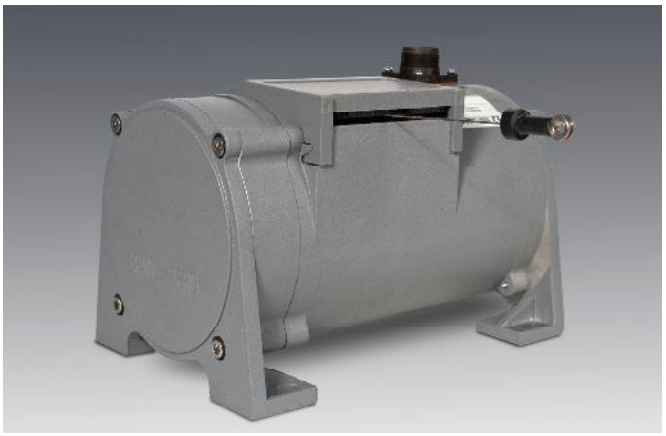
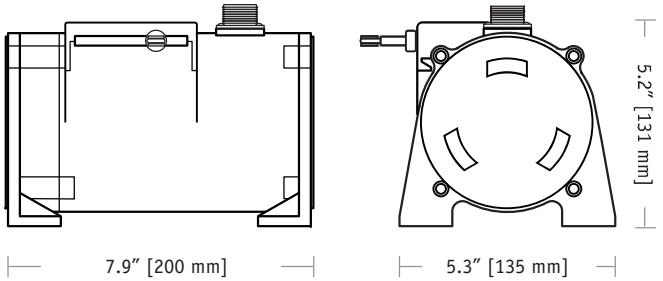
PT9101

Heavy Industrial • Voltage Divider

Absolute Linear Position to 550 inches (1400 cm)
Aluminum or Stainless Steel Enclosure Options
VLS Option To Prevent Free-Release Damage
IP68 • NEMA 6 Protection

CE





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	stainless steel or thermoplastic
Enclosure Material	powder-painted aluminum or 303 stainless steel
Sensor	plastic-hybrid precision potentiometer
Potentiometer Cycle Life	≥ 250,000
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
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

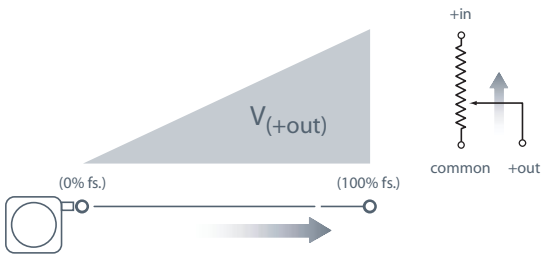
ENVIRONMENTAL

Enclosure	NEMA 4/4X/6, IP 67/68
Operating Temperature	-40° to 200°F (-40° to 90°C)
Vibration	up to 10 g 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".

Output Signal:



-- bridge circuit option available, see ordering information

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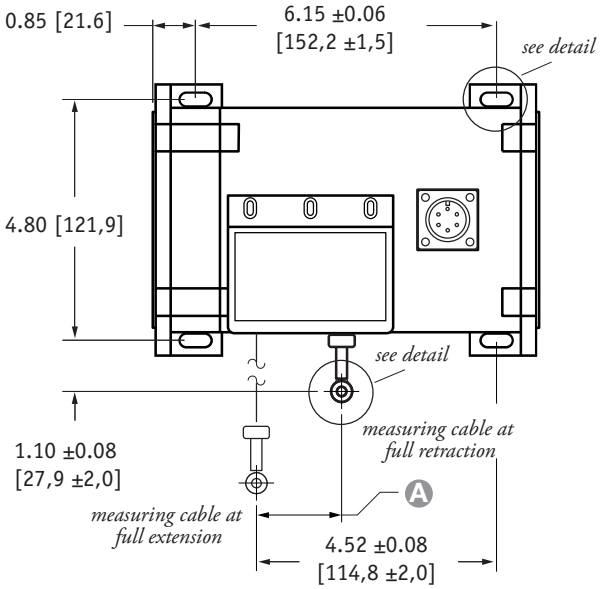
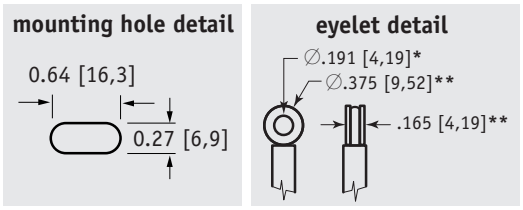
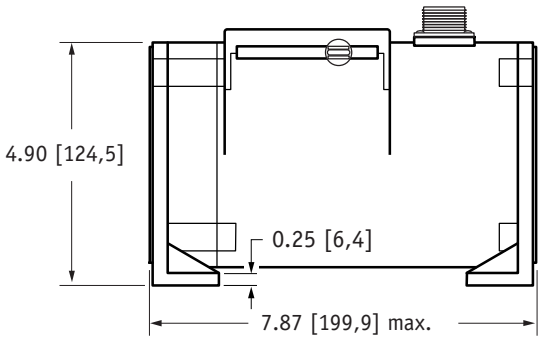
Fig. 1 – Outline Drawing (18 oz. cable tension only)

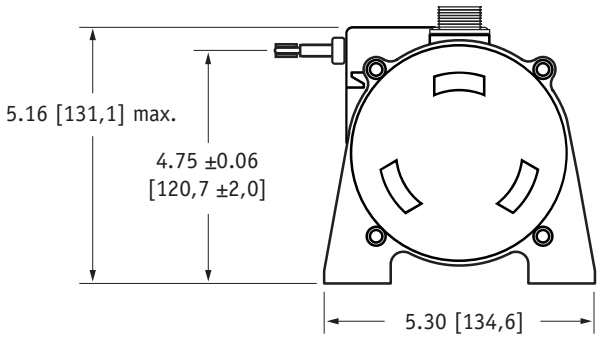




A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
75	n/a	0.22	0.29	0.37
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	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]

