycle is defined as the travel of the measuring cable from full retraction to full extension and back to full retraction*

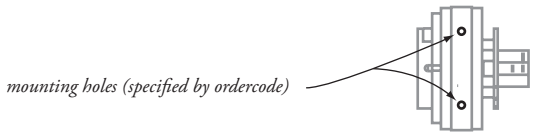
Measuring Cable Tension:

Ⓐ *order code:*	1	2**	3**
	standard tension* (max. acceleration)	increased tension*	high tension*
2, 10, 20 inch range:	12 oz. (11 G)	72 oz.	144 oz.
5, 25, 50 inch range:	5 oz. (2 G)	30 oz.	60 oz.
15, 30 inch range:	8 oz. (3 G)	48 oz.	96 oz.
40 inch range:	6 oz. (4 G)	36 oz.	72 oz.
60 inch range:	13 oz. (4 G)	26 oz.	52 oz.
75, 80 inch range:	10 oz. (3 G)	20 oz.	40 oz.
100 inch range:	13 oz. (5 G)	26 oz.	52 oz.

**– tolerance: ±20% **–Options 2, 3 for re-orders only, Option 7 no longer available.*

Mounting Holes:

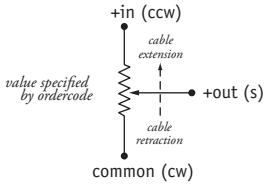
Ⓒ *order code:*	1	2
	#8-32 x 0.25-in. threaded holes	M6 x 6,4 mm threaded holes



Sensing Circuit:

Ⓓ *order code:*	1	2	3	4
	500 ohm*	1000 ohm*	5000 ohm*	10,000 ohm*

sensing circuit

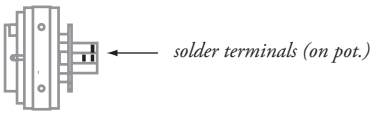


max. input voltage and power rating

	2-inch, 5-inch range	*10-inch to 100-inch range*
500-ohms:	20 V AC/DC (1 W)	30 V AC/DC (2 W)
1K to 10K-ohms:	30 V AC/DC (1 W)	30 V AC/DC (2 W)

**tolerance = ±10%*

Electrical Connection:

order code:	0	1
	solder terminals	10-ft. instrumentation cable shielded, 24 AWG
		
	terminal / **signal** CCW / +in CW / common S / +out	**color code** / **terminal** / **signal** RED / CCW / + in BLACK / CW / common GREEN / S / + out

Incremental Encoder Output
Ranges: 0-25, 0-150 in. • 0-625, 0-3750 mm
Compact Size • OEM Applications

PTX150

The PTX150 is a low cost, compact and easy to use encoder based cable-extension transducer. It is available with full stroke ranges up to 150 inches. The PTX150 provides an incremental encoder feedback signal.

Simply mount the body of the transducer to a fixed surface and attach the extension cable to the moving object. The PTX150 is recommended for application where space and money is limited.

Specification Summary:

GENERAL

Full Stroke Range Options	0-25 to 0-150 in., 0-625 to 0-3750 mm
Output Signal	incremental encoder (quadrature)
Accuracy	*see ordering information*
Repeatability	*see ordering information*
Resolution Options	25 to 1250 pulses per inch
Measuring Cable	0.019-in. dia. nylon-coated stainless steel
Enclosure Material	anodized aluminum
Sensor	optical encoder
Weight	1 lb. max.

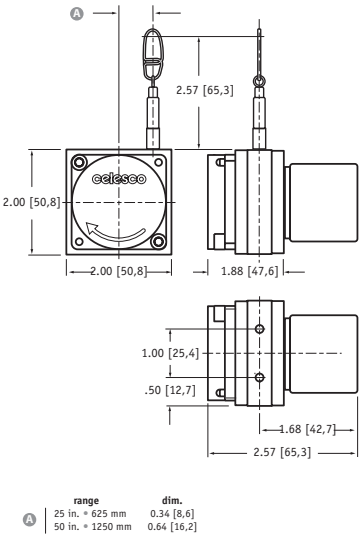
ELECTRICAL

Input Voltage	*see ordering information*
Input Current	*see ordering information*
Electrical Connection	18" multiconductor cable

ENVIRONMENTAL

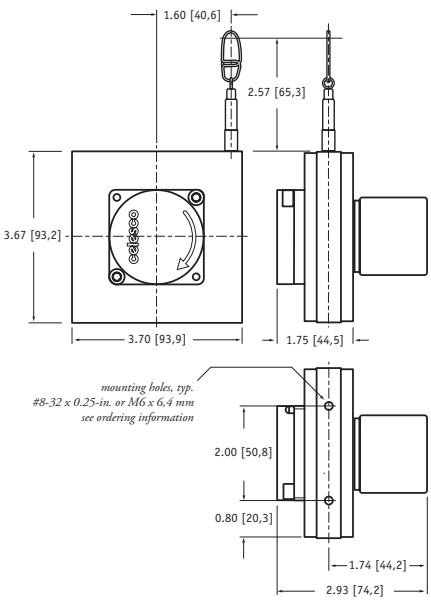
Enclosure	NEMA 1
Operating Temperature	0º to 160ºF (-17º to 71ºC)
Vibration	up to 10 G's to 2000 Hz maximum

Outline (0-25, 0-50 in. range)



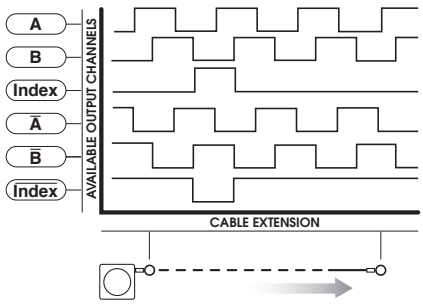
A	range	dim.
	25 in. • 625 mm	0.34 [8,6]
	50 in. • 1250 mm	0.64 [16,2]

(0-100, 0-150 in. range)



All Dimensions are in INCHES [MM] tolerances are ±0.03 in. [0,8 mm]

Output Signal



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Ordering Information:

Model Number:

PTX150 - ____ **-** **1** **1** ____ **-** ____ ____ **0** **0**
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:

PTX150 - 0025 - 111 - 1110

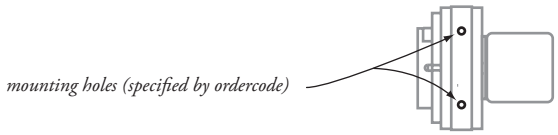
Ⓡ	range:	25 inches
Ⓒ	mounting holes:	8-32 x .25 in. threaded
Ⓓ	output signal:	TTL/CMOS driver, Channels A,B
Ⓔ	resolution:	500 pulses per inch

Full Stroke Range:

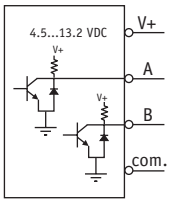
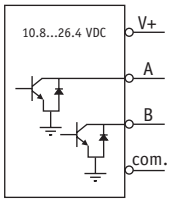
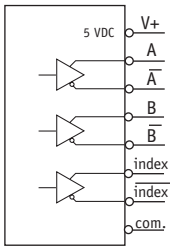
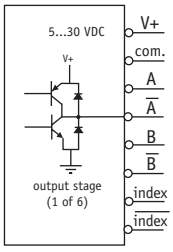
Ⓡ *order code:*	0025	0050	0100	0150	0625	1250	2500	3750
full stroke range, min:	25 in.	50 in.	100 in.	150 in.	625 mm	1250 mm	2500 mm	3750 mm
accuracy:	±0.010 in.	±0.020 in.	±0.040 in.	±0.060 in.	±0.25 mm	±0.50 mm	±1.00 mm	±1.50 mm
repeatability:	±0.005 in.	±0.010 in.	±0.020 in.	±0.030 in.	±0.12 mm	±0.25 mm	±0.50 mm	±0.75 mm
cable tension (±20%):	13 oz.	6 oz.	14 oz.	8 oz.	3,6 N	1,8 N	5,0 N	3,0 N

Mounting Holes:

Ⓒ *order code:*	1	2
	#8-32 x 0.25-in. threaded holes	M6 x 6,4 mm threaded holes



Output Signals:

Ⓓ *order code:*	1	2	3	4
output driver:	TTL - CMOS	Open Collector	5 V - Line Driver	Universal Line Driver
	Input voltage (V+): 4.5...13.2 Vdc Sink current: 20 mA max. Input current: 80 mA max.	Input voltage (V+): 10.8...26.4 Vdc Sink current: 20 mA max. Input current: 80 mA max.	Input voltage (V+): 5 Vdc Sink current: 20 mA max. Input current: 150 mA max.	Input voltage (V+): 5...30 VDC Source/Sink: 20 mA max. Input current: 100 mA max, no load
				

Resolution:

Ⓔ *order code:*	1	2	3	4
25 in. range:	500 ppi	1000 ppi	1250 ppi	50 ppi
50 in. range:	250 ppi	500 ppi	625 ppi	25 ppi
100 in. range:	100 ppi	200 ppi	250 ppi	10 ppi
150 in. range:	100 ppi	200 ppi	250 ppi	10 ppi
625 mm range:	20 ppmm	40 ppmm	50 ppmm	2 ppmm
1250 mm range:	10 ppmm	20 ppmm	25 ppmm	1 ppmm
2500 mm range:	5 ppmm	10 ppmm	12,5 ppmm	0,5 ppmm
3750 mm range:	5 ppmm	10 ppmm	12,5 ppmm	0,5 ppmm

version: **3.0** last updated: **July 6, 2009**

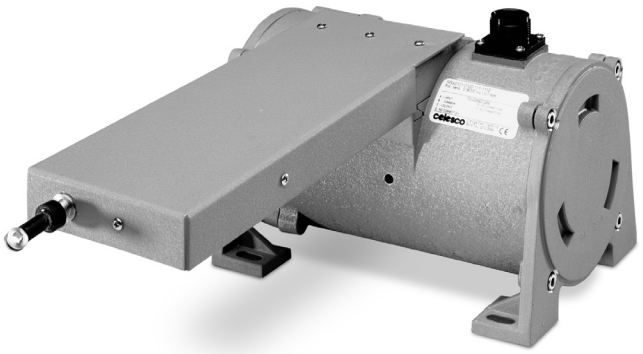
All PT9000 & PT9000 Extended Range Series
Ranges: 0-75 to 0-1700 inches
Aluminum or Stainless Steel Enclosure

RBS9000

RBS option offers extra protection against extraordinarily dirty environments

RBS option reduces the cable-exit opening down to a single point to prevent excess debris from entering the spool cavity

RBS option uses two sets of cable brushes to help clean the measuring cable before it is retracted into the enclosure



Designed for extreme applications where exceptional amounts of dirt, spray or some other foreign matter may enter through the standard PT9000 'slot opening' and interfere with the cable reel mechanism.

The RBS9000 reduces the cable opening down to a single-point exit to block most debris from entering the cable-reel area. Because some debris may get drawn into the transducer by the measuring cable upon retraction, we've taken two measures to help reduce that:

First, each RBS9000 is constructed using our nylon-coated measuring cable which has a smooth layer of protection that helps keep debris from clinging to it.

Second, the measuring cable passes through two integral brushes which help wipe away any matter that may be clinging to it.

Ordering Information:

The appropriate PT9000 Series transducer can be selected from any model found in the Celesco PT9000 and PT9000 Extended sections in the Celesco catalog. VLS is used as a prefix for all VLS model designations.

RBS_____ - _____ (R) - __ (A) __ (B) __ (C) - __ (D) __ (E) __ (F) **0** (G)

creating RBS model number (example):

PT9101-0600-111-1110	select **PT9000** model
~~PT~~ **9101-0600-111-1110**	remove "**PT**"
RBS + 9101-0600-111-1110	add "**RBS**"
RBS9101-0600-111-1110	completed model number

Important –RBS option only available with nylon-coated measuring cable

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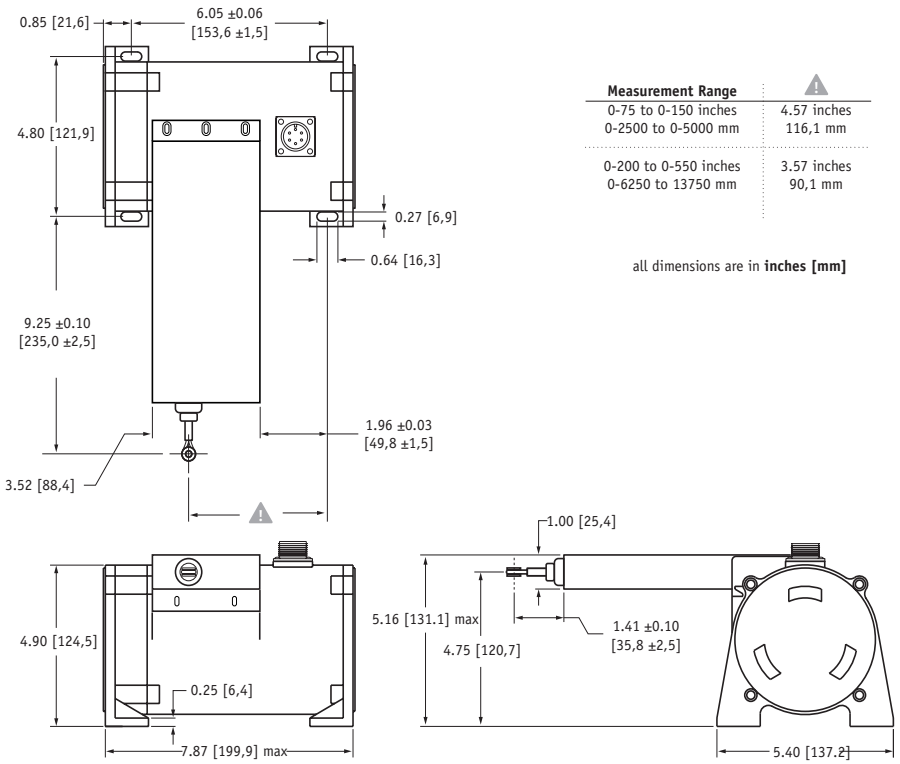
Front Cable Exit Option

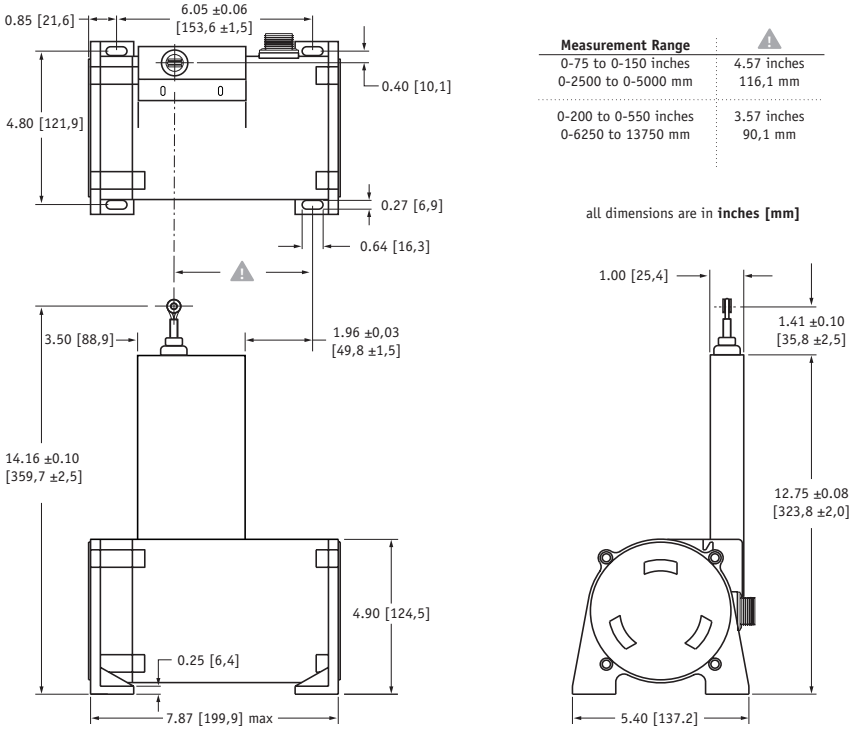


Measurement Range	⚠
0-75 to 0-150 inches 0-2500 to 0-5000 mm	4.57 inches 116,1 mm
0-200 to 0-550 inches 0-6250 to 13750 mm	3.57 inches 90,1 mm

all dimensions are in **inches [mm]**

Note: Dimensions not valid for "increased cable tension" option. Consult factory for dimensions.

Top Cable Exit Option

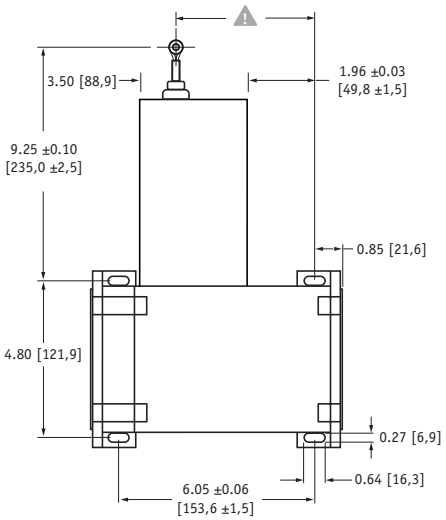


Measurement Range	⚠
0-75 to 0-150 inches 0-2500 to 0-5000 mm	4.57 inches 116,1 mm
0-200 to 0-550 inches 0-6250 to 13750 mm	3.57 inches 90,1 mm

all dimensions are in **inches [mm]**

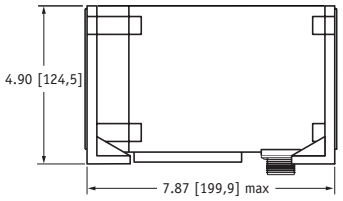
Note: Dimensions not valid for "increased cable tension" option. Consult factory for dimensions.

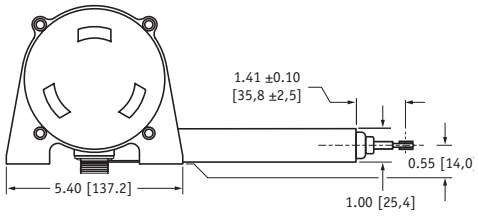
Rear Cable Exit Option



Measurement Range	⚠
0-75 to 0-150 inches 0-2500 to 0-5000 mm	4.57 inches 116,1 mm
0-200 to 0-550 inches 0-6250 to 13750 mm	3.57 inches 90,1 mm

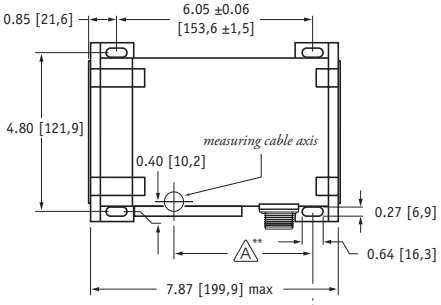
all dimensions are in **inches [mm]**





Note: Dimensions not valid for "increased cable tension" option. Consult factory for dimensions.

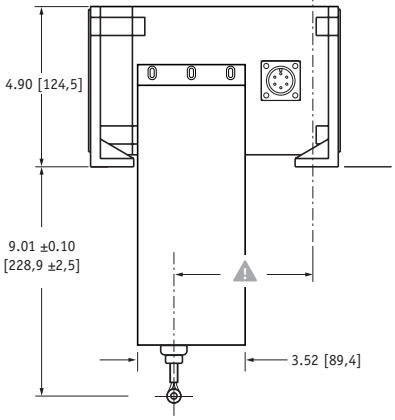
Bottom Cable Exit Option

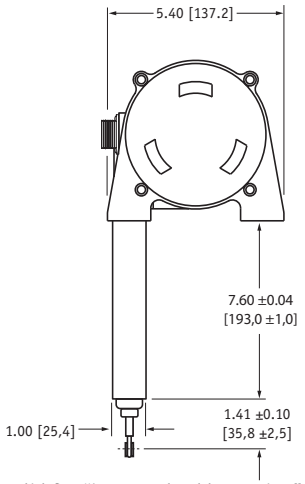


Measurement Range	⚠
0-75 to 0-150 inches 0-2500 to 0-5000 mm	4.57 inches 116,1 mm
0-200 to 0-550 inches 0-6250 to 13750 mm	3.57 inches 90,1 mm

all dimensions are in **inches [mm]**

***Note: see "A" dimension on PT9000 outline drawing*





Note: Dimensions not valid for "increased cable tension" option. Consult factory for dimensions.

version: **1.0** last updated: **March 30, 2005**

PT8000 Series (except PT8600)
Ranges: 10, 20, 25, 30, 40, 50, 60 inches
Aluminum or Stainless Steel Enclosure

VLS8000

Prevents cable from ever reaching damaging velocity during a free-release.

Ideal for applications requiring frequent connecting and disconnecting.

Provide safer operation for mobile applications.

Eliminates internal damage if a cable is broken.

The patented Celesco Velocity Limiting System (VLS) is an option for PT8000 Series cable extension transducers that limits cable retraction to a safe 40 to 55 inches per second.

The VLS option prevents the measuring cable from ever reaching a damaging velocity during an accidental free release. This option is ideal for mobile applications that require frequent cable disconnection and reconnection. It prevents expensive unscheduled downtime due to accidental cable mishandling or attachment failure.

VLS is available for most PT8000 models and options.

Exceptions include:
- PT8600–all configurations.
- PT8101, PT8150, PT8420 and PT8510:
  – medium and high cable tension
  – 2, 5 and 15-inch stroke ranges.

Use the ordering guide to the right to configure the VLS model number.

Ordering Guide:

VLS ____ - ____ - ___ ___ ___ - ___ ___ ___ **0**

®	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ	Ⓖ
8101	0010	1					
8150	0020	3					
8420	0025	8					
8510	0030						
8CN	0040						
8DN	0050						
	0060						

[ ] = only available options**

creating VLS model number (example):

1. select PT8000 model — PT8101-0060-111-1110
2. remove "PT" from the model number — ~~PT~~ 8101-0060-111-1110
3. add "VLS" — VLS + 8101-0060-111-1110
4. completed model number ! — VLS8101-0060-111-1110

***Note: please contact factory for a solution to options not supported.*

version: **3.0** last updated: **August 7, 2009**

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All PT9000 & PT9000 Extended Range Series
Ranges: 0-75 to 0-1700 inches
Aluminum or Stainless Steel Enclosure

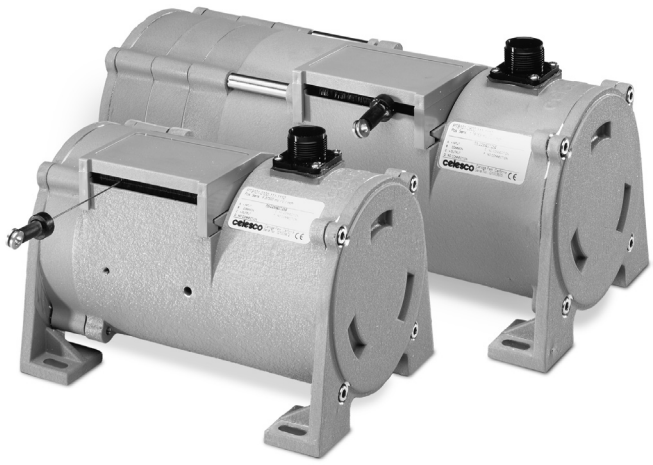
VLS9000

Prevents cable from ever reaching damaging velocity during a free-release.

Ideal for applications requiring frequent connecting and disconnecting.

Provides safer operation for mobile applications.

Eliminates internal damage if a cable is broken.



The patent-pending Celesco Velocity Limiting System (VLS) is an option for PT9000 Series cable extension transducers that limits cable retraction to a safe 40 to 55 inches per second for standard spring options and 40 to 80 inches per second for the higher spring tension options.

The VLS prevents a cable from ever reaching a damaging velocity during an accidental free release. This option is ideal for mobile applications that require frequent cable disconnection and reconnection. It prevents expensive unscheduled downtime due to accidental cable mishandling or attachment failure.

VLS is available for the entire Celesco PT9000 Series. Use the ordering guide below to configure a VLS transducer.

Ordering Information:

The appropriate PT9000 Series transducer can be selected from any model found in the Celesco PT9000 and PT9000 Extended sections in the Celesco catalog. VLS is used as a prefix for all VLS model designations.

VLS_____ - _____ (R) - __ (A) __ (B) __ (C) - __ (D) __ (E) __ (F) **0** (G)

creating VLS model number (example):

PT9101-0600-111-1110	select **PT9000** model
~~**PT** 9101-0600-111-1110~~	remove "**PT**"
VLS + 9101-0600-111-1110	add "**VLS**"
VLS9101-0600-111-1110	completed model number

version: **2.0** last updated: **September 23, 2005**

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CANbus • SAE J1939
Ranges: 0-45° to 0-200 Turns
Industrial Grade

RT8CN

Specification Summary:

GENERAL

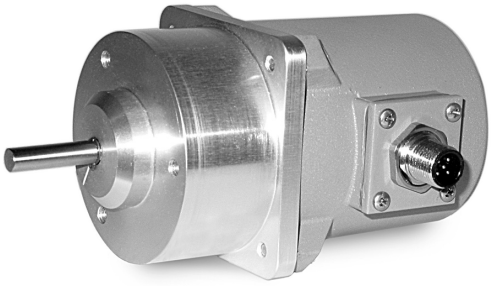
Full Stroke Ranges	0-0.125 to 0-200 turns
Electrial Interface	CANbus SAE J1939
Protocol	Proprietary B
Accuracy	*see ordering information*
Repeatability	± 0.02% full stroke
Resolution	± 0.003% full stroke
Enclosure Material	powder-painted aluminum or stainless steel
Sensor	plastic-hybrid precision potentiometer
Shaft Loading	up to 10 lbs. radial and 5 lbs. axial
Starting Torque (25°C)	2.0 in-oz., max
Weight, Aluminum (Stainless Steel) Enclosure	3 lbs. (6 lbs.), max.

ELECTRICAL

Input Voltage	7 - 18 VDC
Input Current	60 mA max.
Address Setting (Node ID)	0...63 set via DIP Switches
Baud Rate	125K, 250K or 500K set via DIP Switches
Update Rate	10 ms. (20 ms. available–*contact factory*)

ENVIRONMENTAL

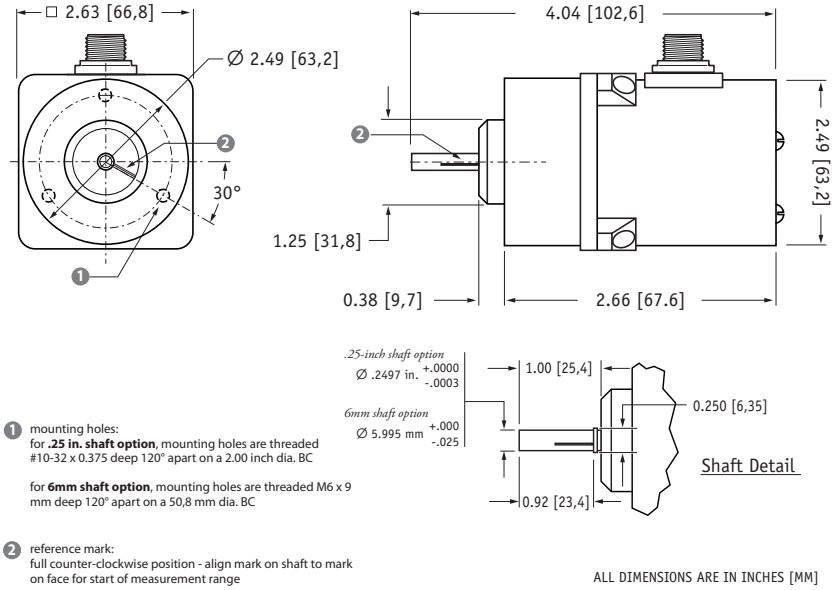
Enviromental Suitability	NEMA 4/4X/6, IP67/68
Operating Temperature	-40° to 185°F
Vibration	up to 10 G's to 2000 Hz maximum



Celesco's model RT8CN communicates rotational position feedback to your PLC via the CANbus SAE J1939 interface. The heart of this sensor is a precision plastic-hybrid position potentiometer which provides a "absolute" position and does not ever have to be reset to a "home" position after a power loss or planned shutdown.

This innovative sensor from Celesco, designed to meet tough NEMA-4 and IP67 environmental standards, is available in full-stroke measurement ranges of 1/8 to 200 turns.

Outline Drawing



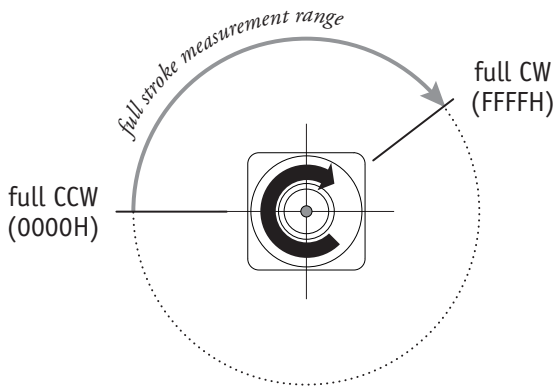
1 mounting holes:
for **.25 in. shaft option**, mounting holes are threaded #10-32 x 0.375 deep 120° apart on a 2.00 inch dia. BC

for **6mm shaft option**, mounting holes are threaded M6 x 9 mm deep 120° apart on a 50,8 mm dia. BC

2 reference mark:
full counter-clockwise position - align mark on shaft to mark on face for start of measurement range

ALL DIMENSIONS ARE IN INCHES [MM]

Output Signal



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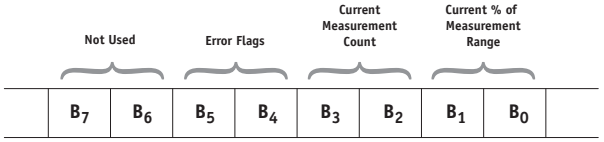
I/O Format:

Data Frame

repetition = 8 msec.

Data Field



B_0 = LSB current % of measurement range byte
B_1 = MSB current % of measurement range byte
B_4 - B_5 = error flags

B_2 = LSB current measurement count byte
B_3 = MSB current measurement count byte
B_6 - B_7 = not used

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.

Setting the Address (Node ID) and Baud Rate

Address Setting (Node ID)

The Address Setting (Node ID) is set via 6 switches located on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

Baud Rate

The transmission baud rate may be either factory preset at the time of order or set manually at the time of installation.

The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

address setting:

DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
...	...	...	...	...	...	...
1	1	1	1	1	1	63

baud rate setting:

DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

Current % of Measurement Range

The Current % of Measurement Range is a 2-byte value that expresses the current linear position as a percentage of the entire full stroke range. Resolution is **.1 %** of the full stroke measurement range.

This value starts at **0x0000** at the beginning of the stroke and ends at **0x03E8**.

Example:

Hex	Decimal	Percent
0000	0000	0.0%
0001	0001	0.1%
0002	0002	0.2%
...	...	...
03E8	1000	100.0%

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 16-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 **0x0000** with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at **0xFFFF**. This holds true for all ranges.

Error Flags

0x55 (yellow LED on controller board) indicates that the sensor has begun to travel beyond the calibrated range of the internal position potentiometer.

0xAA (red LED on controller board) indicates that the sensor has moved well beyond the calibrated range of the internal position potentiometer.

If either error flag occurs within the full stroke range of the sensor, the unit should be returned to the factory for repair and recalibration.

Converting CMC to Degrees

If required, the CMC can easily be converted a rotary measurement expressed in degrees instead of simply counts.

This is accomplished by first dividing the CMC by 65,535 (total counts over the range) and then multiplying that value by the FSR:

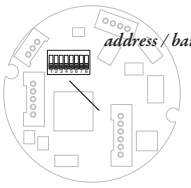
$$\left(\frac{\text{CMC}}{65{,}535}\right) \text{ X FSR}$$

Example:

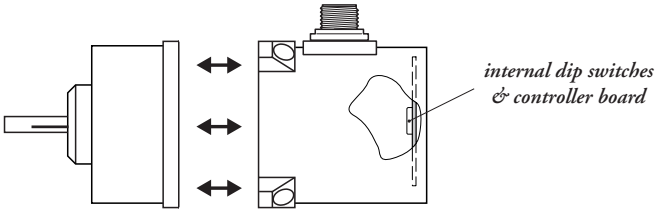
If the full stroke range is **1 turn (360 degrees)** and the current position is **0x0FF2** (4082 Decimal) then,

$$\left(\frac{4082}{65{,}535}\right) \text{ X } 360 \text{ degrees} = 22.4 \text{ degrees}$$

CANBus Controller Board and DIP Switch Location



to gain access to the controller board, remove four Allen-Head Screws and separate case halves



Ordering Information:

Model Number:

RT8CN - ____ - ___ - ___ - ___ - J - ___ - ___ - ___ - ___
order code: ⓡ ⓐ ⓑ ⓒ ⓓ ⓔ ⓕ ⓖ

Sample Model Number:

RT8CN - 100 - AL - 25 - FL - J - 500 - 32 - SC

ⓡ	range:	100 turns
ⓐ	enclosure:	powder-painted aluminum
ⓑ	shaft:	.25-in diameter
ⓒ	mounting style:	flange
ⓓ	interface:	CANbus SAE J1939
ⓔ	baud rate:	500 k bits/sec.
ⓕ	node ID:	32
ⓖ	electrical connection:	5-meter cordset with straight plug

Full Stroke Range:

ⓡ order code:	R125	R25	R50	1	2	3	5	10	20
clockwise shaft rotations, min:	0.125	0.25	0.50	1	2	3	5	10	20
accuracy (% of f.s.):	1.25%	1.25%	0.5%	0.5%	0.5%	0.2%	0.2%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	5×10^5	5×10^5	2.5×10^5	2.5×10^5

ⓡ order code:	30	40	50	80	100	120	140	180	200
clockwise shaft rotations, min:	30	40	50	80	100	120	140	180	200
accuracy (% of f.s.):	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

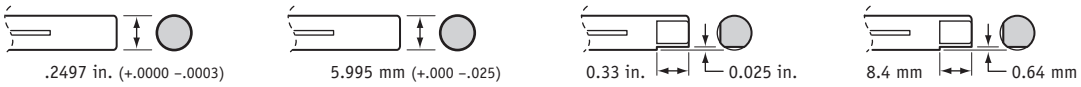
**–number of times the sensor shaft can be cycled back and forth from beginning to end and back to the beginning before any measurable signal degradation may occur.*

Enclosure Material:

ⓐ order code:	AL	SS
	powder-painted aluminum	303 stainless steel

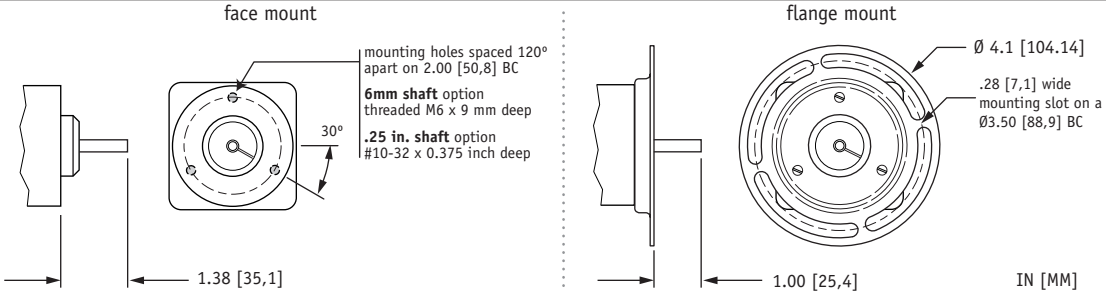
Shaft Diameter:

ⓑ order code:	25	6	25F	6F
	0.25-in. diameter	6 mm diameter	0.25-in. dia. w/flats	6 mm dia. w/flats



Mounting Style:

ⓒ order code:	FA	FM
	face mount	flange mount



Ordering Information:

Baud Rate:

E order code:	125	250	500
	125 kbaud	250 kbaud	500 kbaud

Node ID:

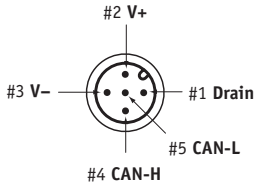
F order code:	0	1	2	...	62	63
	select address (0 - 63 Decimal)					

Electrical Connection:

G order code:

blank

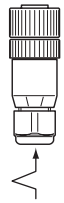
5-pin micro-connector
(no mating plug supplied)



connector
(contact view)

MC5

5-pin micro-connector
w/ mating plug



0.16" - 0.32" OD Cable (THIN)

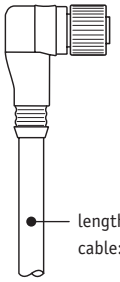
SC5

5-pin micro-connector
and 5 meter length cordset
w/straight mating plug

length: 16ft [5M]
cable: Thin

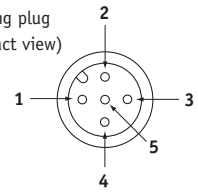
NC5

5-pin micro-connector
and 5 meter length cordset
w/90° mating plug



length: 16ft [5M]
cable: Thin

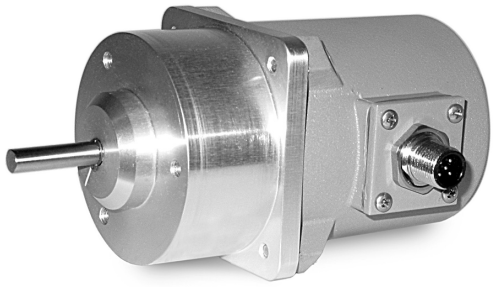
mating plug
(contact view)



pin	signal	wire color
1	drain	brown
2	V+	white
3	V-	blue
4	Can-H	black
5	Can-L	grey

DeviceNET®
Ranges: 0-45° to 0-200 Turns
Industrial Grade

RT8DN



Specification Summary:

GENERAL

Full Stroke Ranges	0-0.125 to 0-200 turns
Electrial Interface	CANbus ISO 11898
Protocol	DeviceNet Version 2.0
Accuracy	*see ordering information*
Repeatability	± 0.02% full stroke
Resolution	± 0.003% full stroke
Enclosure Material	powder-painted aluminum or stainless steel
Sensor	plastic-hybrid precision potentiometer
Shaft Loading	up to 10 lbs. radial and 5 lbs. axial
Starting Torque (25°C)	2.0 in-oz., max
Weight, Aluminum (Stainless Steel) Enclosure	3 lbs. (6 lbs.), max.

ELECTRICAL

Input Voltage	Bus Powered
Input Current	40 mA
Address Setting (Node ID)	0...63 set via DIP Switches—*default setting: 63*
Baud Rate	125K, 250K or 500K set via DIP Switches
EDS file	available @ http://www.celesco.com/download

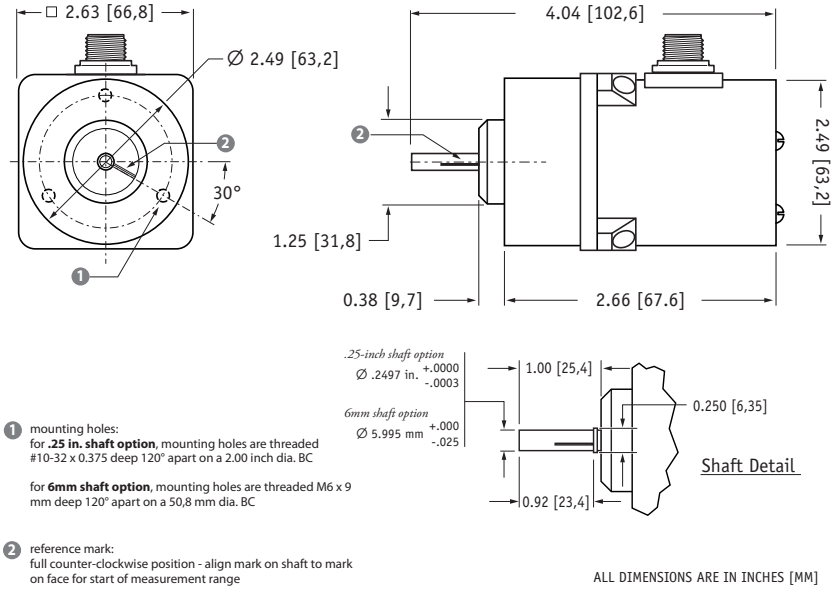
ENVIRONMENTAL

Enviromental Suitability	NEMA 4/4X/6, IP67/68
Operating Temperature	-40° to 200°F
Vibration	up to 10 G's to 2000 Hz maximum

Celesco's model RT8DN communicates rotational position feedback via DeviceNET® to your programmable controller. The heart of this sensor is a precision plastic-hybrid position potentiometer which provides a "absolute" position and does not ever have to be reset to a "home" position after a power loss or planned shutdown.

This innovative sensor from Celesco, designed to meet tough NEMA-4 and IP67 environmental standards, is available in full-stroke measurement ranges of 1/8 to 200 turns.

Outline Drawing



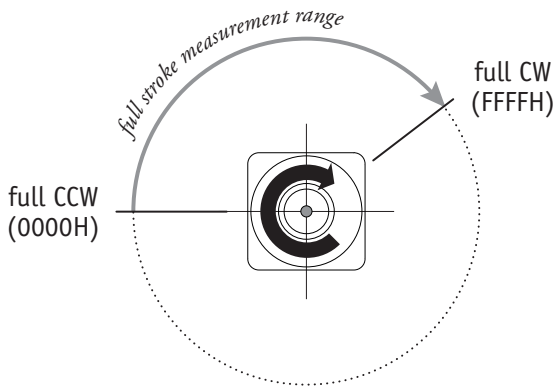
1 mounting holes:
for **.25 in. shaft option**, mounting holes are threaded #10-32 x 0.375 deep 120° apart on a 2.00 inch dia. BC

for **6mm shaft option**, mounting holes are threaded M6 x 9 mm deep 120° apart on a 50,8 mm dia. BC

2 reference mark:
full counter-clockwise position - align mark on shaft to mark on face for start of measurement range

ALL DIMENSIONS ARE IN INCHES [MM]

Output Signal



Celesco Transducer Products, Inc.
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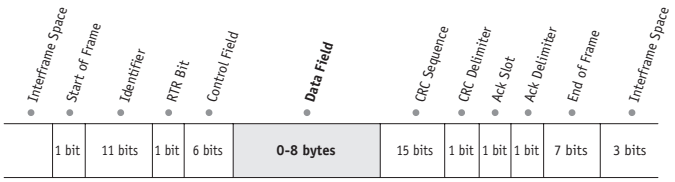
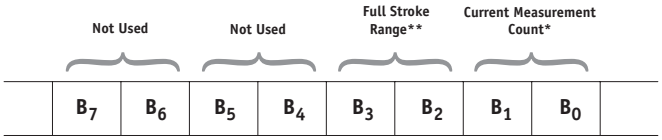
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco.com • info@celesco.com

I/O Format:

Data Frame



Data Field



B_0 = LSB current measurement byte
B_1 = MSB current measurement byte
B_2 = LSB full stroke range byte
B_3 = MSB full stroke range byte
B_4 - B_7 = not used

***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 16-bit value that occupies the first two 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 0000H with shaft at the full counter-clockwise position (0° reference mark) and continues in the clockwise direction to the end of the stroke range stopping at FFFFH. This holds true for all ranges.

****Full Stroke Range**

The **F**ull **S**troke **R**ange **(FSR)** is a 16-bit value in the data field that expresses the full range of the sensor in degrees. This value can be used to convert the actual count to units of measurement should the application require it.

The full stroke measurement range occupies the second two bytes (B_2 and B_3) of the data field.

B_2 is the LSB (least significant byte) and B_3 is the MSB (most significant byte).

This value is expressed in degrees.

Example:

Hex Value	*Decimal Equivalent*	*Full Stroke Range*
0168	360	360 degrees

Converting CMC to Degrees

If required, the CMC can easily be converted to a rotational measurement expressed in degrees instead of counts.

This is accomplished by first dividing the CMC by 65,535 (total counts over the range) and then multiplying that value by the FSR:

$$\left(\frac{\text{CMC}}{65{,}535}\right) \text{X FSR}$$

Example:

If the full stroke range is **1 turn (360 degrees)** and the current position is **OFF2 Hex** (4082 Decimal) then,

$$\left(\frac{4082}{65{,}535}\right) \text{X } 360 \text{ deg.} = 22.4 \text{ degrees}$$

Address Setting (Node ID), Baud Rate and Bus Termination Settings

Address Setting (Node ID)

The Address Setting (Node ID) is set via 6 switches located on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
…	…	…	…	…	…	…
1	1	1	1	1	1	63

Baud Rate

The transmission baud rate may be either factory preset at the time of order or set manually at the time of installation.

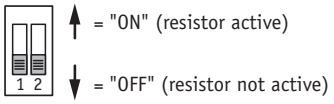
The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

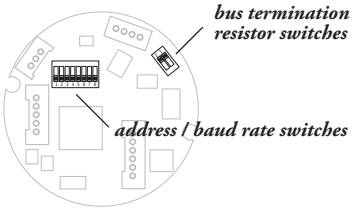
Bus Termination

The setting of the internal bus termination resistor may be specified upon order or manually changed by the end user at the time of installation.

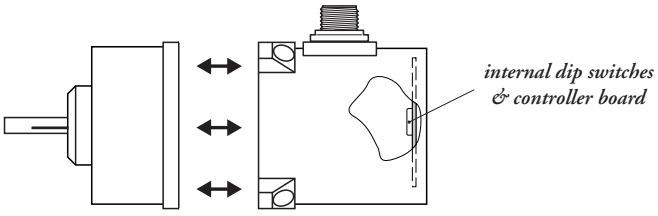
The bus termination resistor is activated setting switches **1** & **2** on the 2-pole DIP switch (located on the internal DeviceNET controller board) to the "ON" position.



DeviceNET Controller Board and DIP Switch Location



to gain access to the controller board, remove four Allen-Head Screws and separate case halves



Ordering Information:

Model Number:

RT8DN - ____ - ___ - ___ - ___ - ___ - ___ - ___ - ___
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ

Sample Model Number:

RT8DN - 100 - AL - 25 - FL - 500 - TR - SC5

Ⓡ	range:	100 turns
Ⓐ	enclosure:	powder-painted aluminum
Ⓑ	shaft:	.25-in diameter
Ⓒ	mounting style:	flange
Ⓓ	baud rate:	500 k bits/sec.
Ⓔ	terminating resistor:	yes
Ⓕ	electrical termination:	5-meter cordset with straight plug

Full Stroke Range:

Ⓡ *order code:*	R125	R25	R50	1	2	3	5	10	20
clockwise shaft rotations, min:	0.125	0.25	0.50	1	2	3	5	10	20
accuracy (% of f.s.):	1.25%	1.25%	0.5%	0.5%	0.5%	0.2%	0.2%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	5×10^5	5×10^5	2.5×10^5	2.5×10^5

Ⓡ *order code:*	30	40	50	80	100	120	140	180	200
clockwise shaft rotations, min:	30	40	50	80	100	120	140	180	200
accuracy (% of f.s.):	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

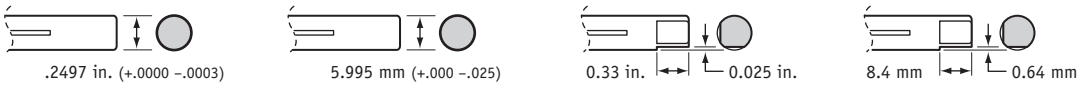
**–number of times the sensor shaft can be cycled back and forth from beginning to end and back to the beginning before any measurable signal degradation may occur.*

Enclosure Material:

Ⓐ *order code:*	AL	SS
	powder-painted aluminum	303 stainless steel

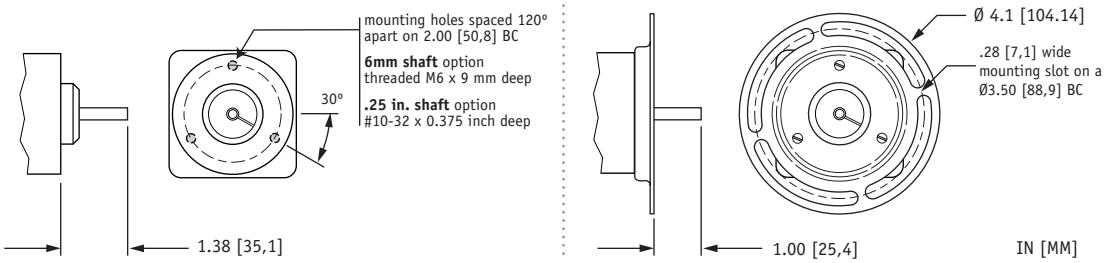
Shaft Diameter:

Ⓑ *order code:*	25	6	25F	6F
	0.25-in. diameter	6 mm diameter	0.25-in. dia. w/flats	6 mm dia. w/flats



Mounting Style:

Ⓒ *order code:*	FA	FM
	face mount	flange mount



Ordering Information:

Baud Rate:

Ⓓ *order code:*	**125**	**250**	**500**
	125 kbaud	250 kbaud	500 kbaud

Terminating Resistor:

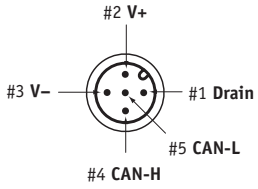
Ⓔ *order code:*	**TR**	**NR**
	terminating resistor	no terminating resistor

Electrical Connection:

Ⓕ *order code:*

blank

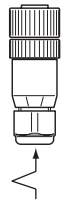
5-pin micro-connector
(no mating plug supplied)



connector
(contact view)

MC5

5-pin micro-connector
w/ mating plug



0.16" - 0.32" OD Cable (THIN)

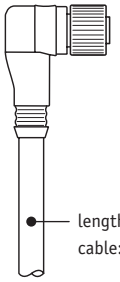
SC5

5-pin micro-connector
and 5 meter length cordset
w/straight mating plug

length: 16ft [5M]
cable: Thin

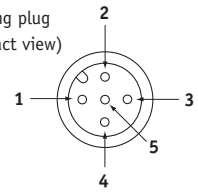
NC5

5-pin micro-connector
and 5 meter length cordset
w/90° mating plug



length: 16ft [5M]
cable: Thin

mating plug
(contact view)



pin	signal	wire color
1	drain	brown
2	V+	white
3	V-	blue
4	Can-H	black
5	Can-L	grey

Precision Potentiometric Output
Ranges: 0-45° to 0-200 Turns
Industrial Grade

RT8101

CE

Specification Summary:

GENERAL

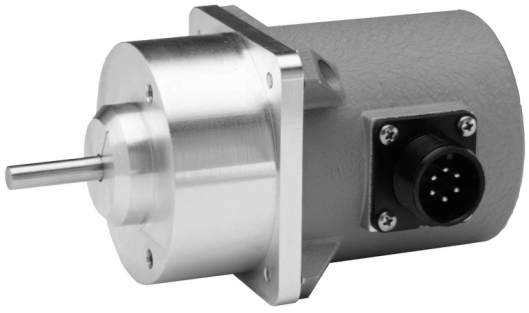
Full Stroke Range Options ..... 0-0.125 to 0-200 turns
Output Signal Options..... voltage divider (potentiometer)
Accuracy ..... *see ordering information*
Repeatability..... ± 0.02% full stroke
Resolution ..... essentially infinite
Enclosure Material Options ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Shaft Loading ..... up to 10 lbs. radial and 5 lbs. axial
Starting Torque (25°C) ..... 2.0 in-oz., max.
Weight, Aluminum (Stainless Steel) Enclosure ..... 3 lbs. (6 lbs.) max.

ELECTRICAL

Input Resistance Options .....500, 1K, 5K, 10K or bridge, *see ordering information*
Power Rating, Watt ..... 2.0 at 70°F derated to 0 at 250°
Recommended Maximum Input Voltage .....30 V (AC/DC)
Output Signal Change Over Full Stroke Range.....94% ±4% of input voltage

ENVIRONMENTAL

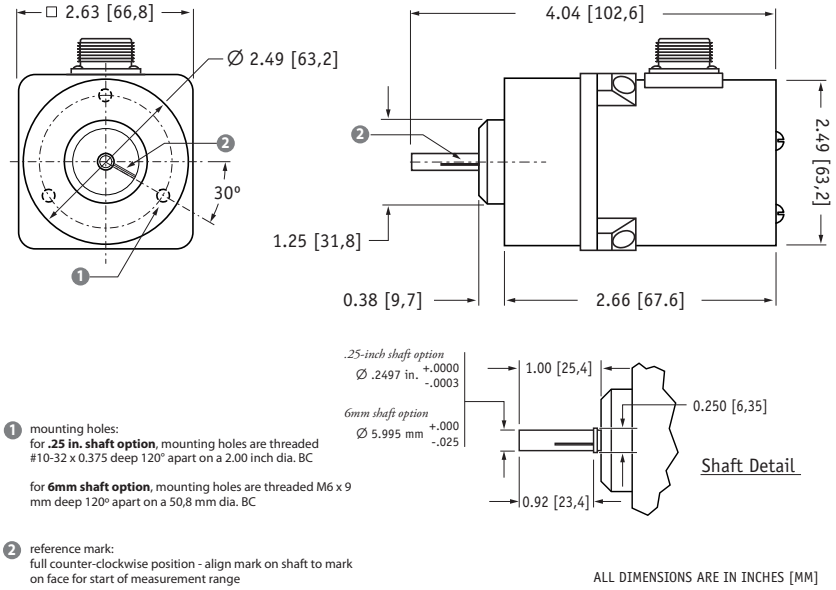
Enclosure .....NEMA 4/4X/6, IP 67/68
Operating Temperature .....-40° to 200°F (-40° to 90°C)
Vibration..... up to 10 G's to 2000 Hz maximum



Celesco's model RT8101 provides a voltage feedback signal for rotational position. The sensing element of this device is a precision plastic-hybrid potentiometer which provides superb linearity and resolution.

The RT8101 provides extended rotational position feedback from as little as 1/8 of a turn f.s. all the way up to 200 turns f.s. Because the sensor is potentiometric, the RT8101 is absolute and will maintain position information even after a loss of power.

Outline Drawing



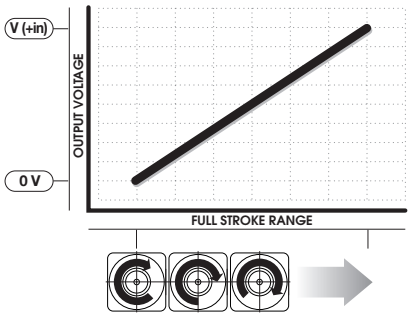
1 mounting holes:
for **.25 in. shaft option**, mounting holes are threaded #10-32 x 0.375 deep 120° apart on a 2.00 inch dia. BC

for **6mm shaft option**, mounting holes are threaded M6 x 9 mm deep 120º apart on a 50,8 mm dia. BC

2 reference mark:
full counter-clockwise position - align mark on shaft to mark on face for start of measurement range

ALL DIMENSIONS ARE IN INCHES [MM]

Output Signal



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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
celesco
celesco.com • info@celesco.com

Ordering Information:

Model Number:

RT8101- ____ Ⓡ **-** __ Ⓐ __ Ⓑ __ Ⓒ **-** __ Ⓓ **1** Ⓔ __ Ⓕ **0** Ⓖ
order code:

Sample Model Number:

RT8101 - 0005 - 111 - 1110

Ⓡ	range:	5 turns (clockwise shaft rotations)
Ⓐ	enclosure:	aluminum
Ⓑ	shaft diameter:	.25 inches
Ⓒ	mounting style:	face mount
Ⓓ	output signal:	500 ohm potentiometer
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ order code:	R125	0R25	0R50	0001	0002	0003	0005	0010	0020
clockwise shaft rotations, min:	0.125	0.25	0.50	1	2	3	5	10	20
accuracy (% of f.s.):	1.25%	1.25%	0.5%	0.5%	0.5%	0.2%	0.2%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	5×10^5	5×10^5	2.5×10^5	2.5×10^5

Ⓡ order code:	0030	0040	0050	0080	0100	0120	0140	0180	0200
clockwise shaft rotations, min:	30	40	50	80	100	120	140	180	200
accuracy (% of f.s.):	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

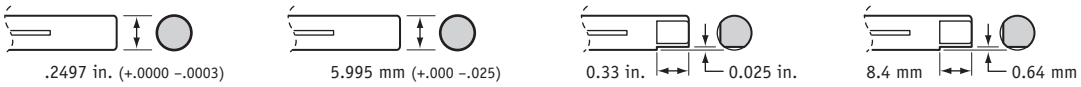
**–number of times the sensor shaft can be cycled back and forth from beginning to end and back to the beginning before any measurable signal degradation may occur.*

Enclosure Material:

Ⓐ order code:	1	2
	powder-painted aluminum	303 stainless steel

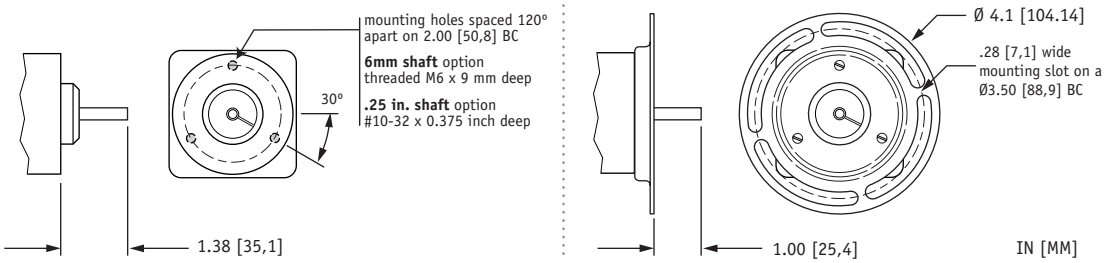
Shaft Diameter:

Ⓑ order code:	1	2	3	4
	0.25-in. diameter	6 mm diameter	0.25-in. dia. w/flats	6 mm dia. w/flats



Mounting Style:

Ⓒ order code:	1	2
	face mount	flange mount



Ordering Information:

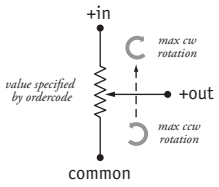
Output Signals:

Ⓓ *order code:*

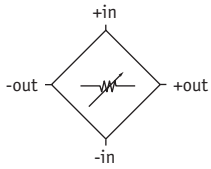
	1	2	3	4	5
	500 ohm*	1000 ohm*	5000 ohm*	10,000 ohm*	adjustable bridge
available ranges:	all ranges	not available for .125-turn (**R125**) and .25-turn (**OR25**) range options			(0...30 mV/V)

**tolerance = ±10%*

circuit options: 1, 2, 3, 4



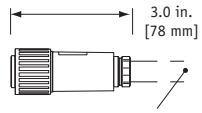
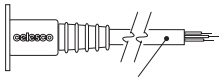
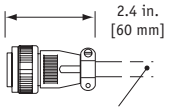
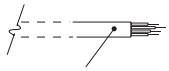
circuit option: 5 (adjustable bridge)



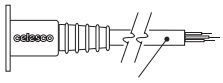
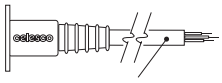
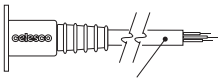
full scale output: adjustable from 0 to 30mV/V
zero adjust: from factory set zero to 50% of full stroke

Electrical Connection:

Ⓕ *order code:*

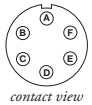
1	2	3	4
6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
			
1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

Ⓕ *order code:*

5	6	7
100-ft. [30 M] waterproof cable	10-ft. [3 M] **pressure tested*** waterproof cable	100-ft. [30 M] **pressure tested*** waterproof cable
IP 67, NEMA 4X,6**	**IP 68, NEMA 4X**, 6P**	**IP 68, NEMA 4X**, 6P**
		
100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	standard	bridge
A	+ in	+ in
B	common	– in
C	+ out	– out
D	-	+ out



contact view

Waterproof Cable

color code	standard	bridge
WHITE	+ in	n/a
BLACK	common	n/a
GREEN	+ out	n/a

Instrumentation Cable

color code	standard	bridge
RED	+ in	+ in
BLACK	common	– in
GREEN	+ out	+ out
WHITE	-	– out

Notes: { * –*Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours.*
** –*NEMA 4X applies to stainless steel enclosure only.*

0/4...20 mA Output
Ranges: 0-45° to 0-200 Turns
Industrial Grade

RT8420

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-0.125 to 0-200 turns
Output Signal Options..... 4...20 mA (2-wire) and 0...20 mA (3-wire)
Accuracy..... *see ordering information*
Repeatability..... ± 0.05% full stroke
Resolution ..... essentially infinite
Enclosure Material Options ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Shaft Loading ..... up to 10 lbs. radial and 5 lbs. axial
Starting Torque (25ºC)..... 2.0 in-oz., max.
Weight, Aluminum (Stainless Steel) Enclosure ..... 3 lbs. (6 lbs.) max.

ELECTRICAL

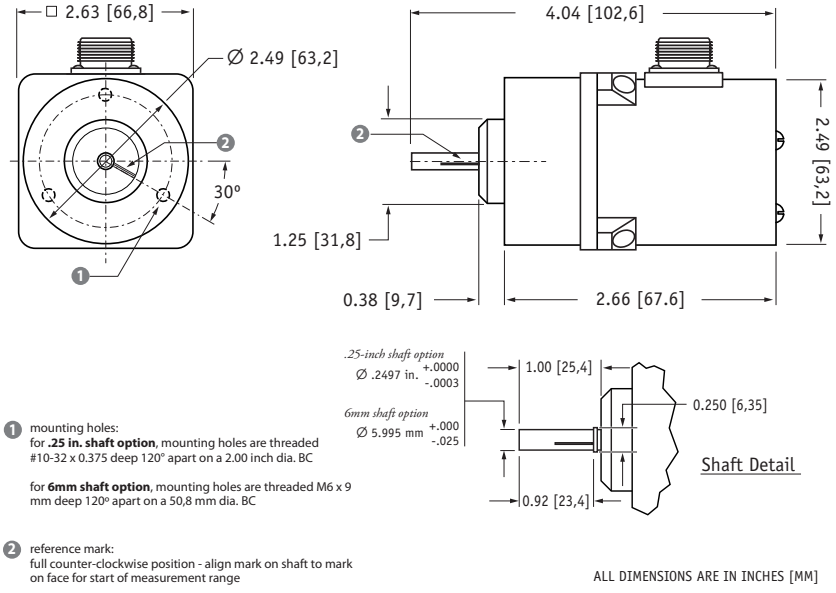
Input Voltage ..... *see ordering information*
Input Current..... 20 mA max.
Maximum Loop Resitance (Load) ..... (loop supply voltage - 8)/0.020
Circuit Protection ..... 38 mA max.
Impedence..... 100M ohms@100 VDC, min.
Output Signal Adjustment
Zero Adjustment ..... from factory set zero to 50% of full stroke range
Span Adjustment..... to 50% of factory set span
Thermal Effects
Zero ..... 0.01% f.s./ºF, max.
Span ..... 0.01% f.s./ºF, max.

ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration..... up to 10 G's to 2000 Hz maximum

EMC COMPLIENCE PER DIRECTIVE 89/336/EEC

Emission/Immunity EN50081-2/EN50082-2

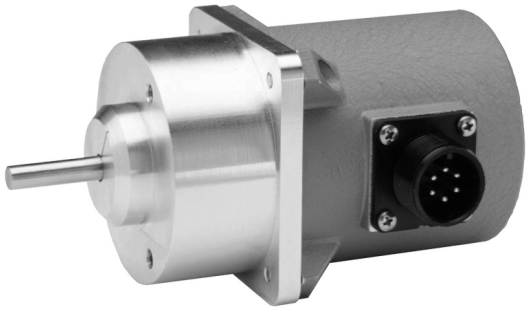


1 mounting holes:
for **.25 in. shaft option**, mounting holes are threaded #10-32 x 0.375 deep 120° apart on a 2.00 inch dia. BC

for **6mm shaft option**, mounting holes are threaded M6 x 9 mm deep 120º apart on a 50,8 mm dia. BC

2 reference mark:
full counter-clockwise position - align mark on shaft to mark on face for start of measurement range

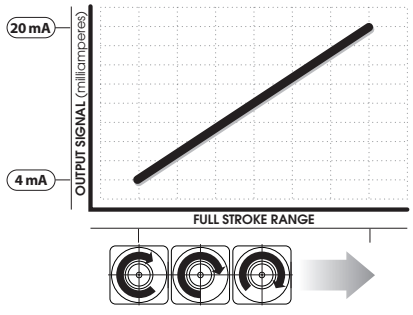
ALL DIMENSIONS ARE IN INCHES [MM]



Celesco's model RT8420 provides extended rotational position feedback from as little as 1/8 of a turn f.s. all the way up to 200 turns f.s. The RT8420 combines the superb linearity and resolution of a plastic-hybrid potententiometer with the durability of Celesco's 4...20 mA circuit to provide an accurate and reliable electrical signal over all ranges.

Additionally, the RT8420 has fully accessible zero and span settings allowing precise matching of the output signal to the required measurement.

Output Signal



celesco
celesco.com • info@celesco.com

Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

Ordering Information:

Model Number:

RT8420- ____ Ⓡ - ____ Ⓐ ____ Ⓑ ____ Ⓒ - **1** Ⓓ ____ Ⓔ ____ Ⓕ **0** Ⓖ
order code:

Sample Model Number:
RT8420 - 0005 - 111 - 1110

Ⓡ	range:	5 turns (clockwise shaft rotations)
Ⓐ	enclosure:	aluminum
Ⓑ	shaft diameter:	.25 inches
Ⓒ	mounting style:	face mount
Ⓓ	output signal:	4...20 mA signal increasing clockwise
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ *order code:*	R125	0R25	0R50	0001	0002	0003	0005	0010	0020
clockwise shaft rotations, min:	0.125	0.25	0.50	1	2	3	5	10	20
accuracy (% of f.s.):	1.25%	1.25%	0.5%	0.5%	0.5%	0.2%	0.2%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	5×10^5	5×10^5	2.5×10^5	2.5×10^5

Ⓡ *order code:*	0030	0040	0050	0080	0100	0120	0140	0180	0200
clockwise shaft rotations, min:	30	40	50	80	100	120	140	180	200
accuracy (% of f.s.):	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

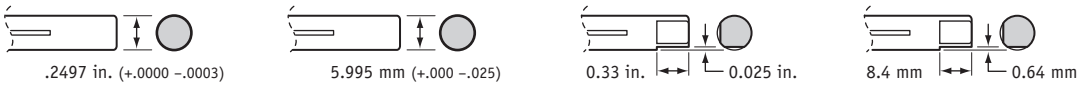
**–number of times the sensor shaft can be cycled back and forth from beginning to end and back to the beginning before any measurable signal degradation may occur.*

Enclosure Material:

Ⓐ *order code:*	1	2
	powder-painted aluminum	303 stainless steel

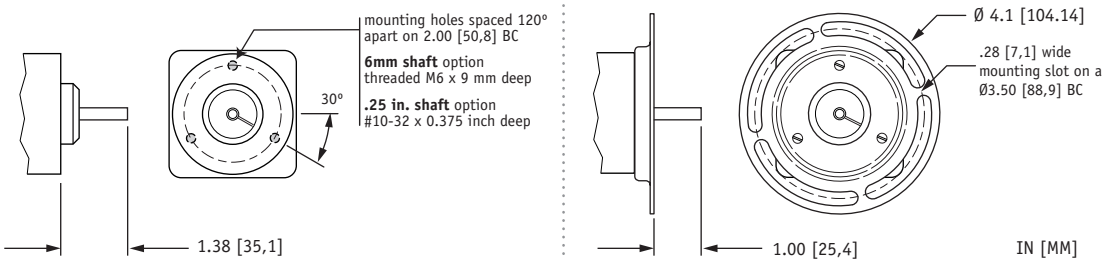
Shaft Diameter:

Ⓑ *order code:*	1	2	3	4
	0.25-in. diameter	6 mm diameter	0.25-in. dia. w/flats	6 mm dia. w/flats



Mounting Style:

Ⓒ *order code:*	1	2
	face mount	flange mount



Ordering Information:

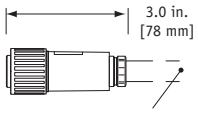
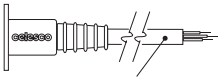
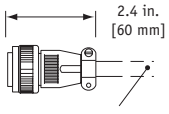
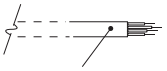
Output Signals:

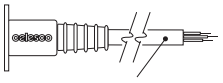
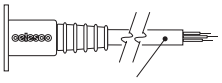
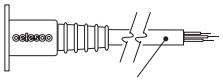
order code:	1	2	3	4
output signal options:	4...20 mA	20...4 mA	0...20 mA	20...0 mA
	4 → 20 ccw cw	20 → 4 ccw cw	0 → 20 ccw cw	20 → 0 ccw cw
sensitivity:	16 mA/full stroke ±0.25%		20 mA/full stroke ±0.25%	
wiring configuration:	2 – wire		3 – wire	
input voltage:	8 – 40 vdc		14 – 29 vdc	

Example:

ordercode = **1** = 4...20 mA { max ccw = 4 mA; max cw = 20 mA

Electrical Connection:

order code:	1	2	3	4
	6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
	IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
				
	1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

order code:	5	6	7
	100-ft. [30 M] waterproof cable	10-ft. [3 M] **pressure tested*** waterproof cable	100-ft. [30 M] **pressure tested*** waterproof cable
	IP 67, NEMA 4X,6**	**IP 68, NEMA 4X**, 6P**	**IP 68, NEMA 4X**, 6P**
			
	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	2-wire	3-wire
A	8...40 vdc	14...29 vdc
B	4...20 mA out	common
C	–	0...20 mA out
D	case ground	–

contact view

Waterproof Cable

color code	2-wire	3-wire
WHITE	8...40 vdc	14...29 vdc
BLACK	4...20 mA out	common
GREEN	case ground	0...20 mA out

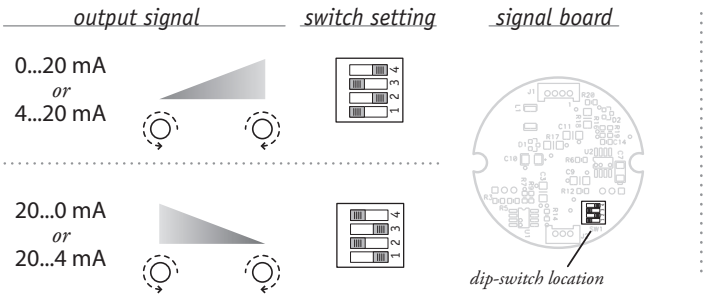
Instrumentation Cable

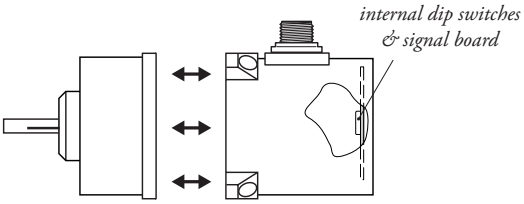
color code	2-wire	3-wire
RED	8...40 vdc	14...29 vdc
BLACK	4...20 mA out	common
WHITE	n/a	n/a
GREEN	case ground	0...20 mA out

Notes: { * *–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours.*
** *–NEMA 4X applies to stainless steel enclosure only.*

Output Signal Selection:

The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.





To gain access to the signal board, remove four Allen-Head Screws and seperate the two case halves.

0...5, 0...10 VDC Output
Ranges: 0-45° to 0-200 Turns
Industrial Grade

RT8510

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-0.125 to 0-200 turns
Output Signal Options ..... 0...5, 0...10 VDC
Accuracy ..... *see ordering information*
Repeatability ..... ± 0.05% full stroke
Resolution ..... essentially infinite
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Shaft Loading ..... up to 10 lbs. radial and 5 lbs. axial
Starting Torque (25ºC) ..... 2.0 in-oz., max.
Weight, Aluminum (Stainless Steel) Enclosure ..... 3 lbs. (6 lbs.) max.

ELECTRICAL

Input ..... 14.5-40 VDC (10.5-40 VDC for 0...5 volt output)
Input Current ..... 10 mA maximum
Output Impedence ..... 1000 ohms
Maximum Load ..... 5000 ohms
Zero Adjustment ..... from factory set zero to 50% of full stroke range
Span Adjustment ..... to 50% of factory set span

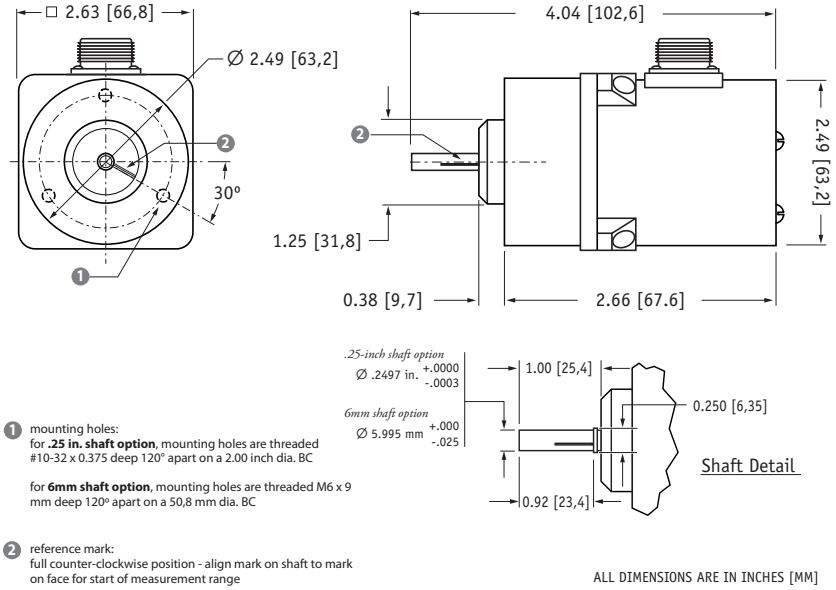
ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration ..... up to 10 G's to 2000 Hz maximum

EMC COMPLIENCE PER DIRECTIVE 89/336/EEC

Emission/Immunity ..... EN50081-2 / EN50082-2

Outline Drawing

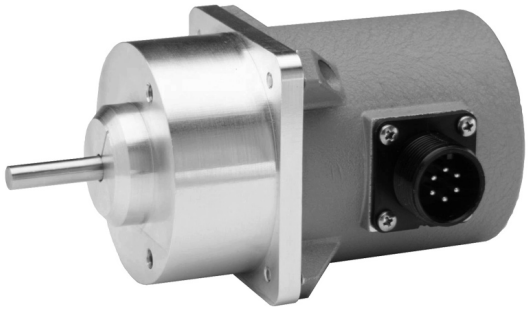


1 mounting holes:
for **.25 in. shaft option**, mounting holes are threaded #10-32 x 0.375 deep 120° apart on a 2.00 inch dia. BC

for **6mm shaft option**, mounting holes are threaded M6 x 9 mm deep 120º apart on a 50,8 mm dia. BC

2 reference mark:
full counter-clockwise position - align mark on shaft to mark on face for start of measurement range

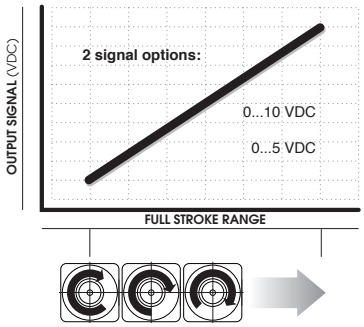
ALL DIMENSIONS ARE IN INCHES [MM]



The RT8510 can operate from an unregulated 14.5 to 40 VDC power supply while providing a regulated output signal over it's full range from 1/8 of a turn up to 200 turns. It provides a 0 - 10 VDC position feedback signal proportional to the rotational position of the shaft

As a member of Celesco's innovative family of NEMA-4/ IP67 rotational transducers, the RT8510 offers numerous benefits including a zero and span adjust and a potentiometric sensor which provides an "absolute" feedback signal that is unaffected by power loss.

Output Signal



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Celesco Transducer Products, Inc.
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

Ordering Information:

Model Number:

RT8510- ____ Ⓡ **-** ___ Ⓐ ___ Ⓑ ___ Ⓒ **-** 1 Ⓓ ___ Ⓔ ___ Ⓕ 0 Ⓖ
order code:

Sample Model Number:

RT8510 - 0005 - 111 - 1110

Ⓡ	range:	5 turns (clockwise shaft rotations)
Ⓐ	enclosure:	aluminum
Ⓑ	shaft diameter:	.25 inches
Ⓒ	mounting style:	face mount
Ⓔ	output signal:	0...10 VDC signal increasing clockwise
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ *order code:*	R125	0R25	0R50	0001	0002	0003	0005	0010	0020
clockwise shaft rotations, min:	0.125	0.25	0.50	1	2	3	5	10	20
accuracy (% of f.s.):	1.25%	1.25%	0.5%	0.5%	0.5%	0.2%	0.2%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	5×10^5	5×10^5	2.5×10^5	2.5×10^5

Ⓡ *order code:*	0030	0040	0050	0080	0100	0120	0140	0180	0200
clockwise shaft rotations, min:	30	40	50	80	100	120	140	180	200
accuracy (% of f.s.):	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

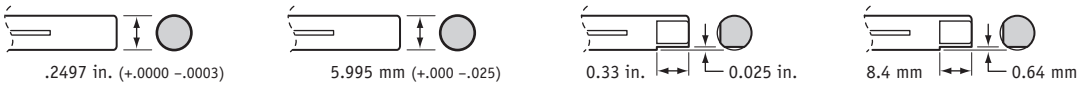
**–number of times the sensor shaft can be cycled back and forth from beginning to end and back to the beginning before any measurable signal degradation may occur.*

Enclosure Material:

Ⓐ *order code:*	1	2
	powder-painted aluminum	303 stainless steel

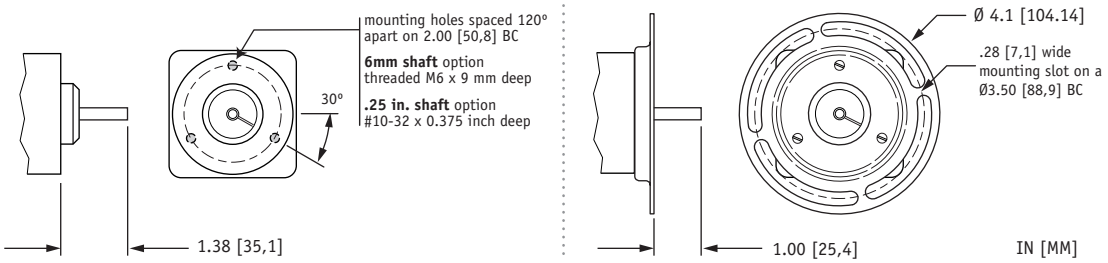
Shaft Diameter:

Ⓑ *order code:*	1	2	3	4
	0.25-in. diameter	6 mm diameter	0.25-in. dia. w/flats	6 mm dia. w/flats



Mounting Style:

Ⓒ *order code:*	1	2
	face mount	flange mount



Ordering Information:

Output Signals:

Ⓔ order code:

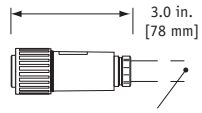
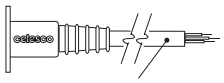
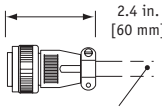
	1	2	3	4
output signal options:	0...10 VDC	10...0 VDC	0...5 VDC	5...0 VDC
	0 → 10, ccw / cw	10 → 0, ccw / cw	0 → 5, ccw / cw	5 → 0, ccw / cw
input voltage:	14.5...40 VDC		10.5...40 VDC	

Example:

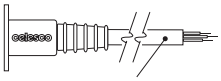
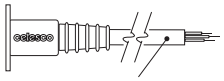
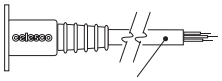
ordercode = **1** = 0...10 VDC { max ccw = 0 VDC ; max cw = 10 VDC

Electrical Connection:

Ⓕ order code:

1	2	3	4
6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
			
1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

Ⓕ order code:

5	6	7
100-ft. [30 M] waterproof cable	10-ft. [3 M] **pressure tested*** waterproof cable	100-ft. [30 M] **pressure tested*** waterproof cable
IP 67, NEMA 4X,6**	**IP 68, NEMA 4X**, 6P**	**IP 68, NEMA 4X**, 6P**
		
100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	signal
A	input voltage
B	output signal
C	common

contact view

Waterproof Cable

color code	signal
WHITE	input voltage
GREEN	output signal
BLACK	common

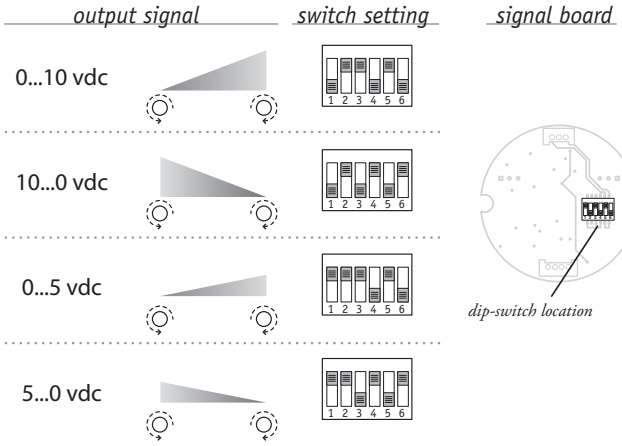
Instrumentation Cable

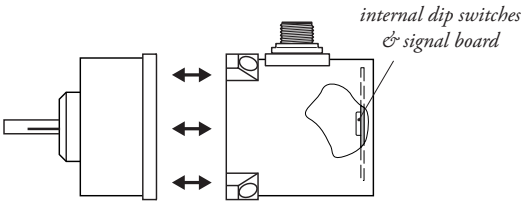
color code	signal
RED	input voltage
GREEN	output signal
BLACK	common

Notes: { * *–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours.*
** *–NEMA 4X applies to stainless steel enclosure only.*

Output Signal Selection:

The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.





To gain access to the signal board, remove four Allen-Head Screws and seperate the two case halves.

CANbus • SAE J1939
Ranges: 0-90º to 0-50 Turns
Industrial Grade

RT9CN

Specification Summary:

GENERAL

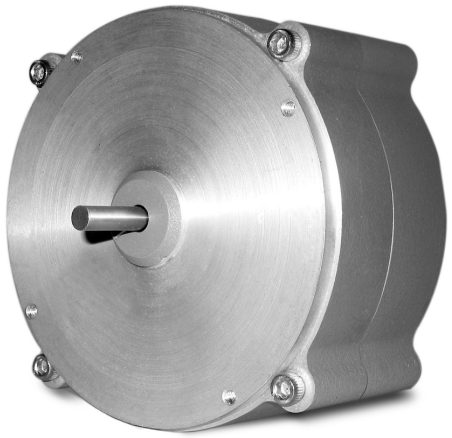
Full Stroke Ranges ..... 0-0.25 to 0-50 turns
Electrical Interface ..... CANbus SAE J1939
Protocol ..... Proprietary B
Accuracy ..... ± 0.15 to ± 0.30% full stroke, see ordering information
Repeatability ..... ± 0.02% full stroke
Resolution ..... ± 0.003% full stroke
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Shaft Loading ..... up to 35 lbs. radial and 5 lbs. axial
Weight, Aluminum (Stainless Steel) Enclosure ..... 5 lbs. (10 lbs.), max.

ELECTRICAL

Input Voltage ..... 7 - 18 VDC
Input Current ..... 60 mA max.
Address Setting (Node ID) ..... 0..63 set via DIP Switches
Baud Rate ..... 125K, 250K or 500K set via DIP Switches
Update Rate ..... 10 ms. (20 ms. available–*contact factory*)

ENVIRONMENTAL

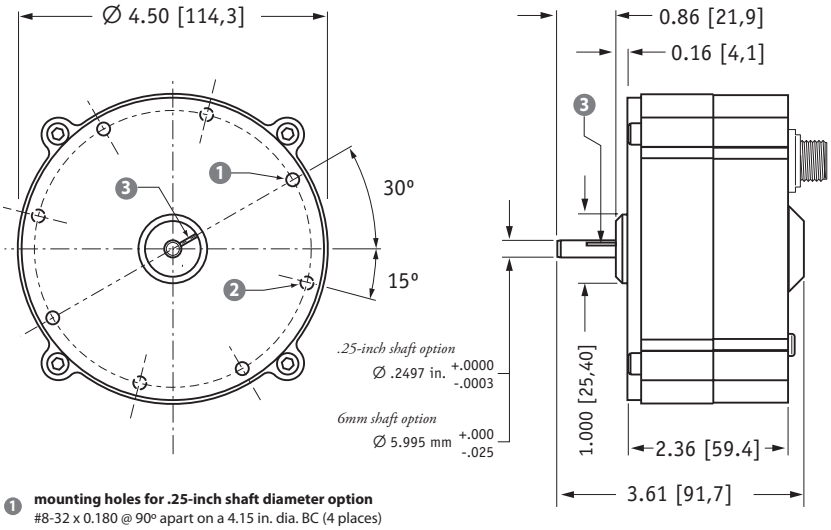
Environmental Suitability ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... -40º to 185ºF
Vibration ..... up to 10 G's to 2000 Hz maximu



Celesco's model RT9CN communicates rotational position feedback to your PLC via the CANbus SAE J1939 interface. The heart of this sensor is a precision plastic-hybrid position potentiometer which provides a "absolute" position and does not ever have to be reset to a "home" position after a power loss or planned shutdown.

This innovative sensor from Celesco, designed to meet tough NEMA-4 and IP67 environmental standards, is available in full-stroke measurement ranges of 1/4 to 50 turns.

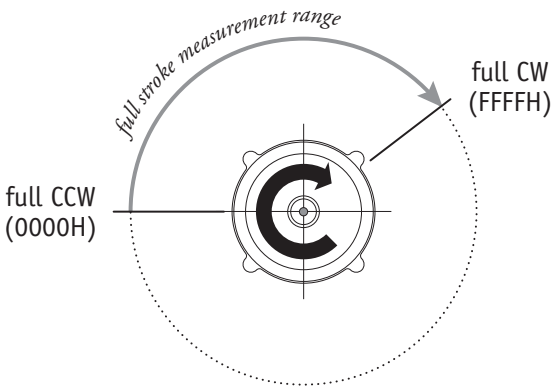
Outline Drawing



1. **mounting holes for .25-inch shaft diameter option**
   #8-32 x 0.180 @ 90º apart on a 4.15 in. dia. BC (4 places)
2. **mounting holes for 6-mm shaft diameter option**
   M4 x 4.5mm @ 90º apart on a 105.4 mm dia. BC (4 places)
3. **reference mark**
   full counter-clockwise position - align mark on shaft to mark on face for start of measurement range

ALL DIMENSIONS ARE IN INCHES [MM]

Output Signal



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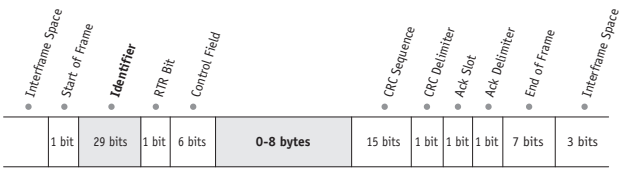
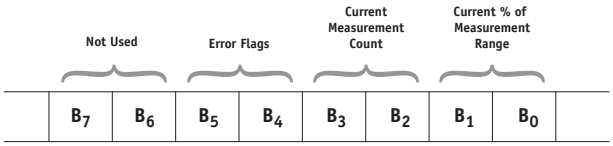
I/O Format:

Data Frame



repetition = 8 msec.

Data Field



B_0 = LSB current % of measurement range byte
B_1 = MSB current % of measurement range byte
B_4 - B_5 = error flags
B_2 = LSB current measurement count byte
B_3 = MSB current measurement count byte
B_6 - B_7 = not used

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.

Setting the Address (Node ID) and Baud Rate

Address Setting (Node ID)

The Address Setting (Node ID) is set via 6 switches located on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

Baud Rate

The transmission baud rate may be either factory preset at the time of order or set manually at the time of installation.

The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

address setting:

DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
...	...	...	...	...	...	...
1	1	1	1	1	1	63

baud rate setting:

DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

Current % of Measurement Range

The Current % of Measurement Range is a 2-byte value that expresses the current linear position as a percentage of the entire full stroke range. Resolution is **.1 %** of the full stroke measurement range.

This value starts at **0x0000** at the beginning of the stroke and ends at **0x03E8**.

Example:

Hex	Decimal	Percent
0000	0000	0.0%
0001	0001	0.1%
0002	0002	0.2%
...	...	...
03E8	1000	100.0%

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 16-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 **0x0000** with the measuring cable fully retracted and continues upward to the end of the stroke range stopping at **0xFFFF**. This holds true for all ranges.

Error Flags

0x55 (yellow LED on controller board) indicates that the sensor has begun to travel beyond the calibrated range of the internal position potentiometer.

0xAA (red LED on controller board) indicates that the sensor has moved well beyond the calibrated range of the internal position potentiometer.

If either error flag occurs within the full stroke range of the sensor, the unit should be returned to the factory for repair and recalibration.

Converting CMC to Degrees

If required, the CMC can easily be converted a rotary measurement expressed in degrees instead of simply counts.

This is accomplished by first dividing the CMC by 65,535 (total counts over the range) and then multiplying that value by the FSR:

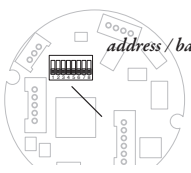
$$\left(\frac{\text{CMC}}{65{,}535}\right) \text{X FSR}$$

Example:

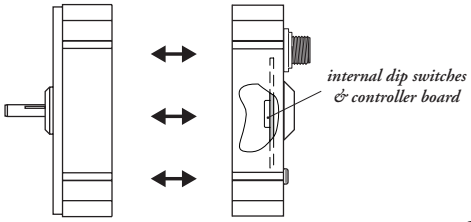
If the full stroke range is **1 turn (360 degrees)** and the current position is **0x0FF2** (4082 Decimal) then,

$$\left(\frac{4082}{65{,}535}\right) \text{X } 360 \text{ degrees} = 22.4 \text{ degrees}$$

CANBus Controller Board and DIP Switch Location



to gain access to the controller board, remove four Allen-Head Screws and separate case halves



Ordering Information:

Model Number:

RT9CN - ____ Ⓡ - ___ Ⓐ - ___ Ⓑ - J Ⓒ - ___ Ⓓ - ___ Ⓔ - ___ Ⓕ
order code:

Sample Model Number:

RT9CN - 30 - AL - 25 - J - 500 - 32 - SC5

Ⓡ	range:	30 turns
Ⓐ	enclosure:	powder-painted aluminum
Ⓑ	shaft:	.25-in diameter
Ⓒ	interface:	CANbus SAE J1939
Ⓓ	baud rate:	500 k bits/sec.
Ⓔ	node ID:	32
Ⓕ	electrical connection:	5-meter cordset with straight plug

Full Stroke Range:

Ⓡ order code:	R25	R50	1	2	3	5	10	20	30	50
clockwise shaft rotations, min:	0.25	0.50	1	2	3	5	10	20	30	50
accuracy (% of f.s.):	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.15%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

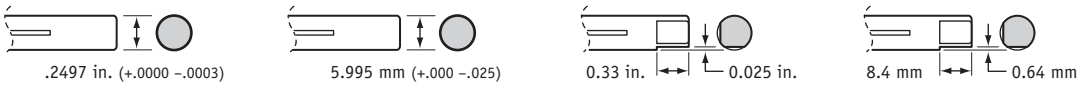
**–number of times the sensor shaft can be cycled back and forth from beginning to end and back to the beginning before any measurable signal degradation may occur.*

Enclosure Material:

Ⓐ order code:	AL	SS
	powder-painted aluminum	303 stainless steel

Shaft Diameter:

Ⓑ order code:	25	6	25F	6F
	0.25-in. diameter	6 mm diameter	0.25-in. dia. w/flats	6 mm dia. w/flats



Baud Rate:

Ⓓ order code:	125	250	500
	125 kbaud	250 kbaud	500 kbaud

Node ID:

Ⓔ order code:	0	1	2	...	62	63
	select address (0 - 63 Decimal)					

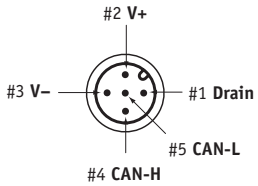
Ordering Information:

Electrical Connection:

order code:

blank

5-pin micro-connector
(no mating plug supplied)



connector
(contact view)

MC5

5-pin micro-connector
w/ mating plug

0.16" - 0.32" OD Cable (THIN)

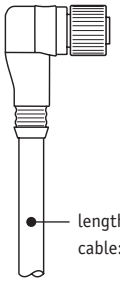
SC5

5-pin micro-connector
and 5 meter length cordset
w/straight mating plug

length: 16ft [5M]
cable: Thin

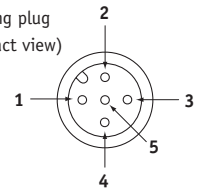
NC5

5-pin micro-connector
and 5 meter length cordset
w/90° mating plug



length: 16ft [5M]
cable: Thin

mating plug
(contact view)



pin	signal	wire color
1	drain	brown
2	V+	white
3	V-	blue
4	Can-H	black
5	Can-L	grey

DeviceNET®
Ranges: 0-90° to 0-50 Turns
Industrial Grade

RT9DN

Specification Summary:

GENERAL

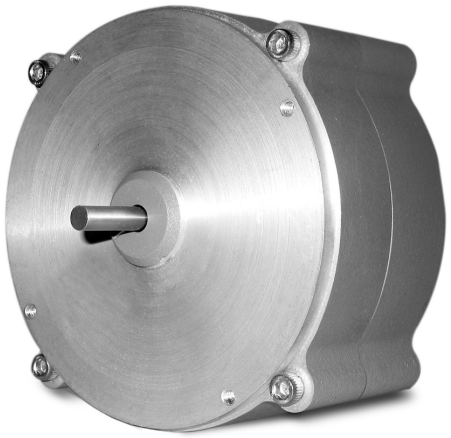
Full Stroke Ranges ..... 0-0.25 to 0-50 turns
Electrial Interface ..... CANbus ISO 11898
Protocol ..... DeviceNet Version 2.0
Accuracy ..... ± 0.30 to 0.15% full stroke
Repeatability ..... ± 0.02% full stroke
Resolution ..... ± 0.003% full stroke
Enclosure Material ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Shaft Loading ..... up to 35 lbs. radial and 5 lbs. axial
Weight, Aluminum (Stainless Steel) Enclosure ..... 5 lbs. (10 lbs.), max.