Ordering Information:

Model Number:

PT9101-_____ **-** ____ ____ ____ **-** ____ **1** ____ **0**
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:
PT9101 - 0500 - 111 - 1110

Ⓡ	range:	500 inches
Ⓐ	enclosure/cable tension:	aluminum/18 oz.
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	cable exit:	front
Ⓓ	output signal:	500 ohm potentiometer
Ⓕ	electrical connection:	6-pin plastic connector

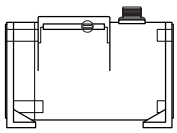
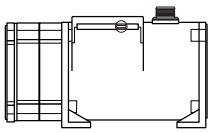
Full Stroke Range:

Ⓡ *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.

** – 36 oz. cable tension strongly recommended*

Ordering Information (cont.):

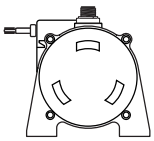
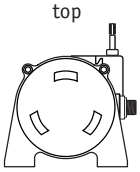
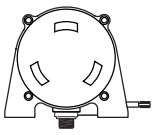
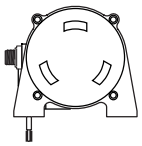
Enclosure Material and Measuring Cable Tension:

Ⓐ order code:	1	3	2	4
tension (±30%):	18 oz.		36 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	4
	∅.034-inch nylon-coated stainless steel	∅.047-inch stainless steel	∅.062-inch thermoplastic	∅.031-inch stainless steel
	*available in **all** ranges*	*all ranges up to **500 inches***	*all ranges up to **400 inches***	***550 inch** range only*

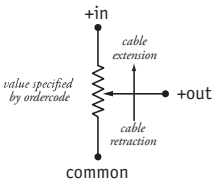
Cable Exit:

Ⓒ order code:	1	2	3	4
	front	top	back	down
				

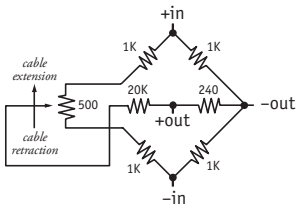
Output Signals:

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

circuit, options 1-4

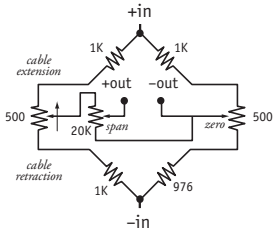


fixed bridge circuit



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

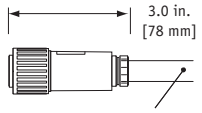
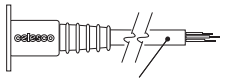
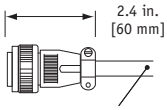
adjustable bridge cicuit

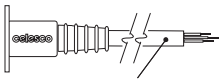
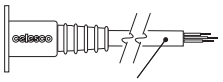
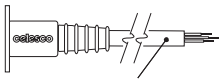


full scale output: adjustable from 0 to 30mV/V
zero adjust: to 50% of full stroke

Ordering Information (cont.):

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	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.*

VLS Option - Free Release Protection

The patented 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 the single spring option and 40 to 80 inches per second for the higher tension dual spring option.

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.

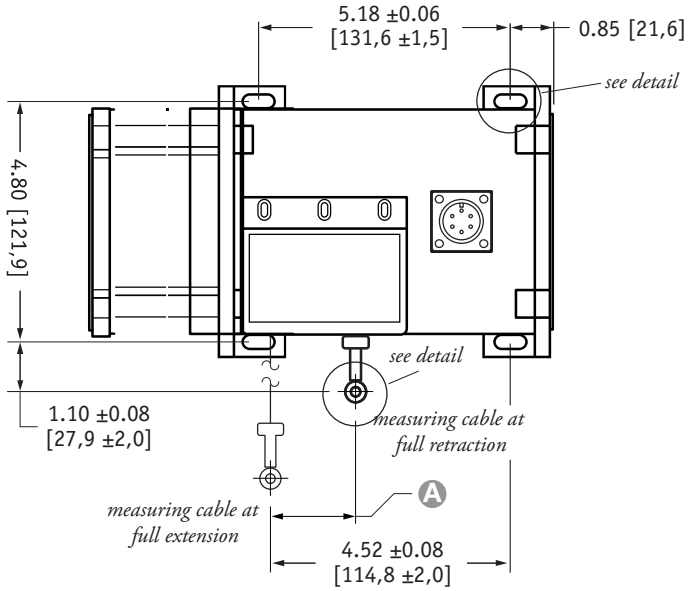
How To Configure Model Number for VLS Option:

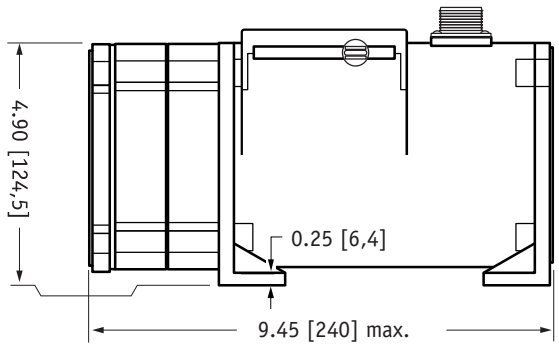
VLS 9101- ____ Ⓡ **-** ____ Ⓐ ____ Ⓑ ____ Ⓒ **-** ____ Ⓓ ____ Ⓔ ____ Ⓕ ____ Ⓖ

creating VLS model number (example)...