ELECTRICAL

Input Voltage ..... Bus Powered
Input Current ..... 40 mA
Address Setting (Node ID) ..... 0..63 set via DIP Switches—*default setting: 63*
Baud Rate ..... 125K, 250K or 500K set via DIP Switches
EDS file ..... available @ http://www.celesco.com/download

ENVIRONMENTAL

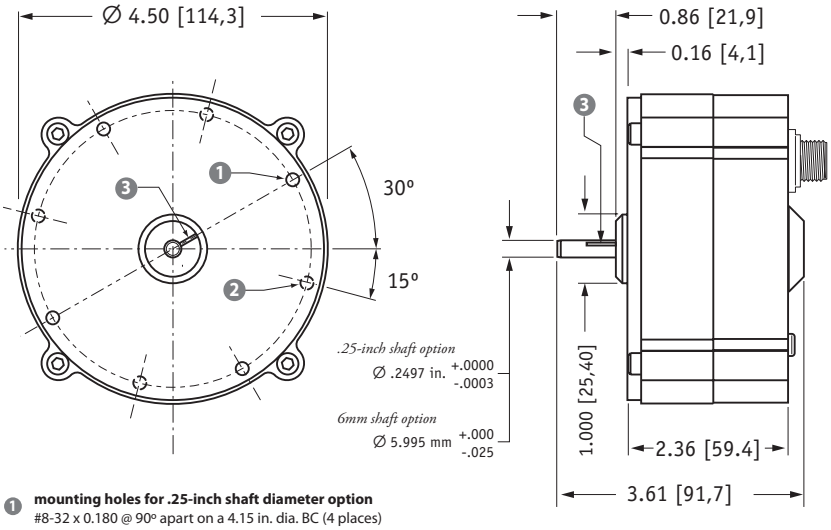
Enviromental Suitability ..... NEMA 4/4X/6, IP67/68
Operating Temperature ..... -40° to 200°F
Vibration ..... up to 10 G's to 2000 Hz maximum



Celesco's model RT9DN communicates rotational position feedback via DeviceNET® to your programmable controller. The heart of this sensor is a precision plastic-hybrid position potentiometer which provides a "absolute" position and does not ever have to be reset to a "home" position after a power loss or planned shutdown.

This innovative sensor from Celesco, designed to meet tough NEMA-4 and IP67 environmental standards, is available in full-stroke measurement ranges of 1/4 to 50 turns.

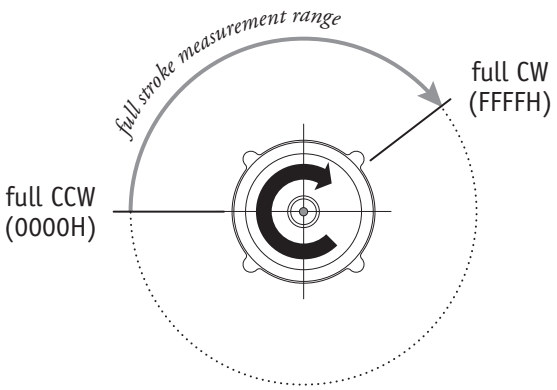
Outline Drawing



1. **mounting holes for .25-inch shaft diameter option**
   #8-32 x 0.180 @ 90° apart on a 4.15 in. dia. BC (4 places)
2. **mounting holes for 6-mm shaft diameter option**
   M4 x 4.5mm @ 90° apart on a 105.4 mm dia. BC (4 places)
3. **reference mark**
   full counter-clockwise position - align mark on shaft to mark on face for start of measurement range

ALL DIMENSIONS ARE IN INCHES [MM]

Output Signal



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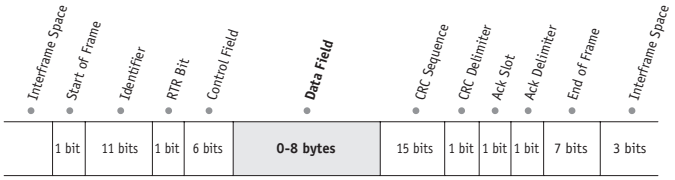
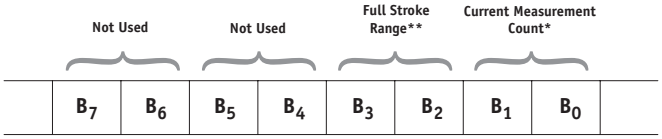
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

I/O Format:

Data Frame



Data Field



B_0 = LSB current measurement byte
B_1 = MSB current measurement byte
B_2 = LSB full stroke range byte
B_3 = MSB full stroke range byte
B_4 - B_7 = not used

***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 16-bit value that occupies the first two 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 0000H with shaft at the full counter-clockwise position (0° reference mark) and continues in the clockwise direction to the end of the stroke range stopping at FFFFH. This holds true for all ranges.

****Full Stroke Range**

The **F**ull **S**troke **R**ange **(FSR)** is a 16-bit value in the data field that expresses the full range of the sensor in degrees. This value can be used to convert the actual count to units of measurement should the application require it.

The full stroke measurement range occupies the second two bytes (B_2 and B_3) of the data field.

B_2 is the LSB (least significant byte) and B_3 is the MSB (most significant byte).

This value is expressed in degrees.

Example:

Hex Value	*Decimal Equivalent*	*Full Stroke Range*
0168	360	360 degrees

Converting CMC to Degrees

If required, the CMC can easily be converted to a rotational measurement expressed in degrees instead of counts.

This is accomplished by first dividing the CMC by 65,535 (total counts over the range) and then multiplying that value by the FSR:

$$\left(\frac{\text{CMC}}{65{,}535}\right) \text{X FSR}$$

Example:

If the full stroke range is **1 turn (360 degrees)** and the current position is **OFF2 Hex** (4082 Decimal) then,

$$\left(\frac{4082}{65{,}535}\right) \text{X } 360 \text{ deg.} = 22.4 \text{ degrees}$$

Address Setting (Node ID), Baud Rate and Bus Termination Settings

Address Setting (Node ID)

The Address Setting (Node ID) is set via 6 switches located on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
…	…	…	…	…	…	…
1	1	1	1	1	1	63

Baud Rate

The transmission baud rate may be either factory preset at the time of order or set manually at the time of installation.

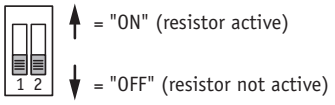
The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

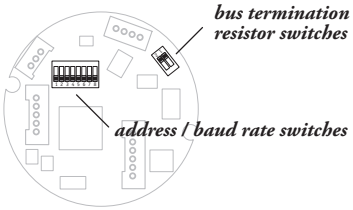
Bus Termination

The setting of the internal bus termination resistor may be specified upon order or manually changed by the end user at the time of installation.

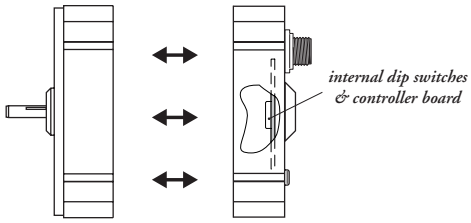
The bus termination resistor is activated setting switches **1** & **2** on the 2-pole DIP switch (located on the internal DeviceNET controller board) to the "ON" position.



DeviceNET Controller Board and DIP Switch Location



to gain access to the controller board, remove four Allen-Head Screws and separate case halves



Ordering Information:

Model Number:

RT9DN - _____ - ___ - ___ - ___ - ___ - ___ - ___
order code: ® Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

Sample Model Number:

RT9DN - 30 - AL - 25 - 500 - TR - SC5

®	range:	30 turns
Ⓐ	enclosure:	powder-painted aluminum
Ⓑ	shaft:	.25-in diameter
Ⓒ	baud rate:	500 k bits/sec.
Ⓓ	terminating resistor:	yes
Ⓔ	electrical termination:	5-meter cordset with straight plug

Full Stroke Range:

® order code:	R25	R50	1	2	3	5	10	20	30	50
clockwise shaft rotations, min:	0.25	0.50	1	2	3	5	10	20	30	50
accuracy (% of f.s.):	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.15%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

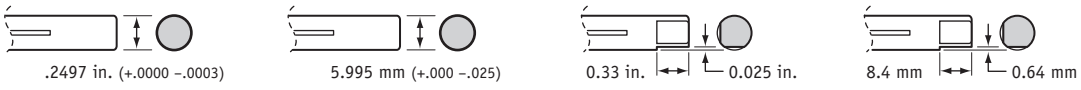
**–number of times the sensor shaft can be cycled back and forth from beginning to end and back to the beginning before any measurable signal degradation may occur.*

Enclosure Material:

Ⓐ order code:	AL	SS
	powder-painted aluminum	303 stainless steel

Shaft Diameter:

Ⓑ order code:	25	6	25F	6F
	0.25-in. diameter	6 mm diameter	0.25-in. dia. w/flats	6 mm dia. w/flats



Baud Rate:

Ⓒ order code:	125	250	500
	125 kbaud	250 kbaud	500 kbaud

Terminating Resistor:

Ⓓ order code:	TR	NR
	terminating resistor	no terminating resistor

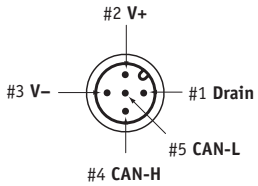
Ordering Information:

Electrical Connection:

order code:

blank

5-pin micro-connector
(no mating plug supplied)

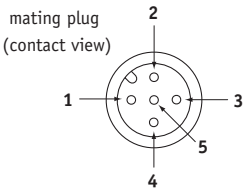


connector
(contact view)

MC5

5-pin micro-connector
w/ mating plug

0.16" - 0.32" OD Cable (THIN)



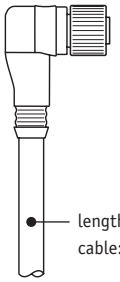
SC5

5-pin micro-connector
and 5 meter length cordset
w/straight mating plug

length: 16ft [5M]
cable: Thin

NC5

5-pin micro-connector
and 5 meter length cordset
w/90° mating plug



length: 16ft [5M]
cable: Thin

pin	signal	wire color
1	drain	brown
2	V+	white
3	V-	blue
4	Can-H	black
5	Can-L	grey

Precision Potentiometric Output
Ranges: 0-90° to 0-50 Turns
Industrial Grade

RT9101

CE

Specification Summary:

GENERAL

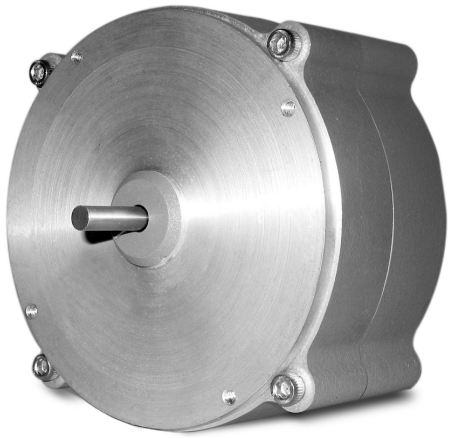
Full Stroke Range Options ..... 0-0.25 to 0-50 turns
Output Signal Options..... voltage divider (potentiometer)
Accuracy .....± 0.30% to ±0.15% full stroke *see ordering information*
Repeatability..... ± 0.02% full stroke
Resolution .....essentially infinite
Enclosure Material Options .....powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life .....*see ordering information*
Shaft Loading ..... up to 35 lbs. radial and 5 lbs. axial
Weight, Aluminum (Stainless Steel) Enclosure ..... 5 lbs. (10 lbs.) max.

ELECTRICAL

Input Resistance Options .....500, 1K, 5K, 10K or bridge, *see ordering information*
Power Rating, Watt .....2.0 at 70°F derated to 0 at 250°
Recommended Maximum Input Voltage .....30 V (AC/DC)
Output Signal Change Over Full Stroke Range.....94% ±4% of input voltage

ENVIRONMENTAL

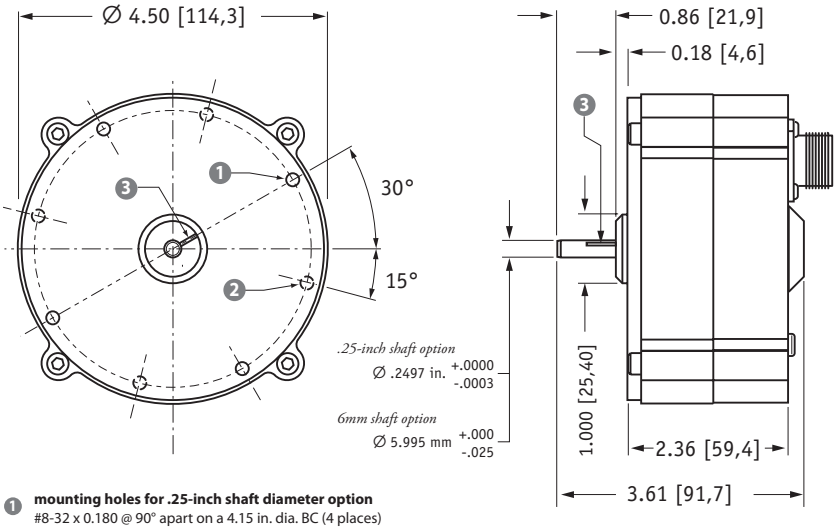
Enclosure .....NEMA 4/4X/6, IP 67/68
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration..... up to 10 G's to 2000 Hz maximum



Celesco's model RT9101 provides a voltage feedback signal for rotational position. The sensing element of this device is a precision plastic-hybrid potentiometer which provied superb linearity and resolution.

This innovative sensor from Celesco, designed to meet tough NEMA-4 and IP67 environmental standards, is available in full-stroke measurement ranges of 1/4 to 50 turns. Because the sensor is potentiometric, the RT9101 is absolute and will maintain position information even after a loss of power.

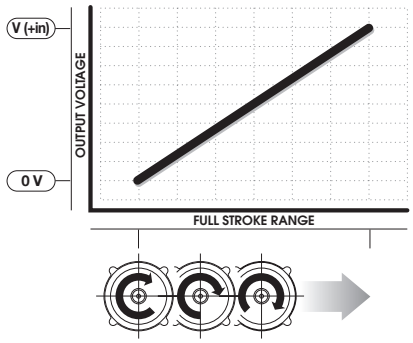
Outline Drawing



1. **mounting holes for .25-inch shaft diameter option**
   #8-32 x 0.180 @ 90° apart on a 4.15 in. dia. BC (4 places)
2. **mounting holes for 6-mm shaft diameter option**
   M4 x 4,5 mm @ 90° apart on a 105,4 mm dia. BC (4 places)
3. **reference mark**
   full counter-clockwise position - align mark on shaft to mark on face for start of measurement range

ALL DIMENSIONS ARE IN INCHES [MM]

Output Signal



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Ordering Information:

Model Number:

RT9101-_____ - ____ ____ **1** - ____ **1** ____ **0**
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:

RT9101 - 0005 - 111 - 1110

Ⓡ	range:	5 turns (clockwise shaft rotations)
Ⓐ	enclosure:	aluminum
Ⓑ	shaft diameter:	.25 inches
Ⓓ	output signal:	500 ohm potentiometer
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ *order code:*	0R25	0R50	0001	0002	0003	0005	0010	0020	0030	0050
clockwise shaft rotations, min:	0.25	0.50	1	2	3	5	10	20	30	50
accuracy (% of f.s.):	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.15%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

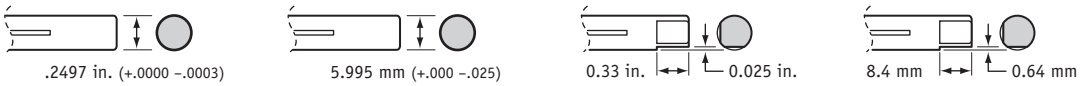
**–number of times the sensor shaft can be cycled back and forth from beginning to end and back to the beginning before any measurable signal degradation may occur.*

Enclosure Material:

Ⓐ *order code:*	1	2
	powder-painted aluminum	303 stainless steel

Shaft Diameter:

Ⓑ *order code:*	1	2	3	4
	0.25-in. diameter	6 mm diameter	0.25-in. dia. w/flats	6 mm dia. w/flats

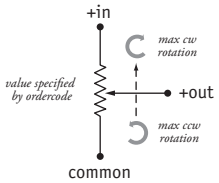


Output Signals:

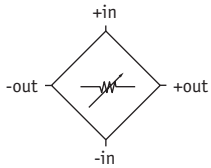
Ⓓ *order code:*	1	2	3	4	5
	500 ohm*	1000 ohm*	5000 ohm*	10,000 ohm*	adjustable bridge (0...30 mV/V)

**tolerance = ±10%*

circuit options: 1, 2, 3, 4



circuit option: 5 (adjustable bridge)



full scale output: adjustable from 0 to 30mV/V
zero adjust: from factory set zero to 50% of full stroke

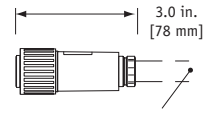
Ordering Information:

Electrical Connection:

order code: **1**

6-pin plastic connector w/mating plug

IP 67, NEMA 4X,6**

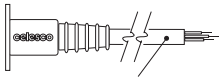


1/2 - 5/16" [14 - 8 mm] cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

order code: **2**

10-ft. [3 M] waterproof cable

IP 67, NEMA 4X, 6**

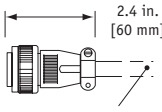


10 ft. x 0.4-in. dia.
[3 M x 10 mm dia.]
18 AWG, type SJTW

order code: **3**

6-pin metal connector w/mating plug

IP 65, NEMA 4

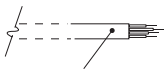


3/8-in. [9 mm] max cable dia.
16 AWG max conductor size
connector: MS3102E-14S-6P
mating plug: MS3106E-14S-6S

order code: **4**

25-ft. [7.5 M] instrumentation cable

IP 67, NEMA 6

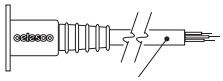


25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

order code: **5**

100-ft. [30 M] waterproof cable

IP 67, NEMA 4X,6**

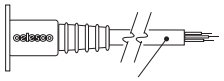


100 ft. x 0.4-in. dia.
[30 M x 10 mm dia.]
18 AWG, type SJTW

order code: **6**

10-ft. [3 M] **pressure tested*** waterproof cable

IP 68, NEMA 4X, 6P**

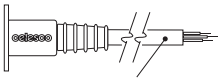


10 ft. x 0.4-in. dia.
[3 M x 10 mm dia.]
18 AWG, type SJTW

order code: **7**

100-ft. [30 M] **pressure tested*** waterproof cable

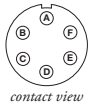
IP 68, NEMA 4X, 6P**



100 ft. x 0.4-in. dia.
[30 M x 10 mm dia.]
18 AWG, type SJTW

6-pin Mating Plug

pin	standard	bridge
A	+ in	+ in
B	common	– in
C	+ out	– out
D	-	+ out



contact view

Waterproof Cable

color code	standard	bridge
WHITE	+ in	n/a
BLACK	common	n/a
GREEN	+ out	n/a

Instrumentation Cable

color code	standard	bridge
RED	+ in	+ in
BLACK	common	– in
GREEN	+ out	+ out
WHITE	-	– out

**–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours. **–Applies to stainless steel enclosure only.*

0/4...20 mA Output • Hazardous Area Certification
Ranges: 0-90° to 0-50 Turns
Industrial Grade

RT9420

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-0.125 to 0-50 turns
Output Signal Options..... 4...20 mA (2-wire) and 0...20 mA (3-wire)
Accuracy..... ± 0.30% to ±0.15% full stroke *see ordering information*
Repeatability..... ± 0.05% full stroke
Resolution .....essentially infinite
Enclosure Material Options ..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life .....*see ordering information*
Shaft Loading ..... up to 35 lbs. radial and 5 lbs. axial
Weight, Aluminum (Stainless Steel) Enclosure ..... 5 lbs. (10 lbs.) max.

ELECTRICAL

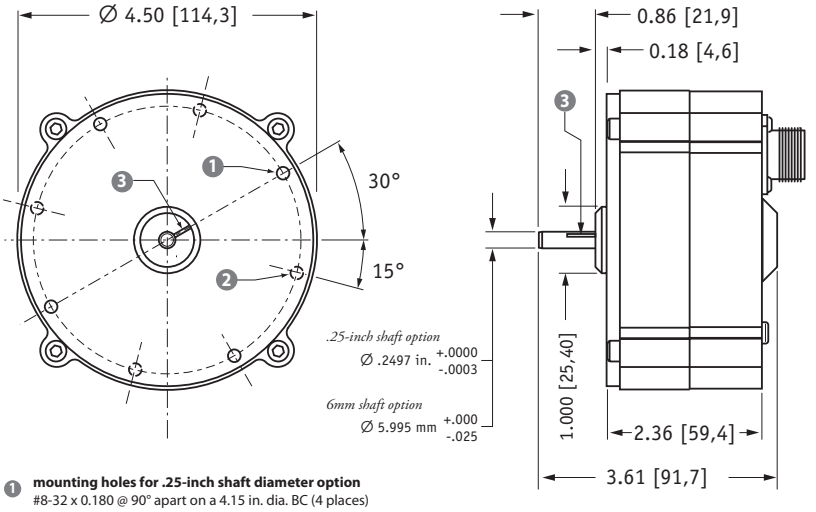
Input Voltage .....*see ordering information*
Input Current.....20 mA max.
Maximum Loop Resitance (Load) ..... (loop supply voltage - 8)/0.020
Circuit Protection .....38 mA max.
Impedence..... 100M ohms@100 VDC, min.
Output Signal Adjustment
Zero Adjustment ..... from factory set zero to 50% of full stroke range
Span Adjustment.....to 50% of factory set span
Thermal Effects
Zero .....0.01% f.s./°F, max.
Span .....0.01% f.s./°F, max.

ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67/68
Hazardous Area Certification .....*see ordering information*
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration..... up to 10 G's to 2000 Hz maximum

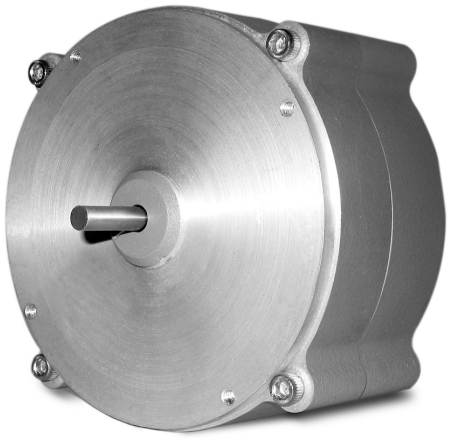
EMC COMPLIENCE PER DIRECTIVE 89/336/EEC

Emission/Immunity EN50081-2/EN50082-2



1. **mounting holes for .25-inch shaft diameter option**
   #8-32 x 0.180 @ 90° apart on a 4.15 in. dia. BC (4 places)
2. **mounting holes for 6-mm shaft diameter option**
   M4 x 4,5 mm @ 90° apart on a 105,4 mm dia. BC (4 places)
3. **reference mark**
   full counter-clockwise position - align mark on shaft to mark on face for start of measurement range

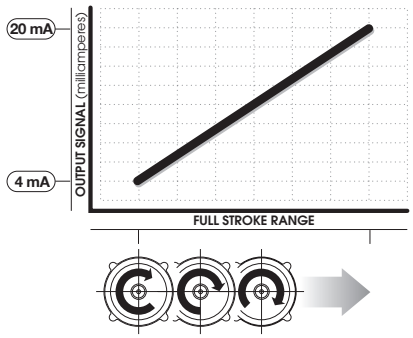
ALL DIMENSIONS ARE IN INCHES [MM]



The RT9420 provides rotational position feedback via 4...20 mA current loop signal. This device combines the superb linearity and resolution of a plastic-hybrid potentiometer and the durability of Celesco's 4...20mA circuit to provide an accurate and reliable electrical signal. Additionally the zero and span settings are adjustable through access holes in the housing.

This innovative sensor from Celesco, designed to meet NEMA-4 and IP67 standards, is available in full stroke ranges of 1/4 to 50 turns.

Output Signal



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celesco.com • info@celesco.com

Ordering Information:

Model Number:

RT9420-____ **-** __ __ **1 - 1** __ __ **0**
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:
RT9420 - 0005 - 111 - 1110

Ⓡ	range:	5 turns (clockwise shaft rotations)
Ⓐ	enclosure:	aluminum
Ⓑ	shaft diameter:	.25 inches
Ⓒ	output signal:	4...20 mA signal increasing clockwise
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

Ⓡ order code:	R125	0R25	0R50	0001	0002	0003	0005	0010	0020	0030	0050
clockwise shaft rotations, min:	0.125	0.25	0.50	1	2	3	5	10	20	30	50
accuracy (% of f.s.):	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.15%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

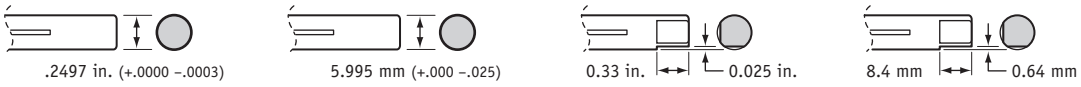
**–number of times the sensor shaft can be cycled back and forth from beginning to end and back to the beginning before any measurable signal degradation may occur.*

Enclosure Material:

Ⓐ order code:	1	2
	powder-painted aluminum	303 stainless steel

Shaft Diameter:

Ⓑ order code:	1	2	3	4
	0.25-in. diameter	6 mm diameter	0.25-in. dia. w/flats	6 mm dia. w/flats
	.2497 in. (+.0000 –.0003)	5.995 mm (+.000 –.025)	0.33 in. 0.025 in.	8.4 mm 0.64 mm



Output Signals:

Ⓔ order code:	1	2	3	4	5*	6*
output signal options:	4...20 mA	20...4 mA	0...20 mA	20...0 mA	4...20 mA	20...4 mA
	4 → 20	20 → 4	0 → 20	20 → 0	4 → 20	20 → 4
	ccw cw	ccw cw	ccw cw	ccw cw	ccw cw	ccw cw
sensitivity:	16 mA/full stroke ±0.25%		20 mA/full stroke ±0.25%		16 mA/full stroke ±0.25%	
wiring configuration:	2 – wire		3 – wire		2 – wire	
input voltage:	8 – 40 vdc		14 – 29 vdc		14 – 32 vdc	
hazardous area certification:	not certified				CSA • Cenelec	

Example:

ordercode = **1** = 4...20 mA { max ccw = 4 mA; max cw = 20 mA

Hazardous Area Certifications:

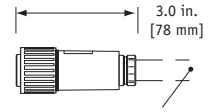
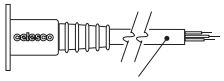
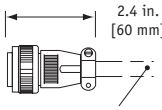
CSA Standard 22.2 Class 1 Groups A, B, C and D

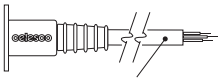
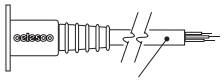
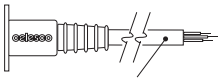
Cenelec LCIE EEx ia IIc T4

**IMPORTANT: intrinsically safe when powered from a CSA certified zener barrier rated 28 VDC max, 110 mA max per installation drawing#677984*

Ordering Information:

Electrical Connection:

order code:	1	2	3	4
	6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
	IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
				
	1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

order code:	5	6	7
	100-ft. [30 M] waterproof cable	10-ft. [3 M] **pressure tested*** waterproof cable	100-ft. [30 M] **pressure tested*** waterproof cable
	IP 67, NEMA 4X,6**	**IP 68, NEMA 4X**, 6P**	**IP 68, NEMA 4X**, 6P**
			
	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	2-wire	3-wire
A	8...40 vdc***	14...29 vdc
B	4...20 mA out	common
C	–	0...20 mA out
D	case ground	–

contact view

Waterproof Cable

color code	2-wire	3-wire
WHITE	8...40 vdc***	14...29 vdc
BLACK	4...20 mA out	common
GREEN	case ground	0...20 mA out

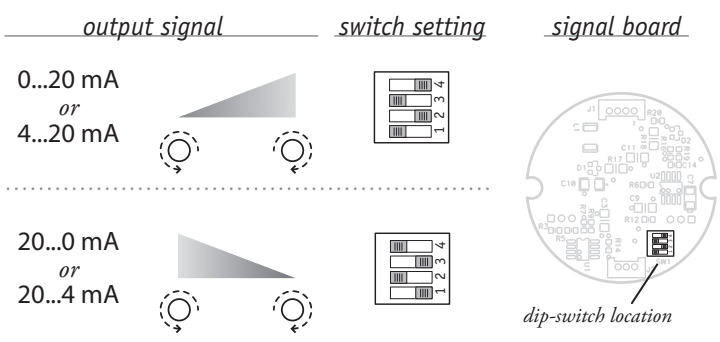
Instrumentation Cable

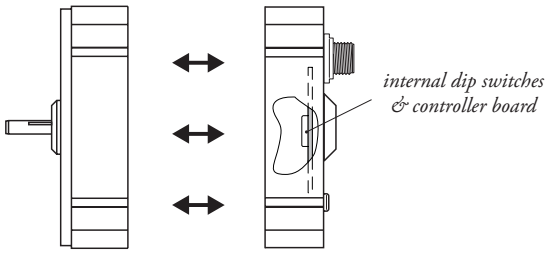
color code	2-wire	3-wire
RED	8...40 vdc***	14...29 vdc
BLACK	4...20 mA out	common
WHITE	n/a	n/a
GREEN	case ground	0...20 mA out

Notes:
- * *–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours.*
- ** *–NEMA 4X applies to stainless steel enclosure only.*
- *** *–14-32 VDC for hazardous area option.*

Output Signal Selection:

The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.





To gain access to the signal board, remove four Allen-Head Screws and seperate the two case halves.

0...5, 0...10 VDC Output
Ranges: 0-90° to 0-50 Turns
Industrial Grade

RT9510

CE

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-0.125 to 0-50 turns
Output Signal Options..... 0...5, 0...10 VDC
Accuracy..... ± 0.30% to ±0.15% full stroke *see ordering information*
Repeatability..... ± 0.05% full stroke
Resolution ..... essentially infinite
Enclosure Material..... powder-painted aluminum or stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Potentiometer Cycle Life ..... *see ordering information*
Shaft Loading ..... up to 35 lbs. radial and 5 lbs. axial
Weight, Aluminum (Stainless Steel) Enclosure ..... 5 lbs. (10 lbs.) max.

ELECTRICAL

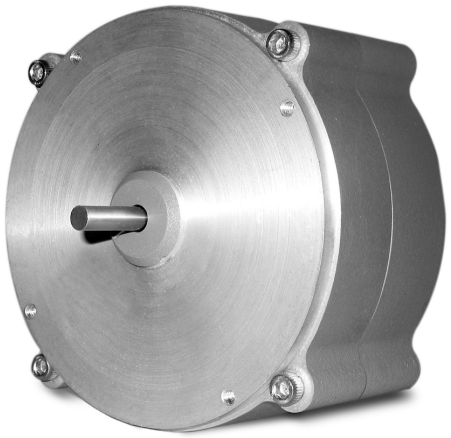
Input ..... 14.5-40 VDC (10.5-40 VDC for 0...5 volt output)
Input Current..... 10 mA maximum
Output Impedence..... 1000 ohms
Maximum Load ..... 5000 ohms
Zero Adjustment ..... from factory set zero to 50% of full stroke range
Span Adjustment..... to 50% of factory set span

ENVIRONMENTAL

Enclosure ..... NEMA 4/4X/6, IP 67/68
Operating Temperature ..... -40° to 200°F (-40° to 90°C)
Vibration..... up to 10 G's to 2000 Hz maximum

EMC COMPLIENCE PER DIRECTIVE 89/336/EEC

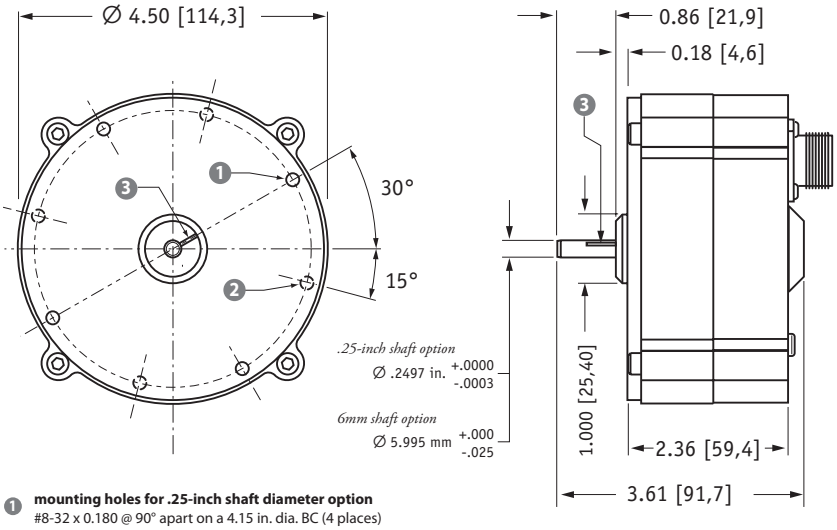
Emission/Immunity..... EN50081-2 / EN50082-2



The RT9510 is an incredibly simple device which provides a regulated 0...10 VDC rotational-position feedback signal with a 14.5...40 VDC unregulated input voltage.

This innovative sensor from Celesco, designed to meet tough NEMA-4 and IP67 environmental standards, is available in full-stroke measurement ranges of 1/4 to 50 turns. Because the sensor is potentiometric, the RT9510 is absolute and will maintain position information even after a loss of power.

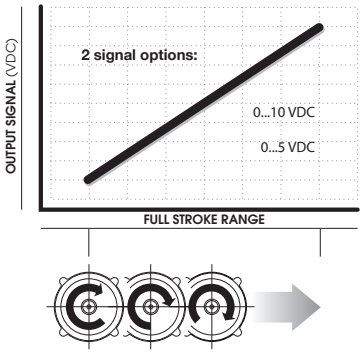
Outline Drawing



1. **mounting holes for .25-inch shaft diameter option**
   #8-32 x 0.180 @ 90° apart on a 4.15 in. dia. BC (4 places)
2. **mounting holes for 6-mm shaft diameter option**
   M4 x 4,5 mm @ 90° apart on a 105,4 mm dia. BC (4 places)
3. **reference mark**
   full counter-clockwise position - align mark on shaft to mark on face for start of measurement range

ALL DIMENSIONS ARE IN INCHES [MM]

Output Signal



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tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

Ordering Information:

Model Number:

RT9510-____ **-** __ __ **1** **-** **1** __ __ **0**
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:
RT9510 - 0005 - 111 - 1110

Ⓡ	range:	5 turns (clockwise shaft rotations)
Ⓐ	enclosure:	aluminum
Ⓑ	shaft diameter:	.25 inches
Ⓒ	output signal:	0...10 VDC signal increasing clockwise
Ⓕ	electrical connection:	6-pin plastic connector

Full Stroke Range:

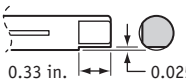
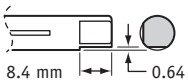
Ⓡ order code:	R125	0R25	0R50	0001	0002	0003	0005	0010	0020	0030	0050
clockwise shaft rotations, min:	0.125	0.25	0.50	1	2	3	5	10	20	30	50
accuracy (% of f.s.):	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.15%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	2.5×10^6	5×10^5	2.5×10^5	2.5×10^5	2.5×10^5	2.5×10^5

**–number of times the sensor shaft can be cycled back and forth from beginning to end and back to the beginning before any measurable signal degradation may occur.*

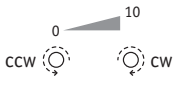
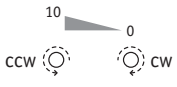
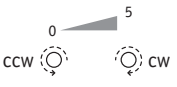
Enclosure Material:

Ⓐ order code:	1	2
	powder-painted aluminum	303 stainless steel

Shaft Diameter:

Ⓑ order code:	1	2	3	4
	0.25-in. diameter	6 mm diameter	0.25-in. dia. w/flats	6 mm dia. w/flats
	 .2497 in. (+.0000 –.0003)	 5.995 mm (+.000 –.025)	 0.33 in. 0.025 in.	 8.4 mm 0.64 mm

Output Signals:

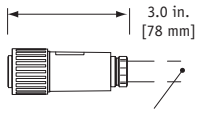
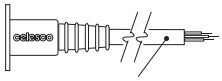
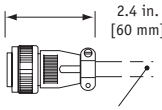
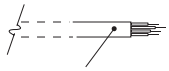
Ⓔ order code:	1	2	3	4
output signal options:	0...10 VDC	10...0 VDC	0...5 VDC	5...0 VDC
				
input voltage:	14.5...40 VDC		10.5...40 VDC	

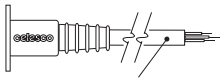
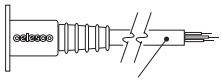
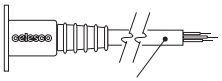
Example:

ordercode = **1** = 0...10 VDC { max ccw  = 0 VDC max cw  = 10 VDC

Ordering Information:

Electrical Connection:

order code:	1	2	3	4
	6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
	IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
				
	1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	3/8-in. [9 mm] max cable dia. 16 AWG max conductor size connector: MS3102E-14S-6P mating plug: MS3106E-14S-6S	25 ft. x 0.2-in. dia. [7,5 M x 5 mm dia.] 24 AWG, shielded

order code:	5	6	7
	100-ft. [30 M] waterproof cable	10-ft. [3 M] **pressure tested*** waterproof cable	100-ft. [30 M] **pressure tested*** waterproof cable
	IP 67, NEMA 4X,6**	**IP 68, NEMA 4X**, 6P**	**IP 68, NEMA 4X**, 6P**
			
	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW	10 ft. x 0.4-in. dia. [3 M x 10 mm dia.] 18 AWG, type SJTW	100 ft. x 0.4-in. dia. [30 M x 10 mm dia.] 18 AWG, type SJTW

6-pin Mating Plug

pin	signal
A	input voltage
B	output signal
C	common

contact view

Waterproof Cable

color code	signal
WHITE	input voltage
GREEN	output signal
BLACK	common

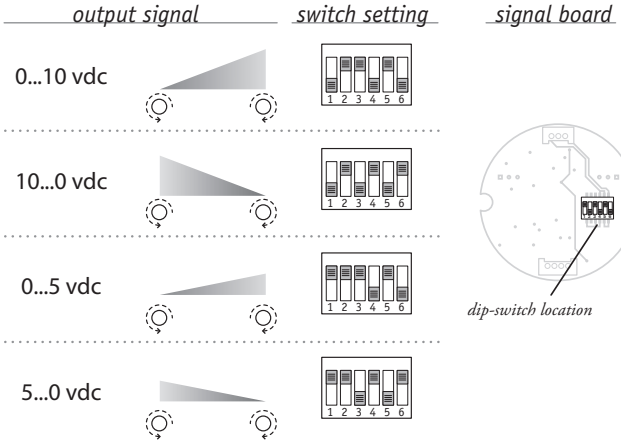
Instrumentation Cable

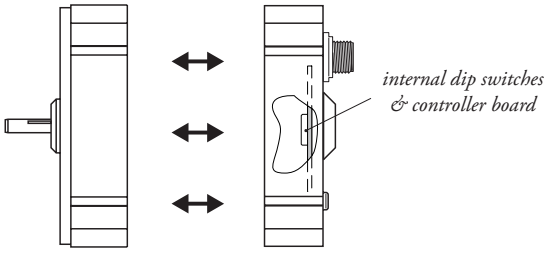
color code	signal
RED	input voltage
GREEN	output signal
BLACK	common

**–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours. **–Applies to stainless steel enclosure only.*

Output Signal Selection:

The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the stroke.





To gain access to the signal board, remove four Allen-Head Screws and seperate the two case halves.

version: **3.0** last updated: **July 14, 2008**

Ranges: Up to 50 inches
Incremental Encoder Output
Low Cost • Long Life • Fast Delivery

SE1

Handy Mounting Bracket
Mounts easily and quickly in several directions

Designed for Cable Misalignment
Long cable life, even when installation isn't perfect

Polycarbonate Enclosure
Withstands impacts and chemicals

"Free-Release" Tolerant
Greatly reduces damage due to mis-handling of cable

The Celesco SE1 is the digital encoder version of our compact String Pot series. The SE1 is an economical and durable device that utilizes a flexible cable, a spring-loaded spool and an incremental optical encoder to detect and measure linear position.

The SE1 is designed for tight spaces, high-cycle applications and generously allows cable misalignment. With a handy mounting bracket included, and 2 basic measurement ranges, the SE1 is a perfect solution for many applications, from light industrial to OEM.

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-25, 0-50 inches
Output Signal ..... incremental encoder (quadrature)
Accuracy ..... ±0.050 inches
Repeatability ..... ± 0.025 inches
Resolution ..... 56.40 ±.32 pulses per inch
Measuring Cable ..... 0.019-in. dia. nylon-coated stainless steel
Measuring Cable Tension ..... 7 oz. (±25%)
Enclosure Material ..... polycarbonate
Sensor ..... optical encoder
Weight ..... 5 oz. (w/o mounting bracket) max.

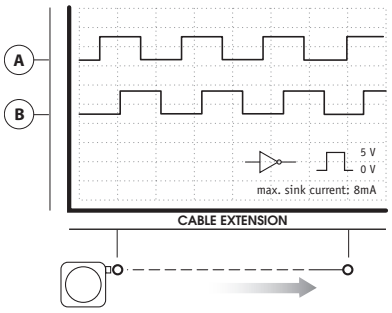
ELECTRICAL

Input Voltage ..... 5 VDC
Input Current ..... 50 mA max.
Output Driver ..... TTL compatible
Sink Current ..... 8 mA max.
Electrical Connection ..... mating plug with 12-inch leads–*included*
Electrical Connector ..... Molex 53048-0410
Mating Plug ..... Molex 51021-0400 (shell), 50079-8100 (pins)

ENVIRONMENTAL

Enclosure ..... IP 50
Operating Temperature ..... 14° to 185°F (-10° to 85°C)
Vibration ..... up to 10 G's to 2000 Hz maximum

Output Signal



Ordering Information:

Item Number:	SE1-25	SE1-50
full stroke range:	25 in.	50 in.
accuracy:	± .050 inches	± .050 inches
cable tension (±25%):	7 oz.	7 oz.
max. cable acceleration:	15 G	15 G

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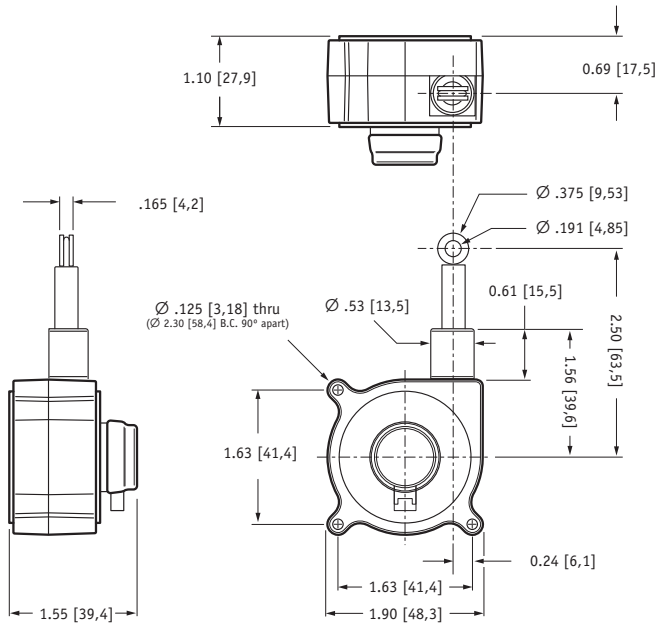
celesco.com • info@celesco.com

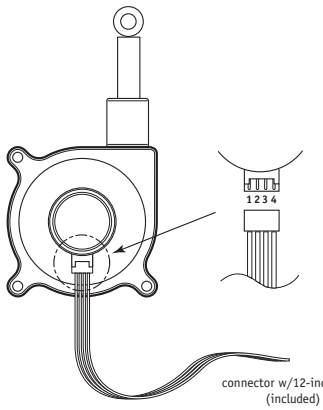
Installation Information:

Outline Drawing (w/o bracket):



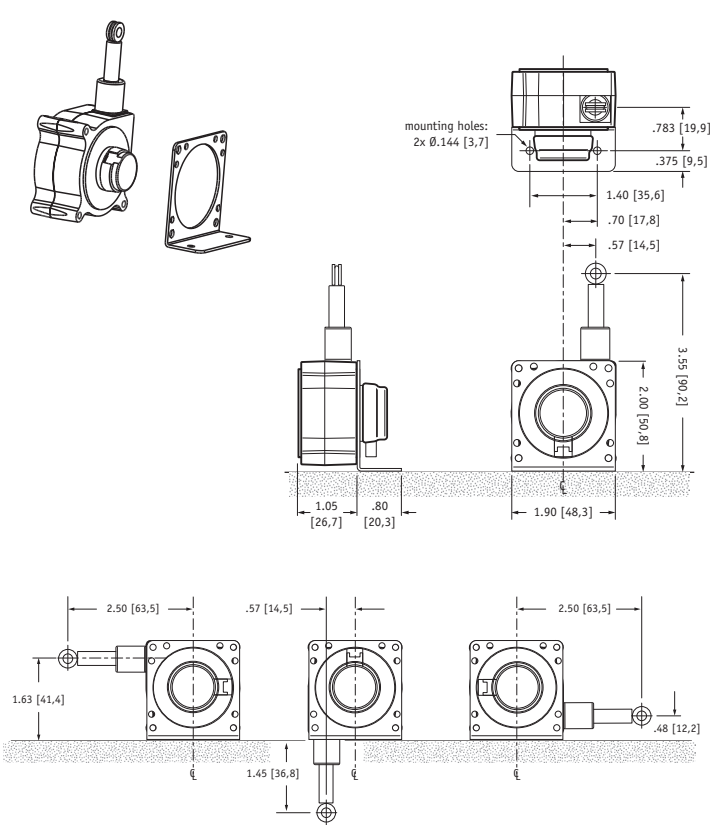
all dimensions are in inches [millimeters]

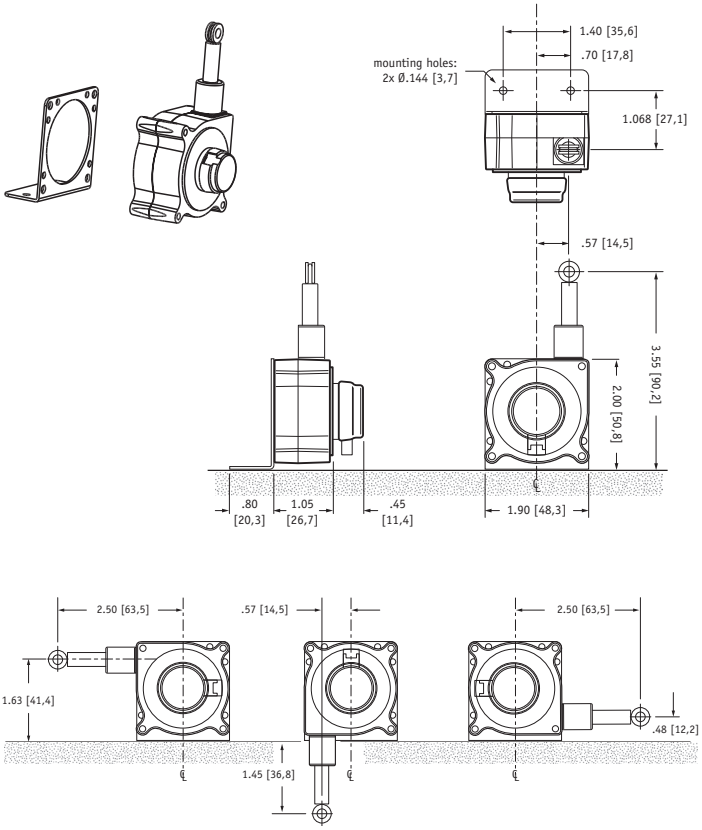
Electrical Connection:



Pin	Description
1	5 VDC power
2	A channel
3	Common
4	B channel

Mounting Options:





version: **4.1** last updated: **May 19, 2009**

SP1

Ranges: Up to 50 inches
Precision Potentiometric Output
Low Cost • Fast Delivery

Handy Mounting Bracket
Mounts easily and quickly in several directions

Designed for Cable Misalignment
Long cable life, even when installation isn't perfect

Polycarbonate Enclosure
Withstands impacts and chemicals

CE

"Free-Release" Tolerant
Greatly reduces damage due to mis-handling of cable

The Celesco SP1 String Pot is a compact, economical and durable device that utilizes a flexible cable, a spring-loaded spool, and a potentiometer to detect and measure linear position.

The SP1 is designed for tight spaces, high-cycle applications and generously allows cable misalignment. With 4 different measurement ranges and handy mounting brackets, the SP1 is a perfect solution for many applications, from light industrial to OEM.

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-4.75, 0-12.5, 0-25, 0-50 inches
Output Signal ..... voltage divider (potentiometer)
Accuracy ..... ±0.25 to ±1.00% *see ordering information*
Repeatability ..... ± 0.05% full stroke
Resolution ..... essentially infinite
Measuring Cable ..... 0.019-in. dia. nylon-coated stainless steel
Enclosure Material ..... polycarbonate
Sensor ..... plastic-hybrid precision potentiometer
Weight ..... 3 oz. (w/o mounting bracket) max.

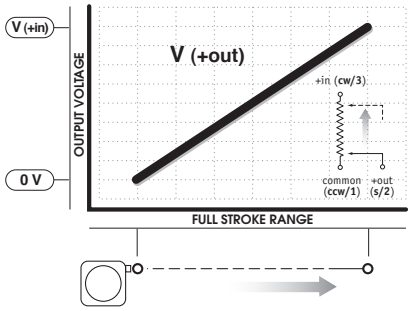
ELECTRICAL

Input Resistance ..... 10K ohms, ±10%
Power Rating, Watts ..... 2.0 at 70°F derated to 0 at 250°
Recommended Maximum Input Voltage ..... 30 V (AC/DC)
Output Signal Change Over Full Stroke Range ..... 94% ±4% of input voltage

ENVIRONMENTAL

Enclosure ..... IP 50
Operating Temperature ..... 0° to 160°F (-18° to 71°C)
Vibration ..... up to 10 G's to 2000 Hz maximum

Output Signal



Ordering Information:

Item Number:	SP1-4	SP1-12	SP1-25	SP1-50
full stroke range:	**4.75 in.**	**12.5 in.**	**25 in.**	**50 in.**
accuracy (% of f.s.):	1.00%	0.25%	0.25%	0.25%
potentiometer cycle life:	2.5M cycles	500K cycles	500K cycles	250K cycles
cable tension (±25%):	7 oz.	7 oz.	7 oz.	7 oz.
max. cable acceleration:	15 G	15 G	15 G	15 G

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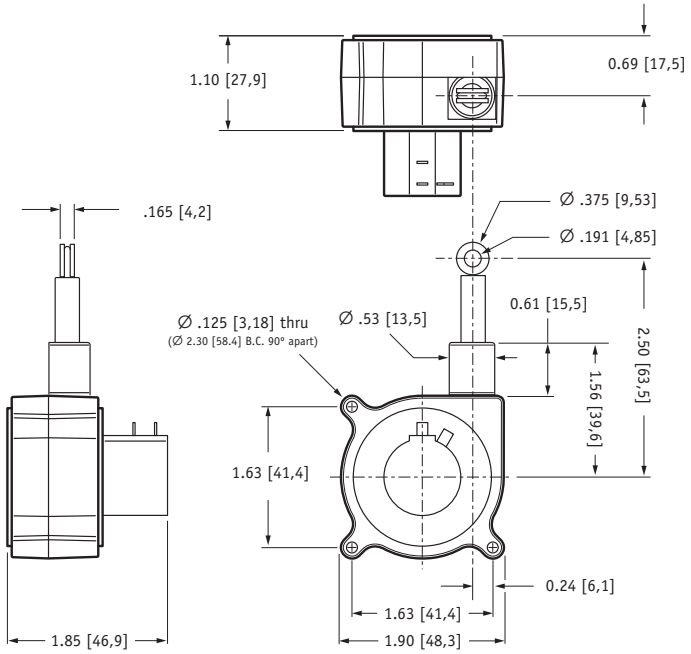
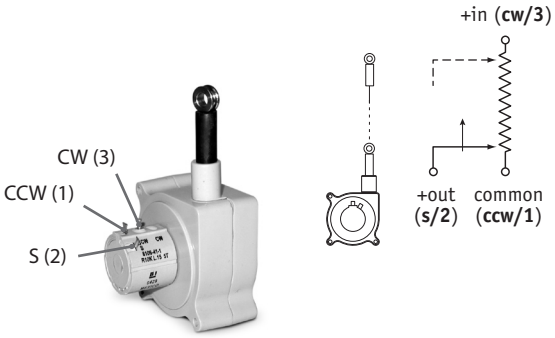
Installation Information:

Outline Drawing (w/o bracket):

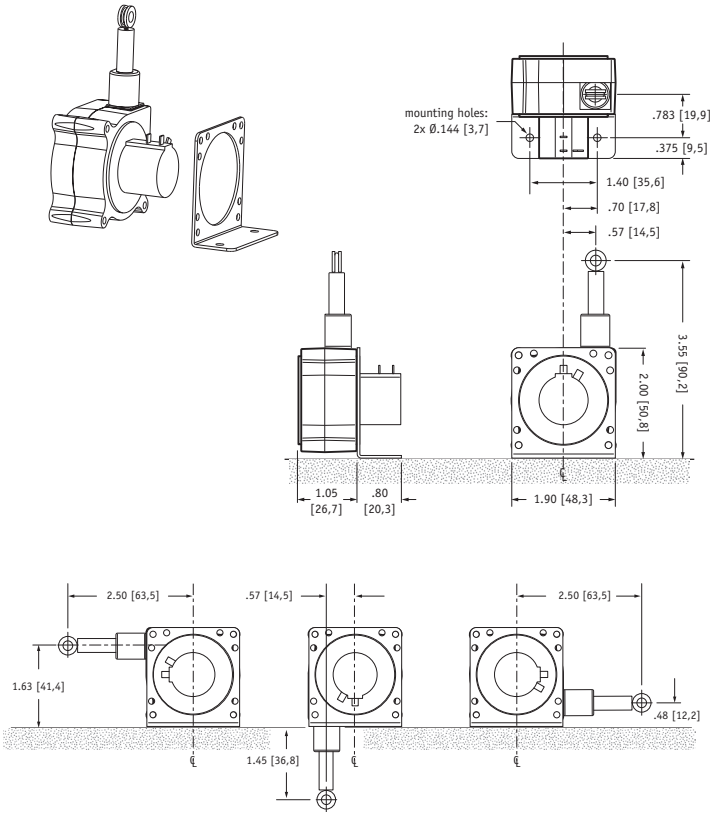


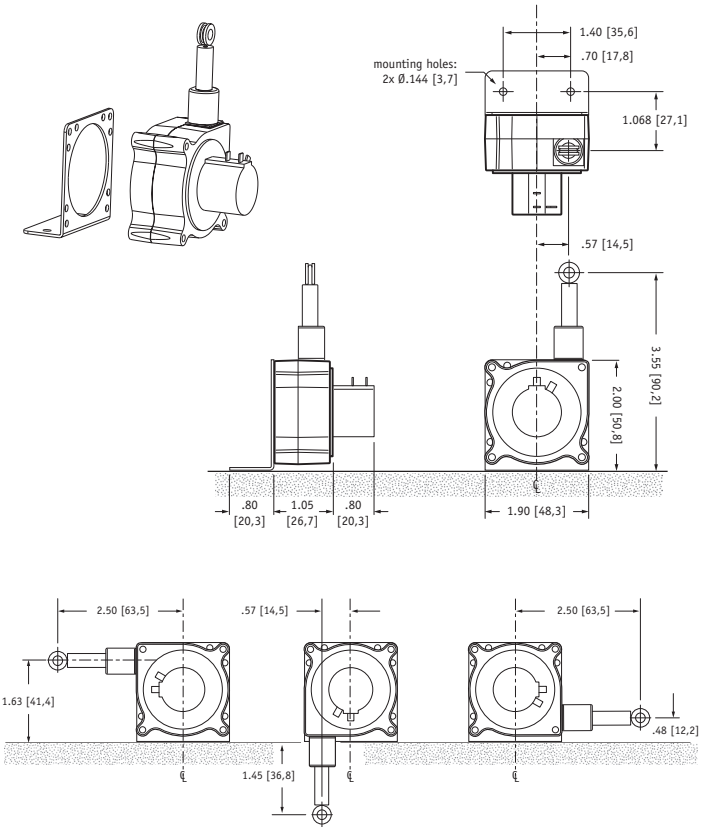
all dimensions are in inches [millimeters]

Electrical Connection:



Mounting Options:





version: **7.1** last updated: **May 19, 2009**

Ranges: Up to 50 inches
Precision Potentiometric Output
Water Resistant • Low Cost • Fast Delivery

SP2

40-inch Electrical Cable
Sealed strain relief

Water and Chemical Resistant Design
Polycarbonate enclosure with sealed electrical connections

Handy Mounting Bracket
Mounts easily and quickly in several directions

CE

Tolerant of Cable Misalignment
Long cable life, even when installation isn't perfect

Specification Summary:

GENERAL

Full Stroke Range Options ..... 0-4.75, 0-12.5, 0-25, 0-50 inches
Output Signal ..... voltage divider (potentiometer)
Accuracy ..... ±0.25 to ±1.00% *see ordering information*
Repeatability ..... ± 0.05% full stroke
Resolution ..... essentially infinite
Measuring Cable ..... 0.019-in. dia. nylon-coated stainless steel
Enclosure Material ..... polycarbonate
Mounting Bracket Material ..... stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Weight ..... 3 oz. (w/o mounting bracket) max.

ELECTRICAL

Input Resistance ..... 10K ohms, ±10%
Power Rating, Watts ..... 2.0 at 70°F derated to 0 at 250°
Recommended Maximum Input Voltage ..... 30 V (AC/DC)
Output Signal Change Over Full Stroke Range ..... 94% ±4% of input voltage

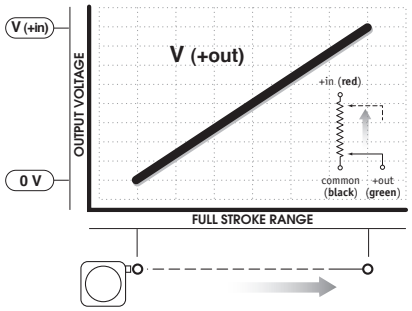
ENVIRONMENTAL

Operating Temperature ..... 0° to 160°F (-18° to 71°C)
Vibration ..... up to 10 G's to 2000 Hz maximum

The SP2 String Pot from Celesco is a compact, economical and water resistant device that utilizes a flexible cable, a spring-loaded spool and a potentiometer to detect and measure linear position.

The SP2 is identical to the SP1 except for an added 40-inch electrical cable with a watertight rubber strain relief. The SP2 has been compactly designed for tight spaces and high cycle applications and generously allows for measuring cable misalignment. With 4 different ranges and a handy mounting bracket, the SP2 is a perfect solution for many applications from light industrial to OEM.

Output Signal



Ordering Information:

Item Number:	SP2-4	SP2-12	SP2-25	SP2-50
full stroke range:	4.75 in.	12.5 in.	25 in.	50 in.
accuracy (% of f.s.):	1.00%	0.25%	0.25%	0.25%
potentiometer cycle life:	2.5M cycles	500K cycles	500K cycles	250K cycles
cable tension (±25%):	7 oz.	7 oz.	7 oz.	7 oz.
max. cable acceleration:	15 G	15 G	15 G	15 G

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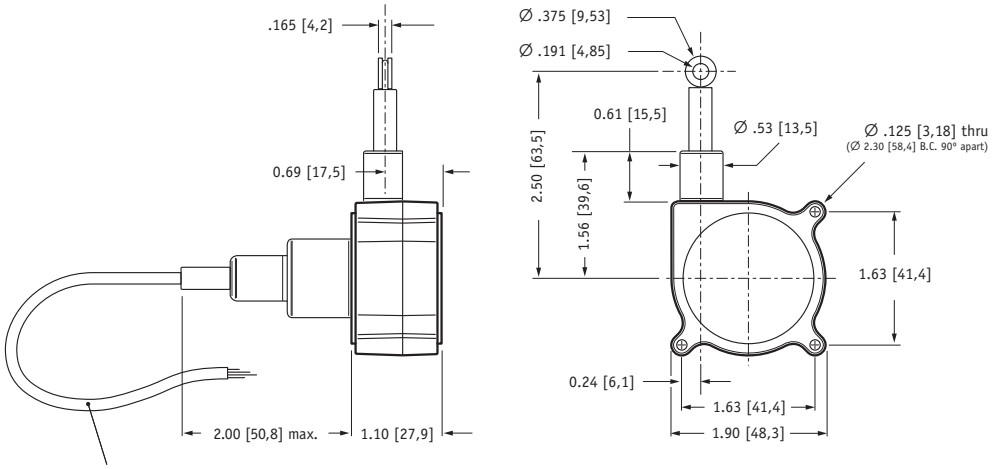
celesco.com • info@celesco.com

Installation Information:

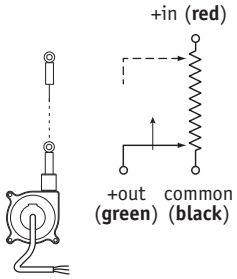
Outline Drawing (w/o bracket):



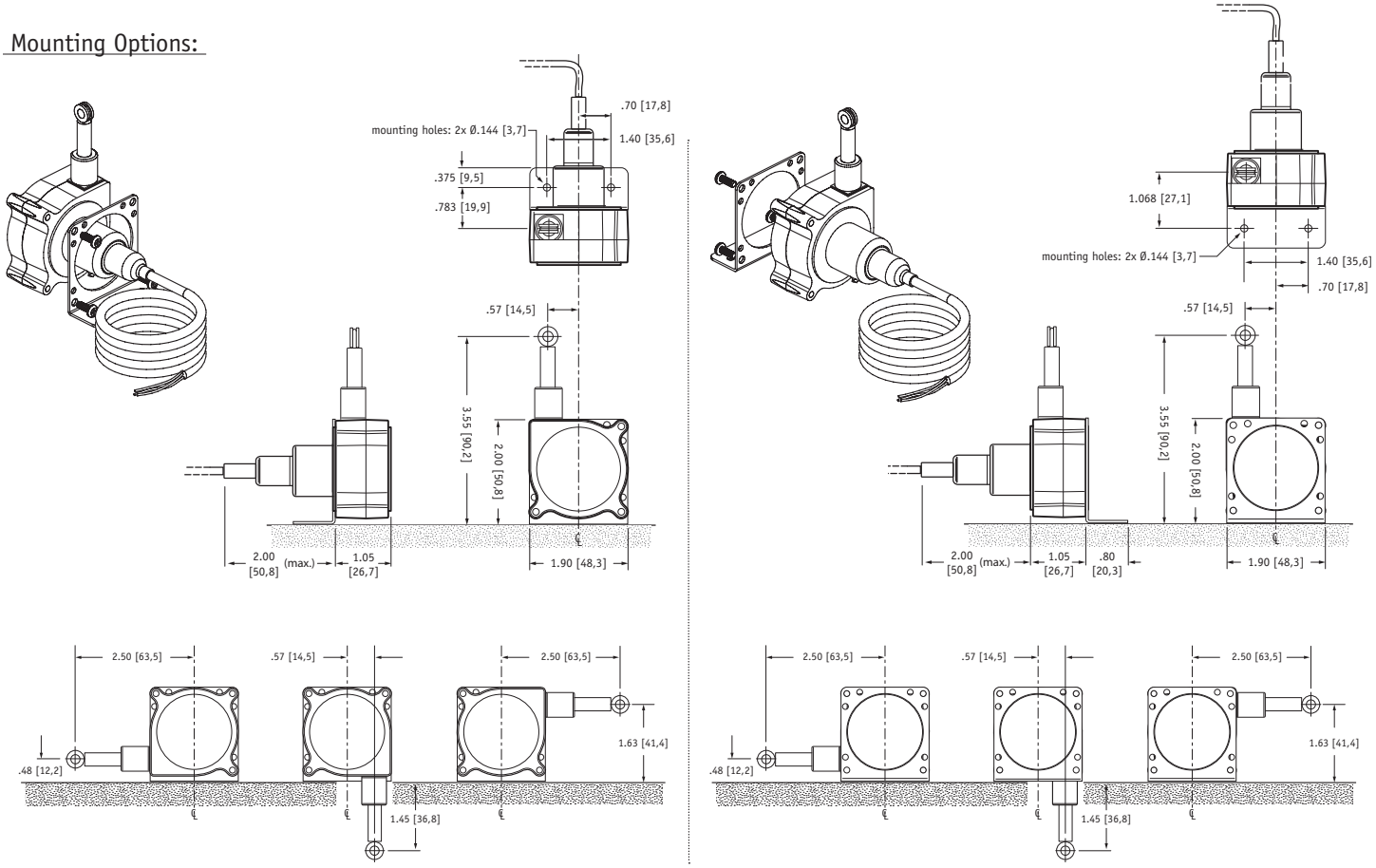
Electrical Cable, 24 GA, 3 conductor, shielded 40 in. [1 meter] long

all dimensions are in inches [millimeters]

Electrical Connection:



Mounting Options:

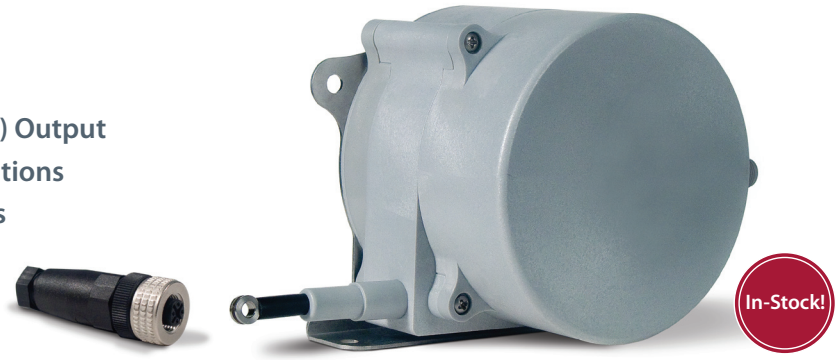


version: **5.2** last updated: **May 19, 2009**

SR1A

Industrial Low Cost String Pot

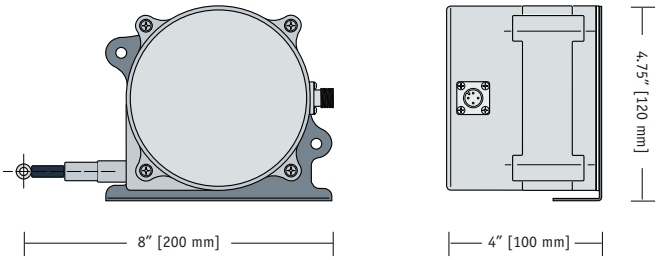
Precision Potentiometric (Voltage Divider) Output
0–62, 0–125 inch Measurement Range Options
Designed for Outdoor / Wet environments



SR1A is a rugged, low-cost, high performance string pot built for wet environments and outdoor applications. Originally designed for off-road construction equipment, the SR1A is the perfect low-cost solution for OEM and stocking distributors.

Available in 62-inch and 125-inch stroke ranges, the SR1A is constructed of a rugged polycarbonate enclosure designed to withstand impact from harsh environments and rugged conditions. Each sensor ships with a handy mounting bracket to make just about any installation very simple. Every SR1A ships with a field installable mating connector and optional cordsets are available.

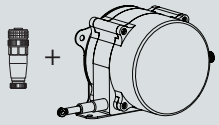
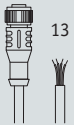
Measurement Range, **SR1A-62**	0–62 in. (0–1575 mm)
Measurement Range, **SR1A-125**	0–125 in. (0–3175 mm)
Accuracy	± 0.5% FS.
Environmental Suitability	NEMA 6, IP67
Operating Temperature	-40˚ to 185˚ F (-40˚ to 85˚ C)



COMPLETE SPECIFICATIONS

Sensor	plastic-hybrid precision potentiometer
Input Resistance	10K ohms
Maximum Input Voltage	30 volts AC/DC
Resolution	essentially infinite
Repeatability	± 0.1% FS.
Measuring Cable	.034-inch dia. nylon-coated stainless
Maximum Velocity	80 inches (2 meters) per second
Maximum Acceleration	10 G (retraction)
Measuring Cable Tension	23 oz. (6,4 N) ±30%
Cycle Life	250,000 (potentiometer)
Enclosure	polycarbonate
Electrical Connection	M12 Connector (mating plug included)
Weight	2.5 lbs. (1.3 Kg)

Ordering Information

	part number	description
	**SR1A-125**	SR1A String Pot 125-inch Measurement Range includes 4-pin M12 connector
	SR1A-62	SR1A String Pot 62-inch Measurement Range includes 4-pin M12 connector
	**9036810-0040**	Optional Cordset w/ 4-pin M12 connector

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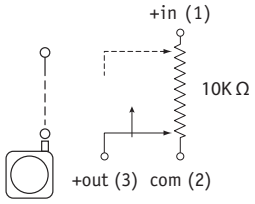
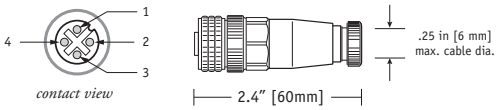
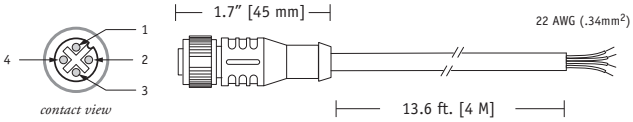
Electrical Connection

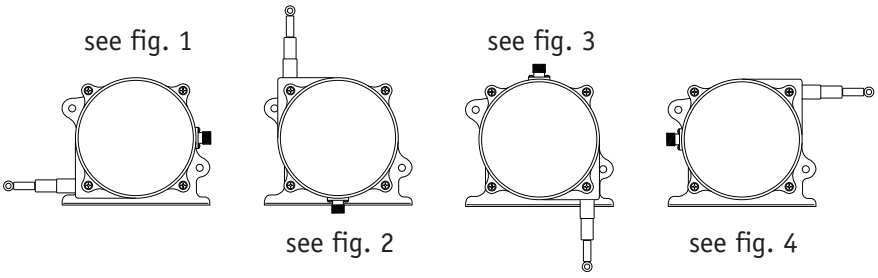
output signal	connector pin	colorcode (cordset)
+in	1	brown
common	2	white
+out	3	blue
n/c	4	black







Cable Exit Direction Options



Changing the Cable Exit

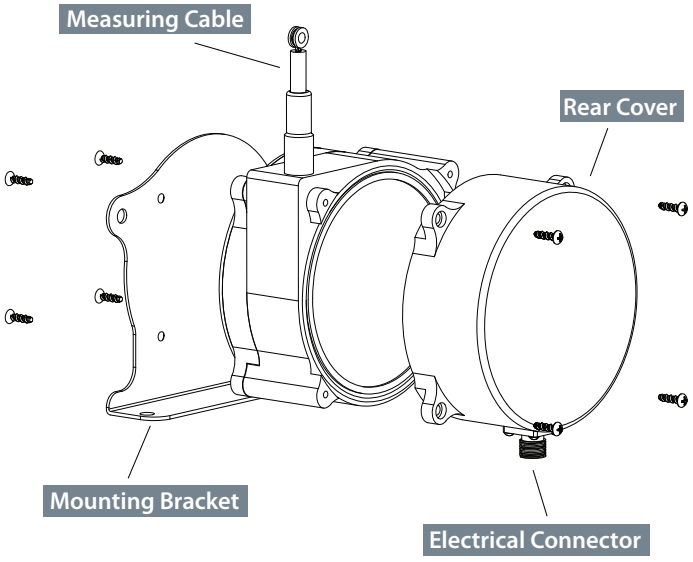
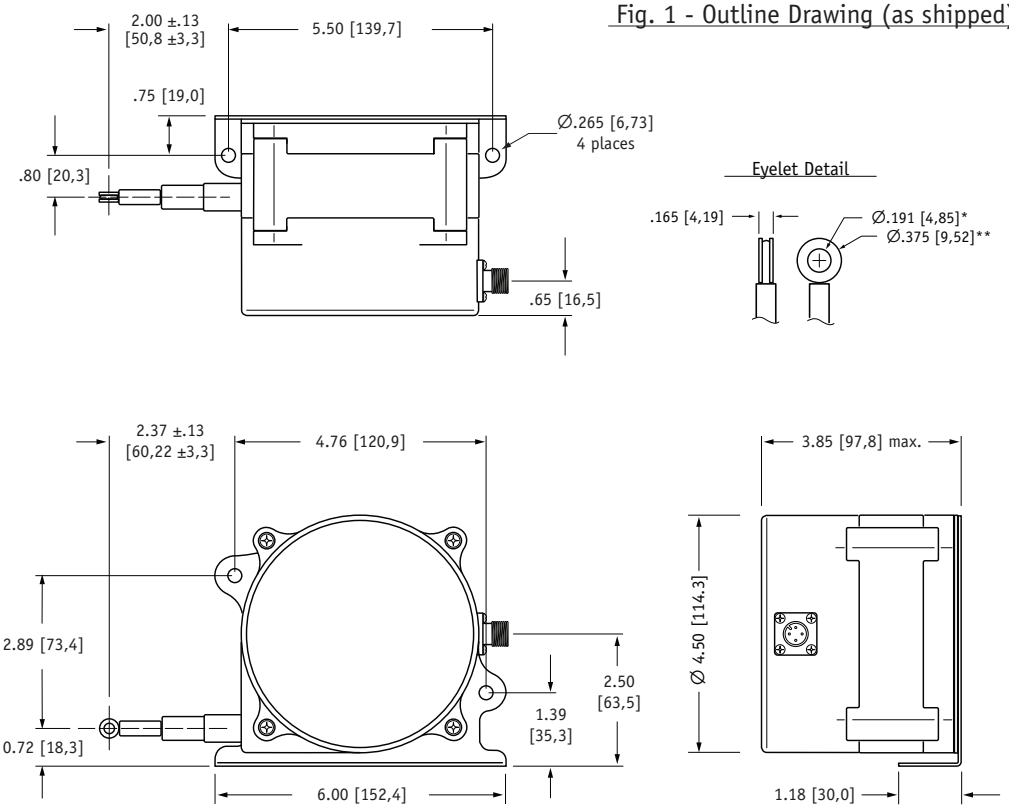


Fig. 1 - Outline Drawing (as shipped)



units are in **inches [mm]** tolerances are ± .04 [1,0] unless otherwise noted

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

Fig. 2 - "Up" Cable Exit Direction

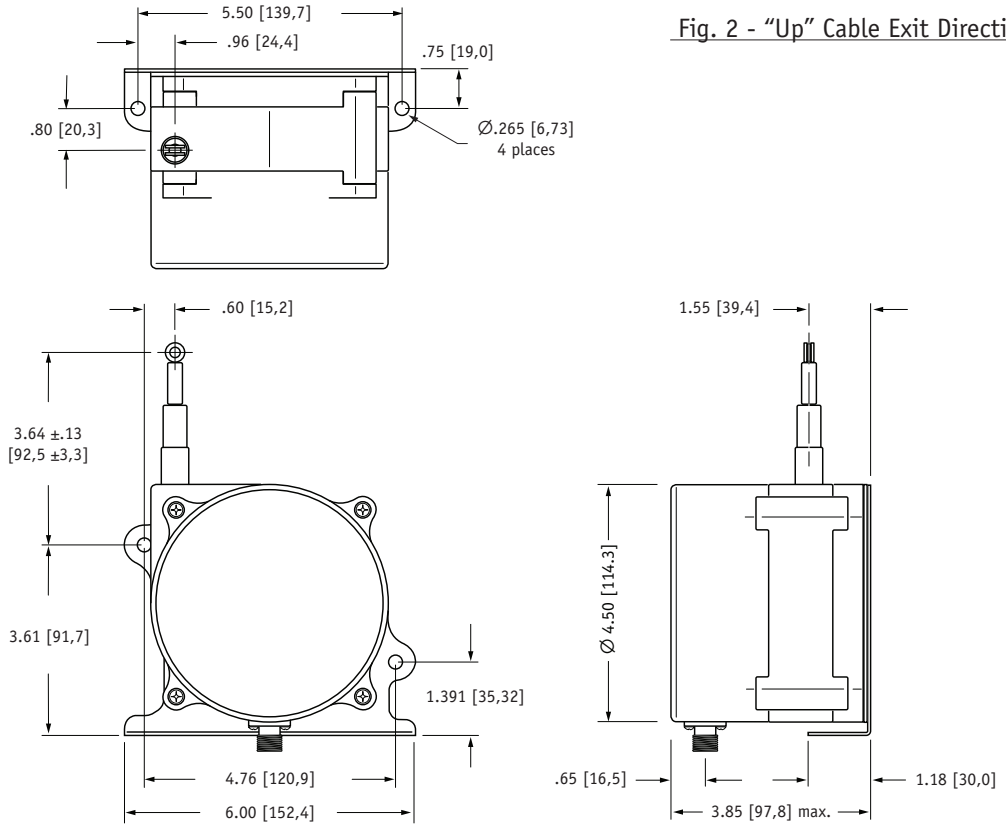


Fig. 3 - "Down" Cable Exit Direction

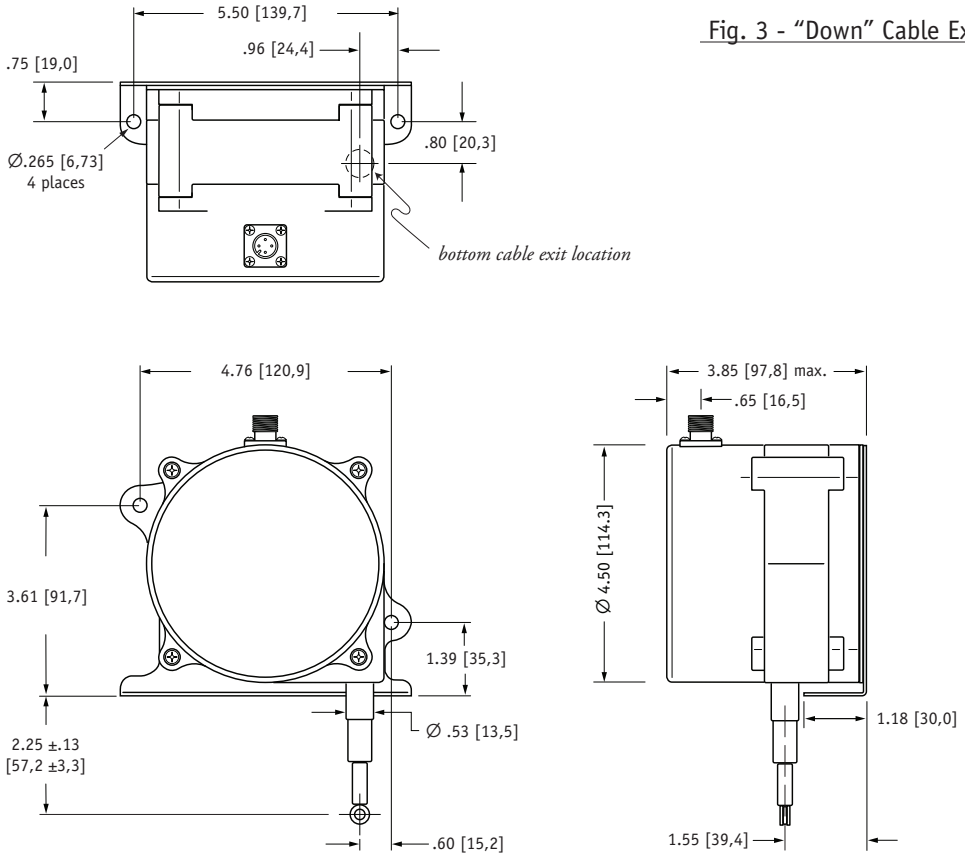
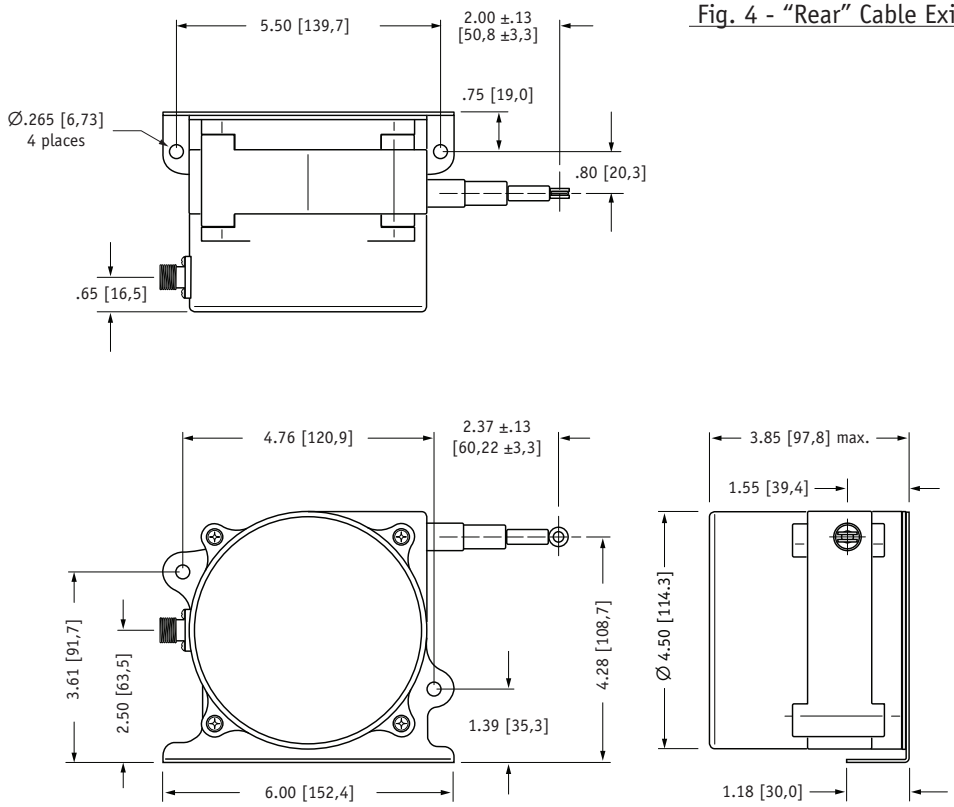


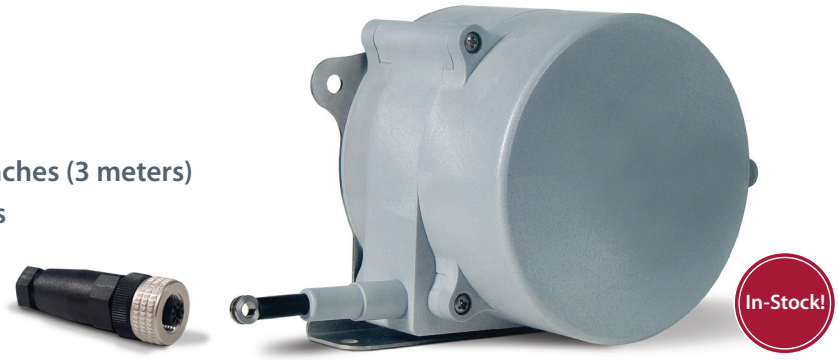
Fig. 4 - "Rear" Cable Exit Direction



SR1E

Industrial Low Cost String Pot

Incremental Encoder Output Signal
Linear Position Measurement up to 125 inches (3 meters)
Designed for Outdoor / Wet environments



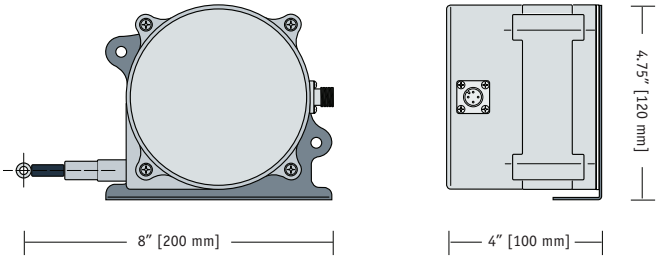
The SR1E is rugged, low-cost, high performance string pot built to withstand wet environments and outdoor applications. Designed for construction equipment and factory use, the SR1E is the perfect low-cost solution for OEM and stocking distributors.

At the heart of this sensor is a robust incremental encoder that delivers a linear resolution of 101 pulses per inch. The SR1E ships with an industry standard push-pull encoder driver that can be powered by 5-30 VDC. (Other resolutions and complimentary channels are available, please consult factory). Each sensor ships with a 4-pin, field installable, M12 connector and an additional 13 ft. (4 m) cordset is also available. Just like the rest of our SR1 series, the SR1E is in stock for quick delivery.

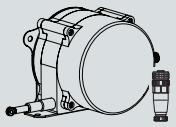
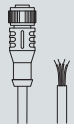
SPECIFICATIONS

Input Voltage	5-30 VDC
Input Current	100 mA max., no load
Sensor	incremental encoder
Output Driver Type	push-pull (note: Vin = Vout)
Output Driver Current	20 mA max., source/sink
Maximum Velocity	80 inches (2 meters) per second
Maximum Acceleration	10 G (retraction)
Operating Temperature	-4˚ to 185˚ F (-20˚ to 85˚ C)
Enclosure	polycarbonate
Measuring Cable	.034-inch dia. nylon-coated stainless
Electrical Connection	M12 Connector (mating plug included)
Weight	2.5 lbs. (1.3 Kg)

Full Stroke Range	125 inches (3175 mm)
Output Signal	incremental encoder
Resolution	101 ±2 pulses per inch
Accuracy	± .1% FS.
Repeatability	± .05% FS.
Environmental Suitability	NEMA 6, IP67



Ordering Information

	part number	description
	SR1E-125	125-inch measurement range 101 pulses per inch includes 4 pin M12 connector
13 ft (4 m) 	9036810-0040	Optional Cordset w/ 4-pin M12 connector

Consult factory for alternate resolution and differential output signals.

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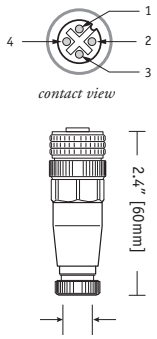
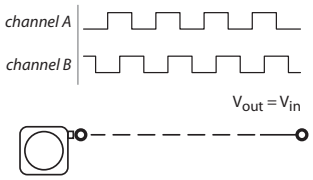
Electrical Connection

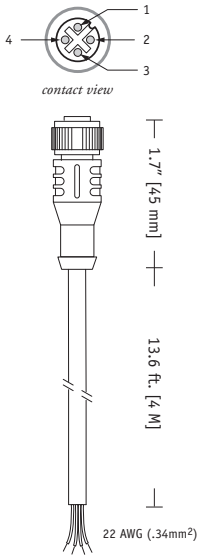
Field Installable Connector



pin	signal
1	5...30 VDC
2	common
3	channel A
4	channel B



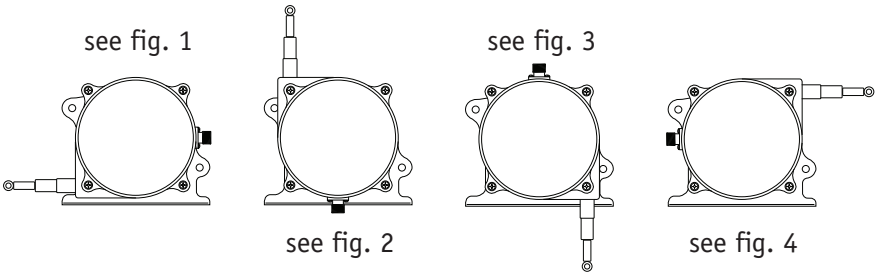
Cord Set Connections



pin	conductor	signal
1	brown	5...30 VDC
2	white	common
3	blue	channel A
4	black	channel B

cable specifications	
length:	13 ft. (4m)
wire size:	22 AWG (.34mm^2)
cable material:	PVC
cable color:	gray

Cable Exit Direction Options



Changing the Measuring Cable Exit and Electrical Connector Direction

Changing Measuring Cable Exit

To change the direction of the measuring cable, remove the 4 mounting bracket screws and rotate bracket to one of four available positions. See figures 1 - 4 on the following pages for mounting dimensions.

Changing Electrical Connector Direction

To change the position of the electrical connector, remove the 4 rear cover screws and carefully separate rear cover from the sensor body.

Rotate the rear cover to desired position being careful to not tangle the wiring harness that runs to the connector.

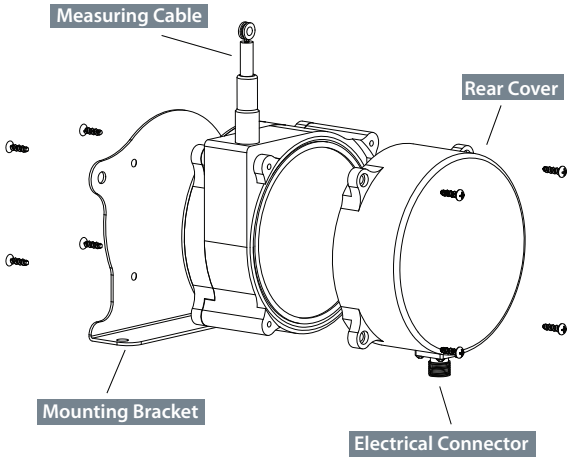
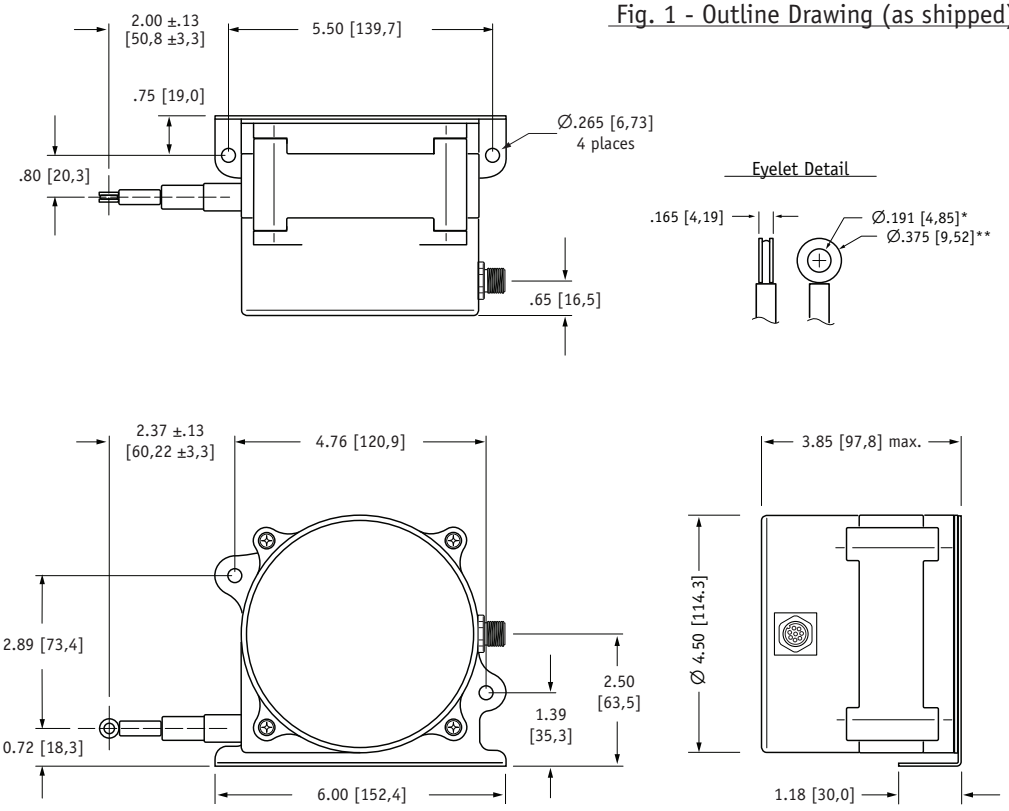


Fig. 1 - Outline Drawing (as shipped)



units are in **inches [mm]** tolerances are ± .04 [1,0] unless otherwise noted

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

Fig. 2 - "Up" Cable Exit Direction

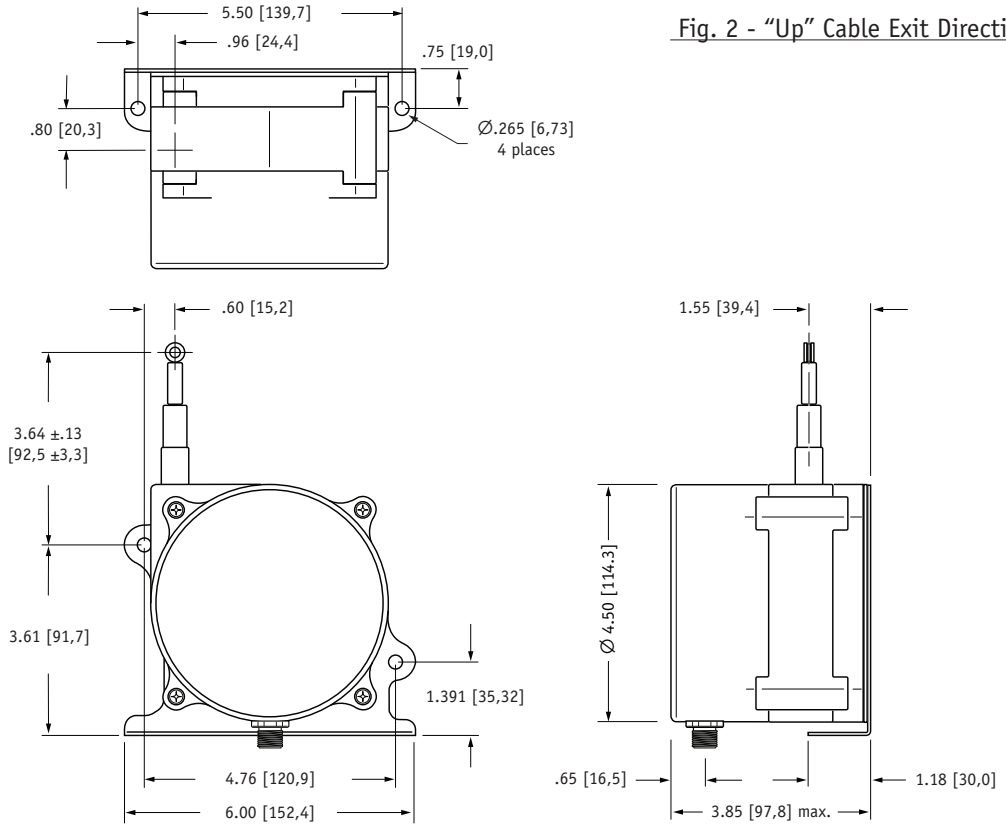


Fig. 3 - "Down" Cable Exit Direction

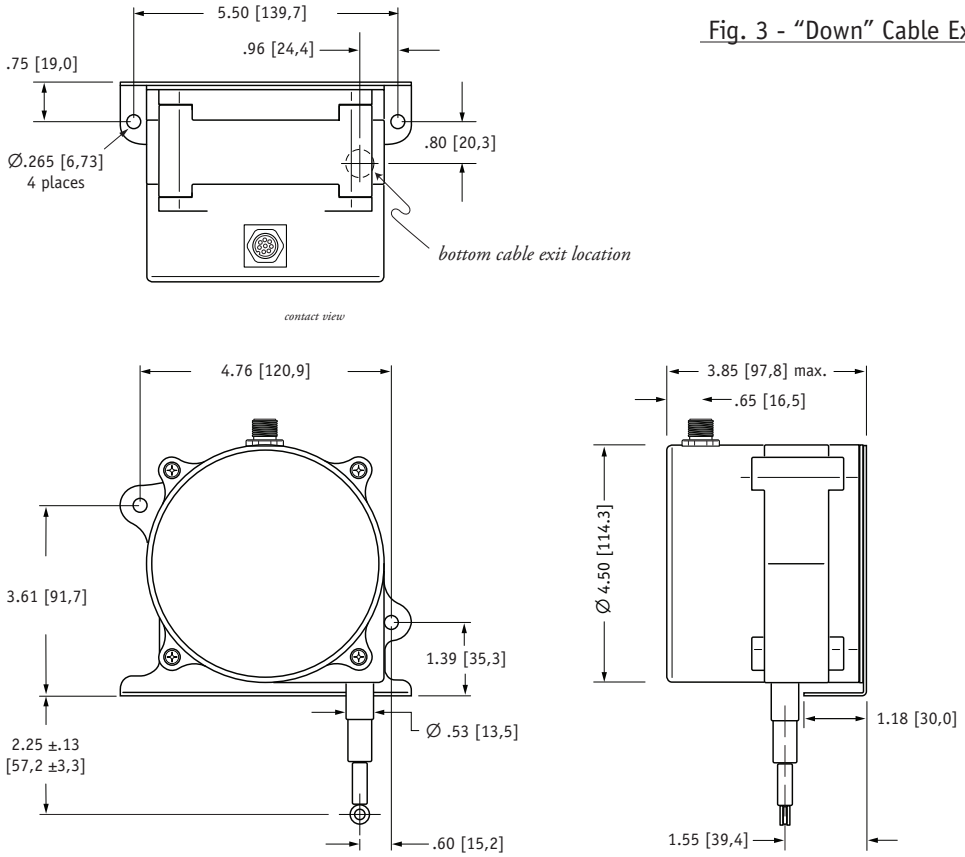
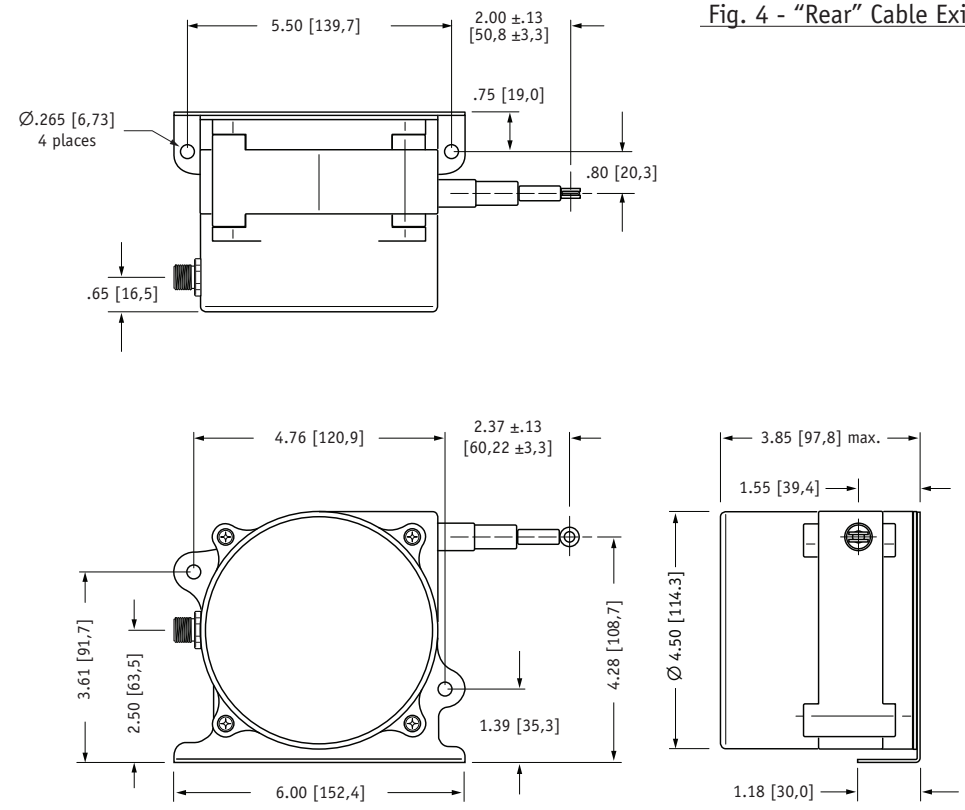


Fig. 4 - "Rear" Cable Exit Direction



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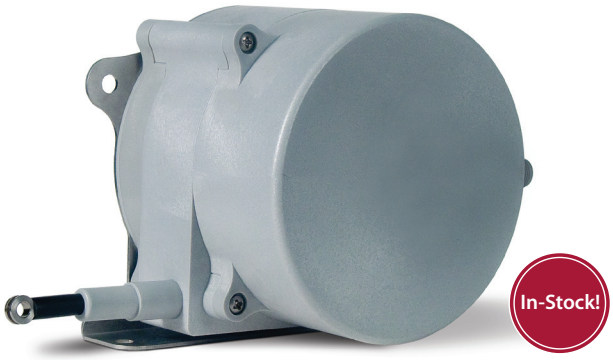
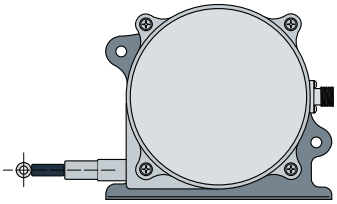
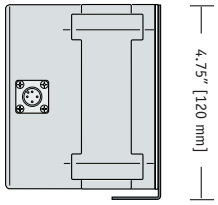
SR1M

Industrial Low Cost String Pot

User Scalable 4...20 mA Output Signal
Linear Position Measurement up to 125 inches (3 meters)
Designed for Outdoor / Wet environments







Maximum Full Stroke Range	125 inches (3175 mm)
Minimum Full Stroke Range	1 inch (25 mm)
Output Signal Settings	4...20 mA, 20...4 mA
Environmental Suitability	NEMA 6, IP67
Operating Temperature	-40˚ to 185˚ F (-40˚ to 85˚ C)

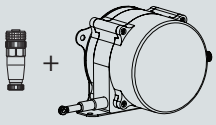
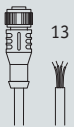
The SR1M is part of a series of rugged, low-cost, high performance string pots built for wet environments and outdoor applications. Designed for the rigors of outdoor construction equipment or the demands of a factory floor, the SR1M is the perfect low-cost solution for OEM and stocking distributors.

What sets this sensor apart from other string pots, is the internal programmable digital circuitry that gives the customer a one-size-fits-all approach for many applications. The SR1M ships factory calibrated to the full 125-inch (3-meter) measurement range but the output signal can be easily re-scaled to match any stroke down to 1 inch (25 mm).

SPECIFICATIONS

Input Voltage	10-30 VDC
Accuracy, full stroke range ≥ 10 inches (254 mm)	.5% FS.
Accuracy, full stroke range < 10 inches (254 mm)	consult factory
Repeatability	.1% FS.
Resolution	.0015% FS.
Output Signal Update Rate	1 msec
Maximum Velocity	80 inches (2 meters) per second
Maximum Acceleration	10 G (retraction)
Measuring Cable Tension	23 oz. (6,4 N) ±30%
Sensor	plastic-hybrid precision potentiometer
Cycle Life	250,000 (potentiometer)
Enclosure	polycarbonate
Measuring Cable	.034-inch dia. nylon-coated stainless
Electrical Connection	M12 Connector (mating plug included)
Weight	2.5 lbs. (1.3 Kg)

Ordering Information

	part number	description
	SR1M-125	SR1M String Pot Factory Calibrated to 125" includes 4-pin M12 connector
 13 ft (4 m)	9036810-0040	Optional Cordset w/ 4-pin M12 connector

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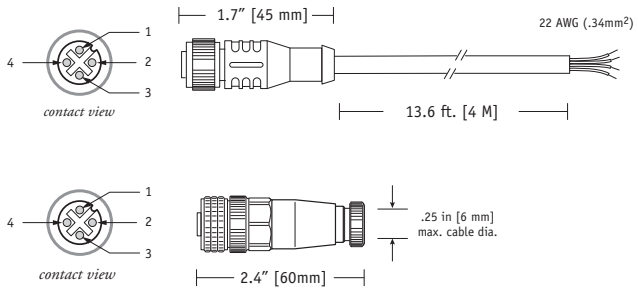
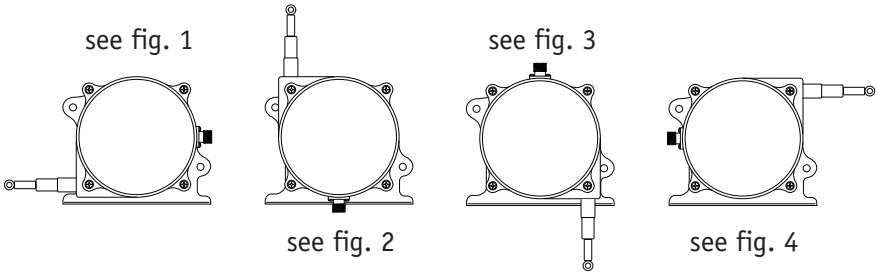
Electrical Connection

i/o signal	connector pin	colorcode (cordset)
10...30 vdc	1	brown
n/c	2	white
output signal	3	blue
n/c	4	black



Cable Exit Direction Options



Changing the Measuring Cable Exit and Electrical Connector Direction

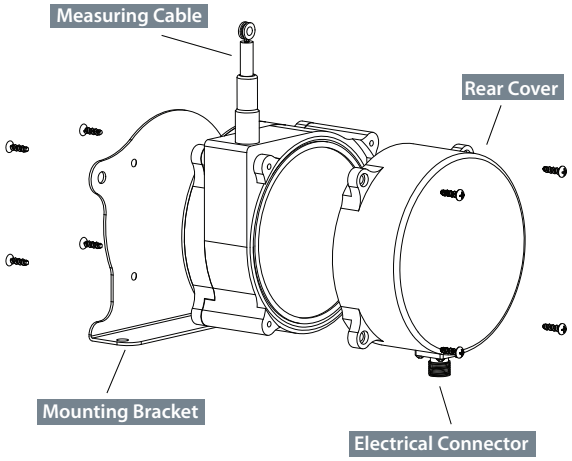
Changing Measuring Cable Exit

To change the direction of the measuring cable, remove the 4 mounting bracket screws and rotate bracket to one of four available positions. See figures 1 - 4 on the following pages for mounting dimensions.

Changing Electrical Connector Direction

To change the position of the electrical connector, remove the 4 rear cover screws and carefully separate rear cover from the sensor body.

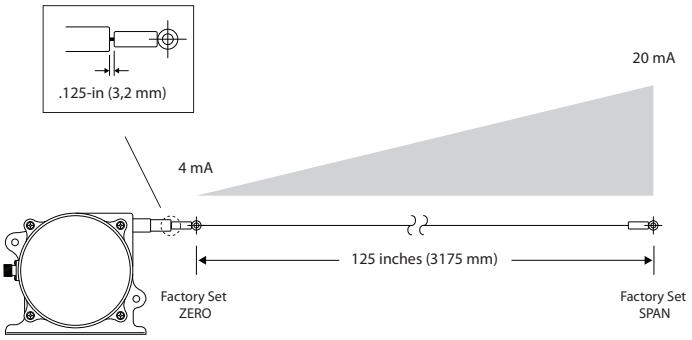
Rotate the rear cover to desired position being careful to not tangle the wiring harness that runs to the connector.



Factory Calibrated Stroke Range

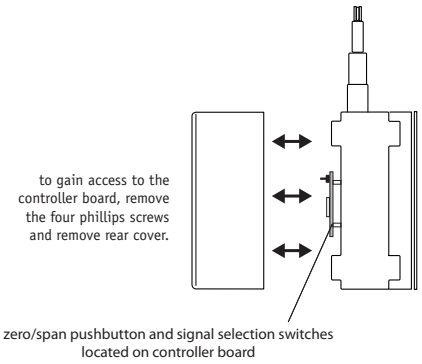
The full scale output signal is set at the factory to the maximum full stroke range of 125 inches. The ZERO point (output = 4mA) is set at the beginning* of the stroke range (0 inches) and the SPAN point (output = 20mA) is set to the end of the range (125 inches).

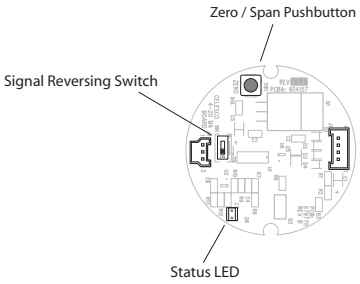
**Important* — The ZERO point is set at the factory with the measuring cable pulled out .125 inches from full retraction. If the measuring cable becomes fully retracted at any time when the sensor is under power, the output signal will begin to fluctuate. This is normal and fluctuation will stop as soon as the cable is extended greater than .125 inches.



This is for the factory setting only and the ZERO may be reprogrammed at full retraction at any time.

Internal Controller Board





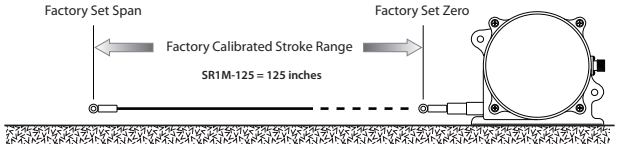
Status LED**

green	red	
off	off	output signal within programmed limits
on	flashing	output signal below zero setting
flashing	on	output signal beyond span setting

***Note: Flashing Status LED will cause the output signal to fluctuate.*

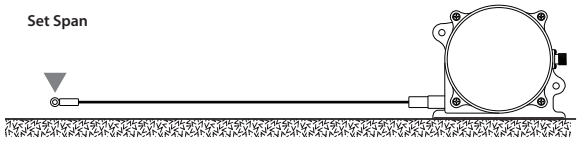
Changing Output Signal

Reprogramming ZERO and SPAN:
The ZERO and SPAN points have been preset at the factory but can easily be changed to match any desired stroke within the full stroke limits of the sensor. To reprogram the SR1M to your own settings, remove the rear cover to gain access to the internal controller board. Locate the push-button on the circuit board and follow the instructions below.

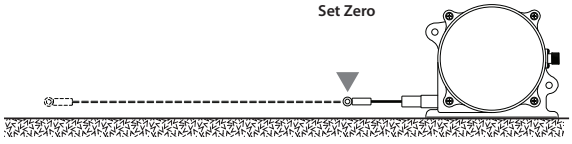


Please note that ZERO and SPAN points can be set independently. You can set one without setting the other. This operation must be performed with the sensor under power. *Important: when you are finished, disconnect power for at least 2 seconds to permanently set your new settings.*

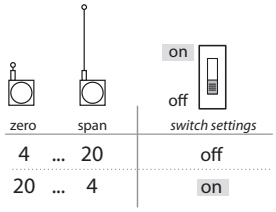
Setting Span:
Set the cable to the desired SPAN point then depress and hold the button until the STATUS LED begins to flash RED. Release the button when the LED begins to flash RED (not GREEN). The flashing will then slow down to about two-second intervals to indicate that the SPAN value is being set into memory. When completed, the STATUS LED will turn off.



Setting Zero:
Set the cable to the desired ZERO point and then depress and hold the button until the STATUS LED begins to flash GREEN. Release the button when the LED begins to flash GREEN (not RED). The flashing will then slow down to about two-second intervals to indicate that the ZERO value is being set into memory. When completed, the STATUS LED will turn off. Remove power for 2 seconds then reconnect.



Reversing the Output Signal:



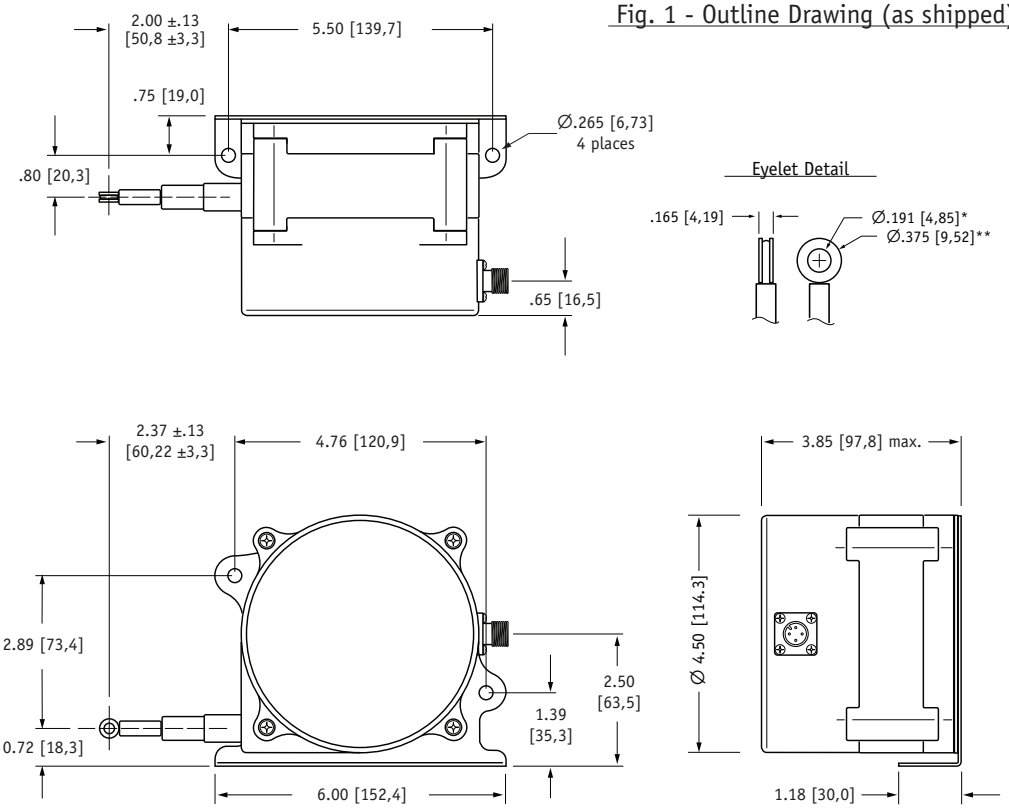
output signal options (mA)				
4	...	20	off
20	...	4	on

The SR1M leaves the factory set with a 4...20 mA full scale output signal. The signal can be reversed (see illustration) by simply changing a dipswitch located on the controller board.

This may be done without resetting the “zero” and “span” points.

Remove the rear cover to gain access to the board.

Fig. 1 - Outline Drawing (as shipped)



units are in **inches [mm]** tolerances are ± .04 [1,0] unless otherwise noted

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

Fig. 2 - "Up" Cable Exit Direction

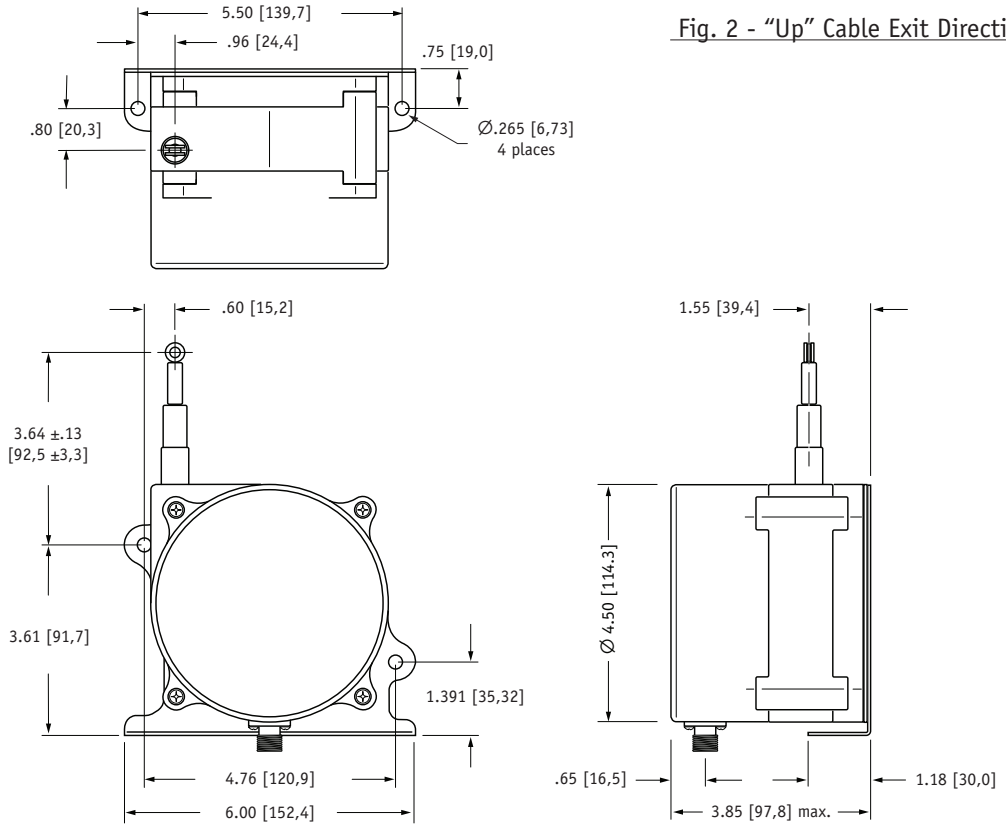


Fig. 3 - "Down" Cable Exit Direction

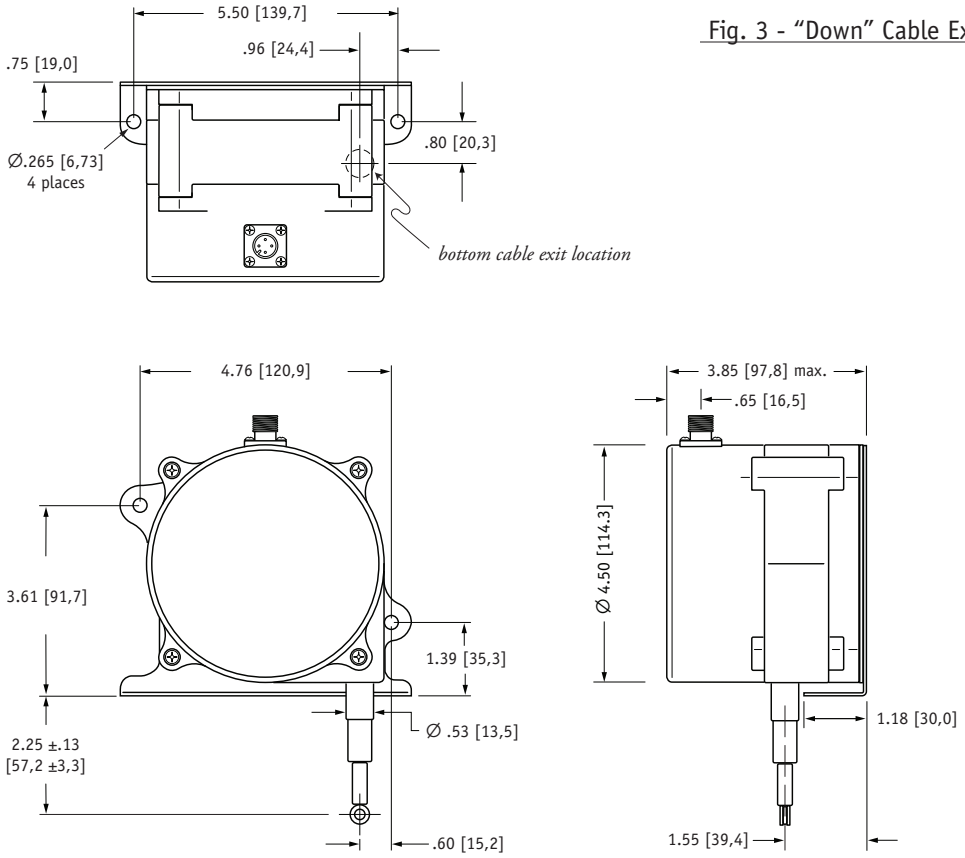
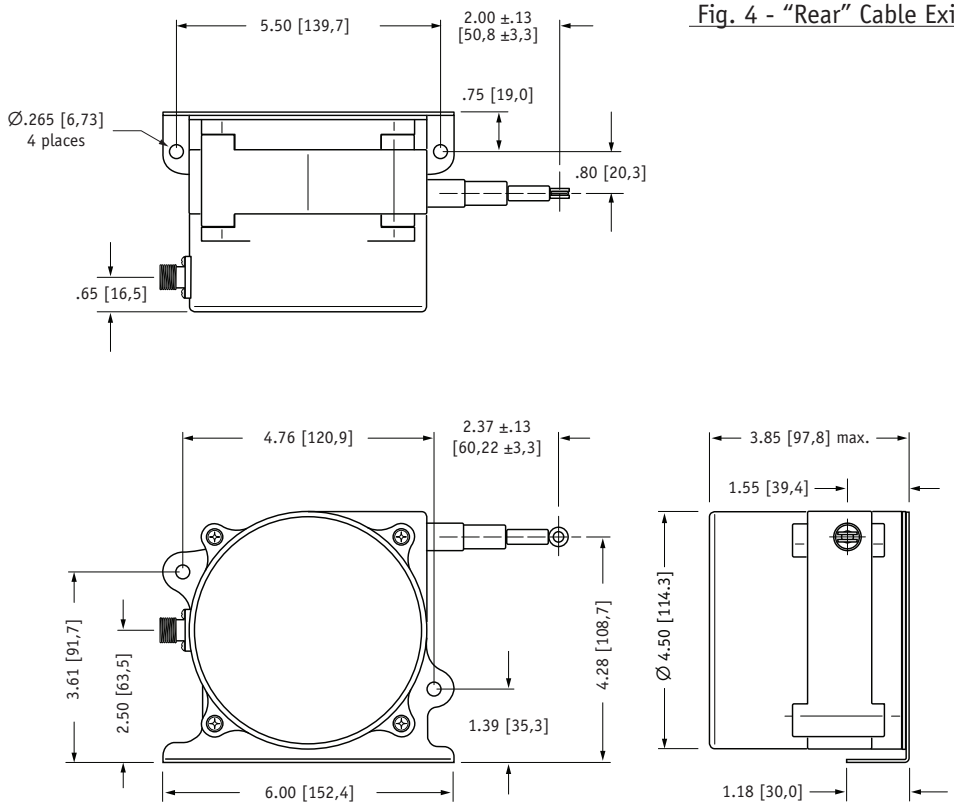


Fig. 4 - "Rear" Cable Exit Direction



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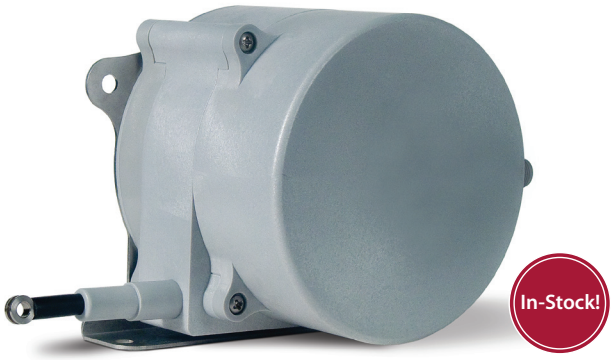
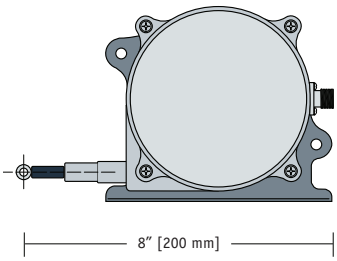
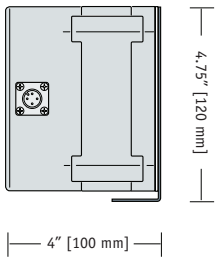
SR1V

Industrial Low Cost String Pot

User Scalable VDC Output Signal
Linear Position Measurement up to 125 inches (3 meters)
Designed for Outdoor / Wet environments







Maximum Full Stroke Range	125 inches (3175 mm)
Minimum Full Stroke Range	1 inches (25 mm)
Output Signal Settings	0–5, 0–10, ⁻5–⁺5, ⁻10–⁺10 VDC
Environmental Suitability	NEMA 6, IP67
Operating Temperature	-40˚ to 185˚ F (-40˚ to 85˚ C)

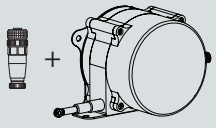
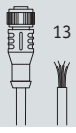
COMPLETE SPECIFICATIONS

Input Voltage	15-30 VDC (10-30 VDC for 0–5, ⁻5–⁺5 volt signal)
Input Current	50 mA, max.
Maximum Output Load	20 mA
Accuracy, full stroke range ≥ 10 inches (254 mm)	.5% FS.
Accuracy, full stroke range < 10 inches (254 mm)	consult factory
Repeatability	.1% FS.
Resolution	.0015% FS.
Output Signal Update Rate	1 msec
Maximum Velocity	80 inches (2 meters) per second
Maximum Acceleration	10 G (retraction)
Measuring Cable Tension	23 oz. (6,4 N) ±30%
Sensor	plastic-hybrid precision potentiometer
Cycle Life	250,000 (potentiometer)
Enclosure	polycarbonate
Measuring Cable	.034-inch dia. nylon-coated stainless
Electrical Connection	M12 Connector (mating plug included)
Weight	2.5 lbs. (1.3 Kg)

The SR1V is part of a series of rugged, low-cost, high performance string pots built for wet environments and outdoor applications. Designed for the rigors of outdoor construction equipment or the demands of a factory floor, the SR1M is the perfect low-cost solution for OEM and stocking distributors.

What sets this sensor apart from other string pots, is the internal programmable digital circuitry that gives the customer a one-size-fits-all approach for many applications. The SR1V ships factory calibrated to the full 125-inch (3-meter) measurement range but the output signal can be easily re-scaled to match any stroke down to 1 inch (25 mm).

Ordering Information

	part number	description
	SR1V-125	SR1V String Pot Factory Calibrated to 125" includes 4-pin M12 connector
 13 ft (4 m)	9036810-0040	Optional Cordset w/ 4-pin M12 connector

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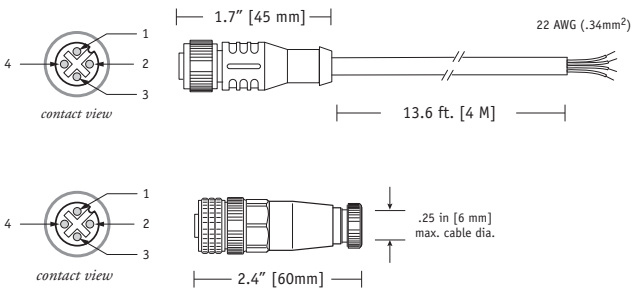
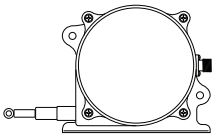
Electrical Connection

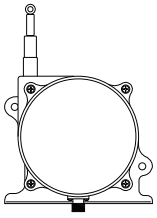
output signal	connector pin	colorcode (cordset)
15...30 vdc	1	brown
output signal	2	white
common	3	blue
n/c	4	black



Cable Exit Direction Options

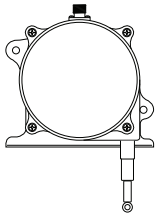
see fig. 1

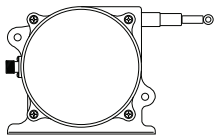




see fig. 2

see fig. 3





see fig. 4

Changing the Measuring Cable Exit and Electrical Connector Direction

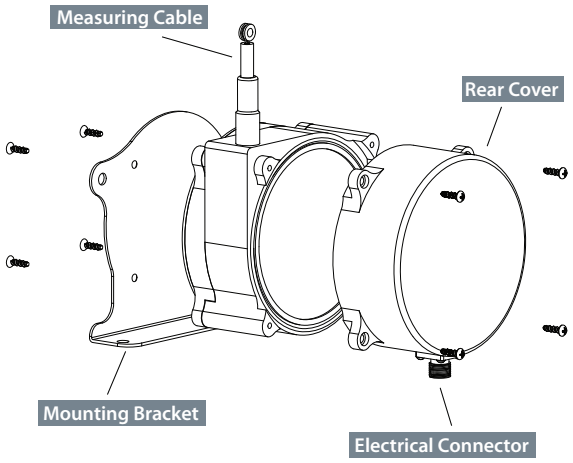
Changing Measuring Cable Exit

To change the direction of the measuring cable, remove the 4 mounting bracket screws and rotate bracket to one of four available positions. See figures 1 - 4 on the following pages for mounting dimensions.

Changing Electrical Connector Direction

To change the position of the electrical connector, remove the 4 rear cover screws and carefully separate rear cover from the sensor body.

Rotate the rear cover to desired position being careful to not tangle the wiring harness that runs to the connector.

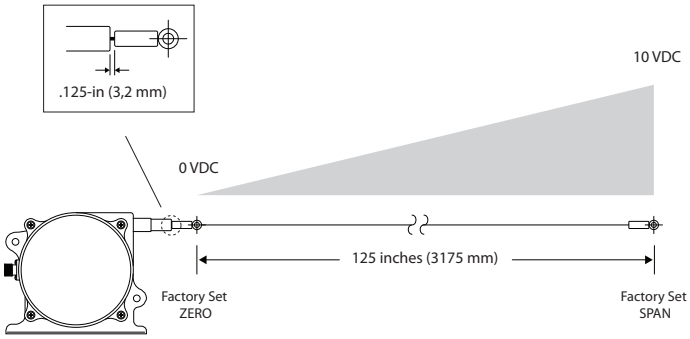


Factory Calibrated Stroke Range

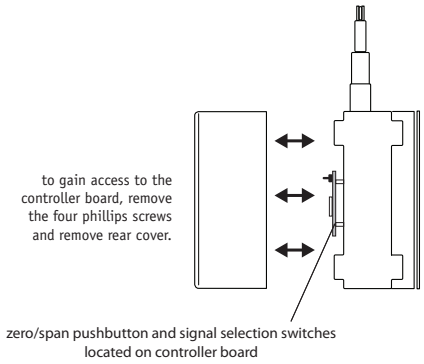
The full scale output signal is set at the factory to the maximum full stroke range of 125 inches. The ZERO point (output = 0 Vdc) is set at the beginning* of the stroke range (0 inches) and the SPAN point (output = 10 Vdc) is set to the end of the range (125 inches).

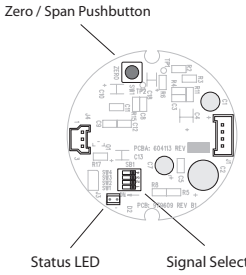
**Important* — The ZERO point is set at the factory with the measuring cable pulled out .125 inches from full retraction.

This is for the factory setting only and the ZERO may be reprogrammed at full retraction at any time.



Internal Controller Board



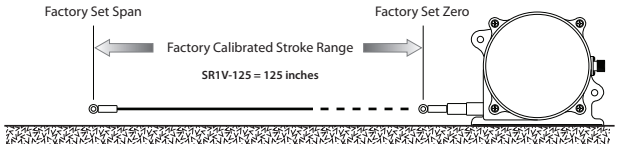


Status LED

green	red	
on	–	power on, output signal within programmed limits
on	flashing	output signal below zero setting
flashing	on	output signal beyond span setting

Changing Output Signal

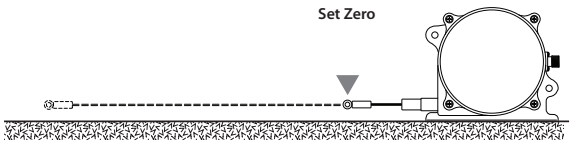
Reprogramming ZERO and SPAN:
Though ZERO and SPAN points have been preset at the factory, they can easily be changed to match any desired stroke within the full stroke limits of the sensor. To reprogram the SR1V to your own settings, remove the rear cover to gain access to the internal controller board. Locate the push-button on the circuit board and follow the instructions below.



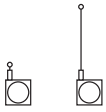
Please note that ZERO and SPAN points can be set independently. You can set one without setting the other. This operation must be performed with the sensor under power. *Important: when you are finished, disconnect power for a couple of seconds to permanently set your new settings.*

Setting Span:
Set the cable to the desired SPAN limit then depress and hold the button until the STATUS LED begins to flash RED. Release the button (when the LED is flashing RED, not GREEN) and the flashing will slow down to about two-second intervals which indicates the SPAN value is being set into memory. When completed, the STATUS LED will display solid GREEN.

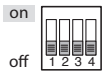
Setting Zero:
Set the cable to the desired ZERO limit and then depress and hold the button until the STATUS LED begins to flash GREEN. Release the button (when the LED is flashing GREEN, not RED) and the flashing will slow down to about two-second intervals which indicates the ZERO value is being set into memory. When completed, the STATUS LED will display solid GREEN. Remove power for 2 seconds then reconnect.



Changing the Output Signal:



switch settings



output signal options (VDC)

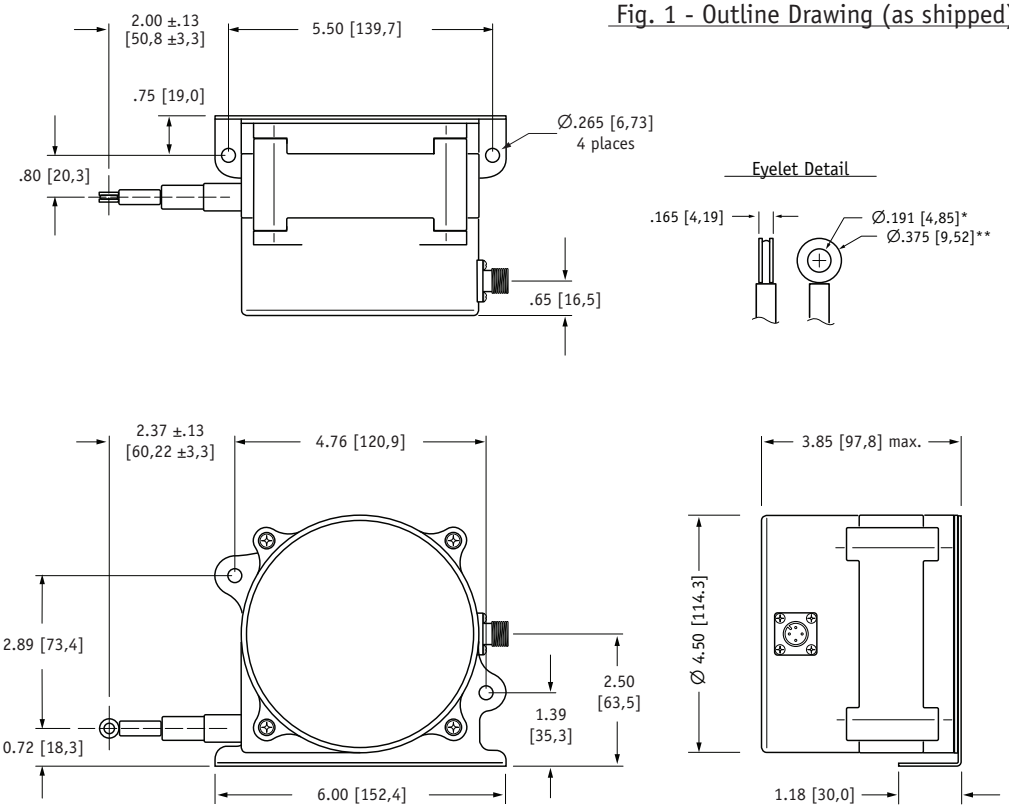
zero		span	SW1	SW2	SW3	SW4
0	...	5	off	off	off	off
5	...	0	on	off	off	off
0	...	10	off	off	off	on
10	...	0	on	off	off	on
-5	...	+5	off	off	on	off
+5	...	-5	on	off	on	off
-10	...	+10	off	on	off	off
+10	...	-10	on	on	off	off

The SR1V leaves the factory set with a 0...10 VDC full scale output signal. The signal can be reversed or changed to either 0...5, -5...+5 or -10...+10 VDC (see illustration) by simply changing a dipswitch located on the controller board.

If you wish to simply reverse the output signal or change it to a different voltage range, you may do so without resetting the "zero" and "span" points.

Remove the rear cover to gain access to the board.

Fig. 1 - Outline Drawing (as shipped)



units are in **inches [mm]** tolerances are ± .04 [1,0] unless otherwise noted

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

Fig. 2 - "Up" Cable Exit Direction

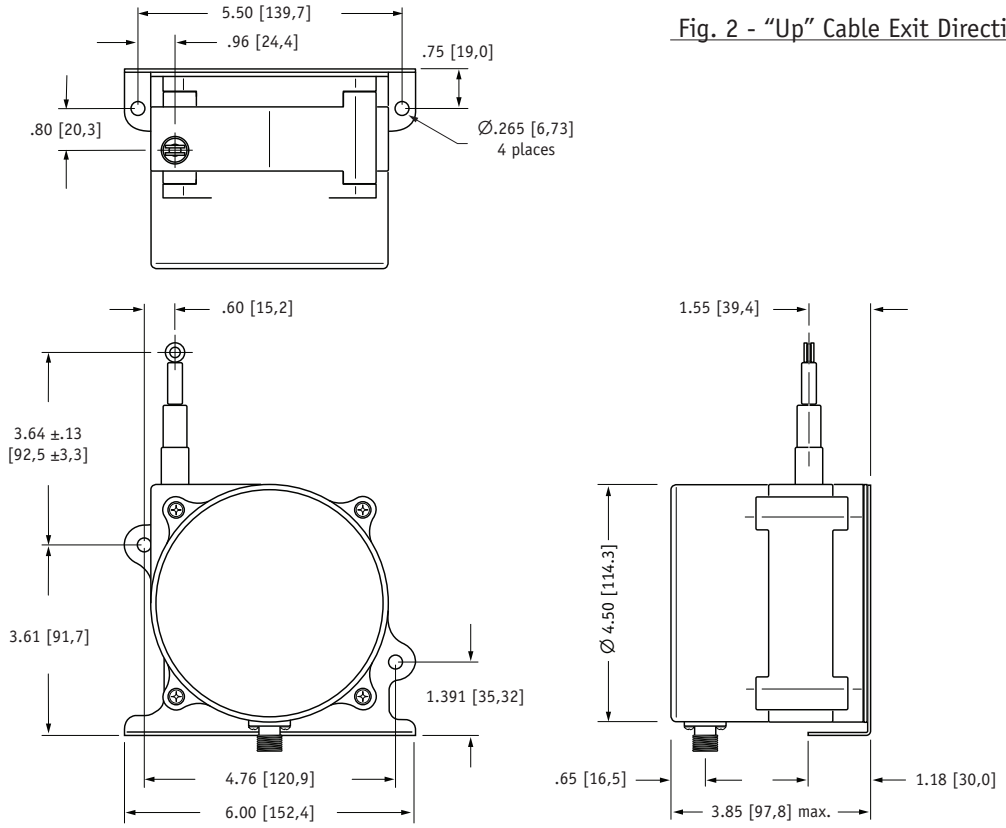


Fig. 3 - "Down" Cable Exit Direction

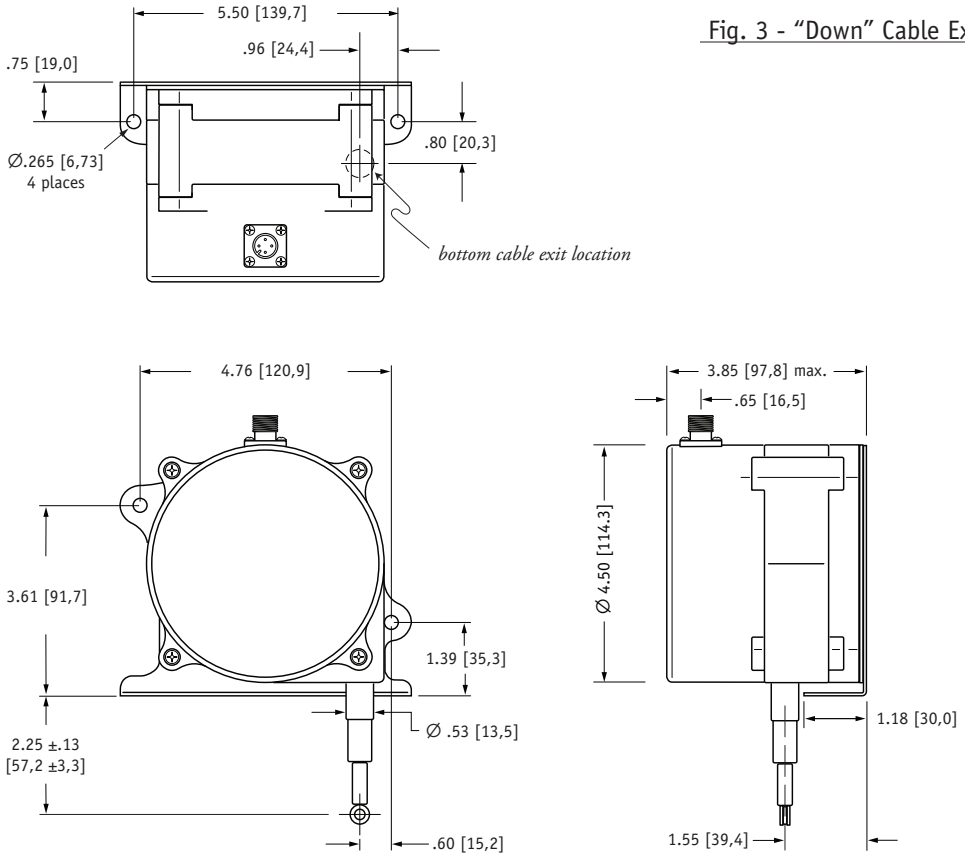
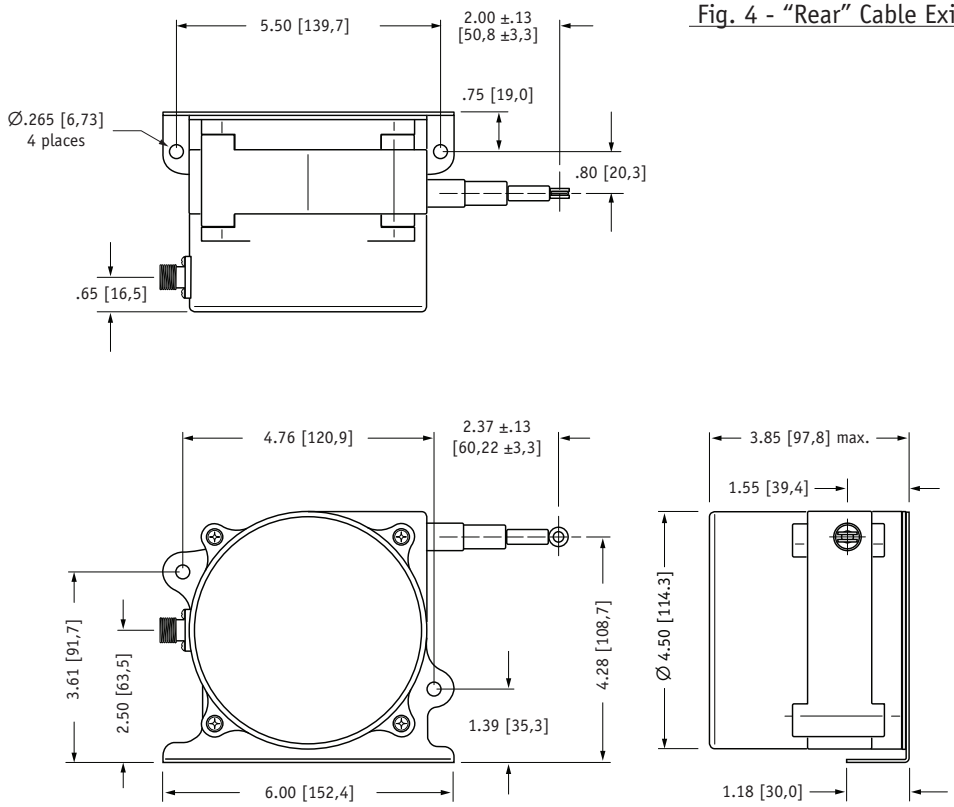


Fig. 4 - "Rear" Cable Exit Direction



Precision Potentiometric Output
Ranges: 0-100 to 0-1000 mm
Compact Size • OEM Applications

Z115

Specification Summary:

GENERAL

Full Stroke Ranges ..... 0-100 to 0-1000 mm
Spool Circumference ..... 58 mm, 115 mm (range dependant)
Output Signal ..... voltage divider (potentiometer)
Accuracy ..... +0.25 to +0.15% of F.S.*
Repeatability ..... +0.15% to +0.075% of F.S.*
Resolution ..... essentially infinite
Measuring Cable ..... 0.034-in dia. nylon-coated stainless steel
Sensor ..... plastic-hybrid precision potentiometer
Frame Material ..... zinc-plated steel
Cover Material ..... plastic
Weight, max. ..... 1 lb.

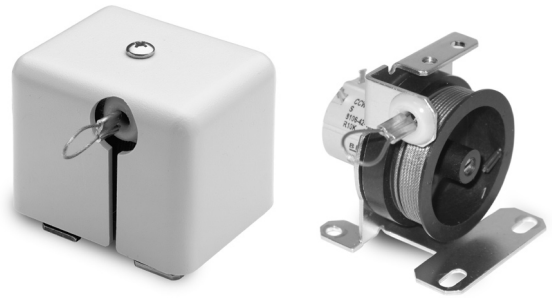
**specifications will vary with configuration, please consult factory*

ELECTRICAL

Input Resistance ..... 500 or 10K ohms (+10%)
Power Rating, Watts ..... 2.0 at 25°C derating to 0 at 105°C

ENVIRONMENTAL

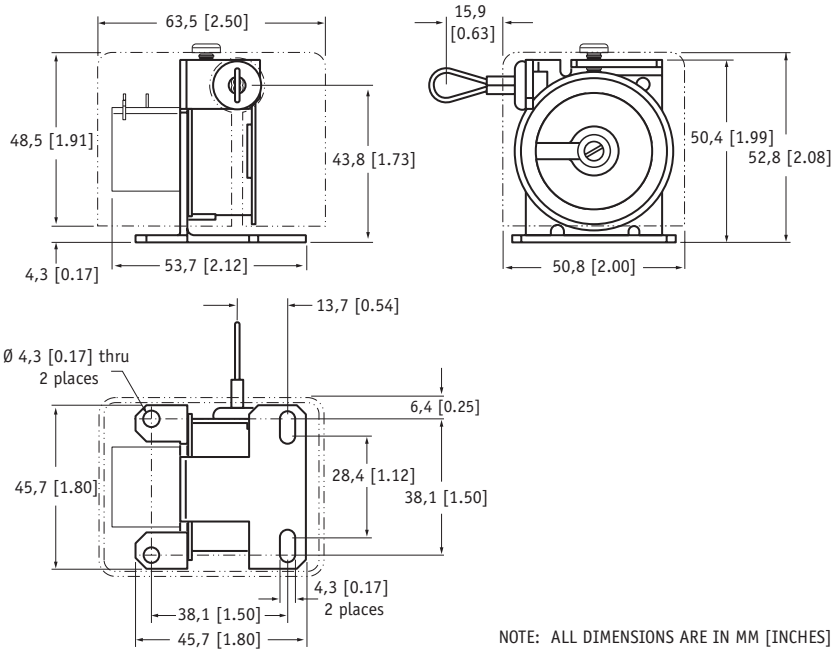
Operating Temperature ..... -25°C to +105°C
Temperature Coefficient of Potentiometer ..... +100ppm/°C, -150ppm/°C



The Z115 Cable-Extension Transducer is a compact, flexible and highly accurate linear position measurement device that can be engineered to OEM specifications.

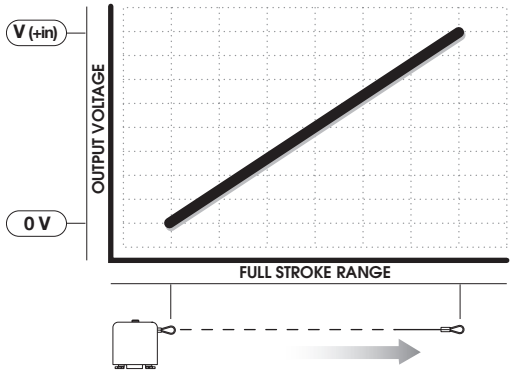
The standard Z115, can be simply modified to meet specific requirements. Circuits can be added for regulated output. Designs are available with and without covers and can be engineered for drop-in replacement of current assemblies. They allow for custom mounting, custom electrical connections and customer-specified life testing. Quantities are available as small as 100 units.

Outline Drawing



NOTE: ALL DIMENSIONS ARE IN MM [INCHES]

Output Signal



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celesco
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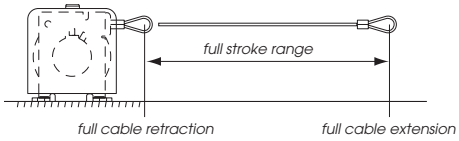
Order Form • Application Worksheet

Application

please provide a brief description of application. include exact stroke range, velocity of stroke and estimated number of cycles per year.

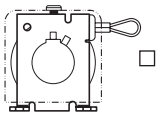
Full Stroke Range

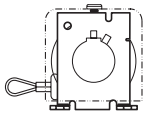
select available range or specify complete requirements

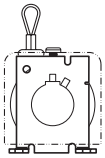


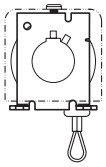
full stroke range (mm):	**50**	**100**	**275**	**550**	**1100**
spool circumference (mm):	58	115	58	58	115
potentiometer turns:	1	1	5	10	10
spring tension, ±30% (oz):	10	7	10	10	7

Measuring Cable Exit


☐ front

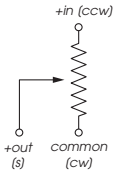

☐ rear


☐ up


☐ down

Potentiometer

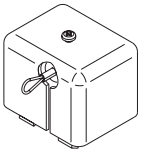
select value or specify complete requirements including value, voltage and linearity and estimated number of cycles per year

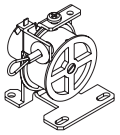


☐ 500 Ω ☐ 10K Ω ☐ other:

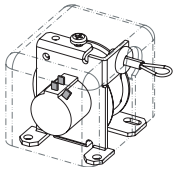
Enclosure

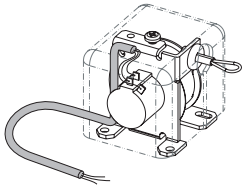
choose with or without cover or specify custom enclosure requirements


☐ cover


☐ no cover ☐ custom enclosure:

ELectrical Connection


☐ solder connection


☐ instrumentation cable
- ☐ length:
- ☐ connector
  - manufacturer:
  - manufacturer's part no.:

Precision Potentiometric Output
Ranges: 0-250 to 0-2400 mm
Compact Size • OEM Applications

Z250

Specification Summary:

GENERAL

Full Stroke Ranges	0-250 to 0-2400 mm
Spool Circumference	250 mm
Output Signal	voltage divider (potentiometer)
Accuracy	±0.25 to ±0.15% of F.S.*
Repeatability	±0.15% to ±0.075% of F.S.*
Resolution	essentially infinite
Measuring Cable	0.034-in dia. nylon-coated stainless steel
Sensor	plastic-hybrid precision potentiometer
Frame Material	zinc-plated steel
Cover Material	plastic
Weight, max.	1 lb.

**specifications will vary with configuration, please consult factory*

ELECTRICAL

Input Resistance	500 or 10K ohms (±10%)
Power Rating, Watts	2.0 at 25°C derating to 0 at 105°C

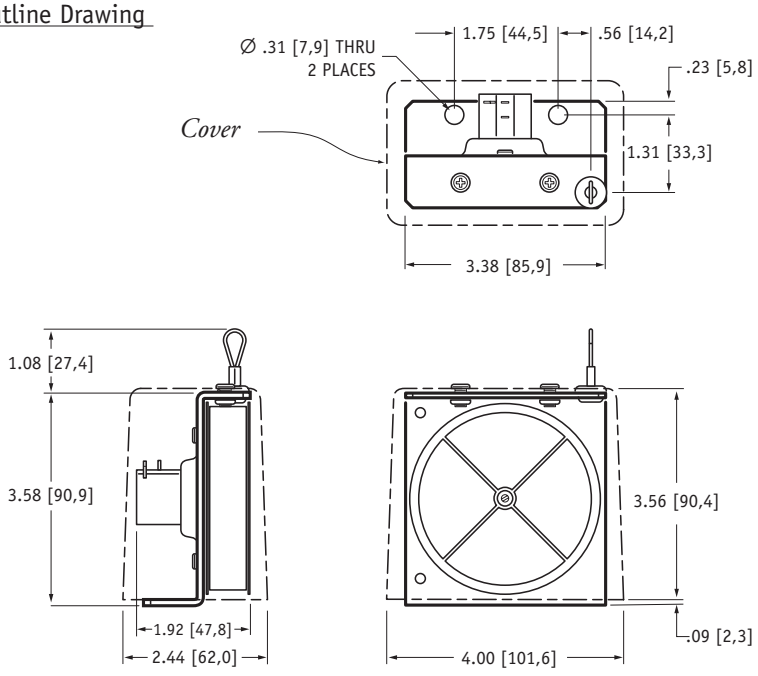
ENVIRONMENTAL

Operating Temperature	-25°C to +105°C
Temperature Coefficient of Potentiometer	+100ppm/°C, -150ppm/°C

The Z250 Cable-ExtensionTransducer is a compact, flexible and highly accurate linear position measurement device that can be engineered to OEM specifications.

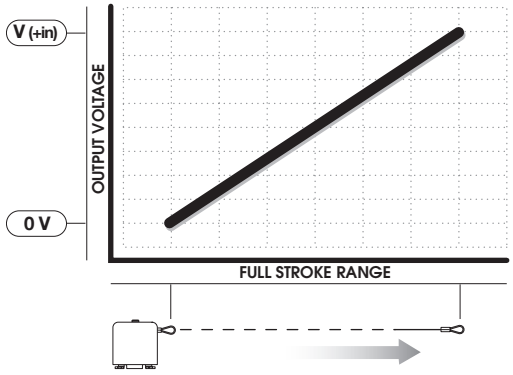
The standard Z250, can be simply modified to meet specific requirements. Circuits can be added for regulated output. Designs are available with and without covers and can be engineered for drop-in replacement of current assemblies. They allow for custom mounting, custom electrical connections and customer-specified life testing. Quantities are available as small as 100 units.

Outline Drawing



NOTE: All dimensions are in INCHES [MM]

Output Signal



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celesco.com • info@celesco.com

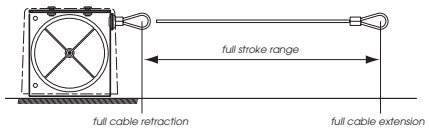
Order Form • Application Worksheet

Application

please provide a brief description of application. include exact stroke range, velocity of stroke and estimated number of cycles per year.

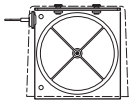
Full Stroke Range

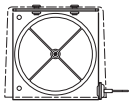
select available range or specify complete requirements

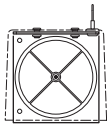


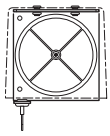
full stroke range (mm):	**220**	**1200**	**2400**
spool circumference (mm):	250	250	250
potentiometer turns:	1	5	10

Measuring Cable Exit


☐ front

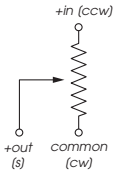

☐ rear


☐ up


☐ down

Potentiometer

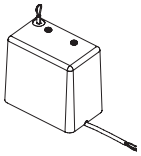
select value or specify complete requirements including value, voltage and linearity and estimated number of cycles per year

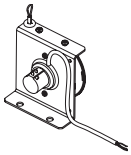


☐ 500 Ω ☐ 10K Ω ☐ other:

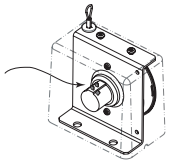
Enclosure

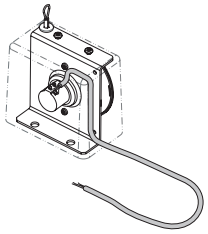
choose with or without cover or specify custom enclosure requirements


☐ cover


☐ no cover ☐ custom enclosure:

ELectrical Connection


☐ solder connection


☐ instrumentation cable
☐ length:
☐ connector
manufacturer:
manufacturer's part no.: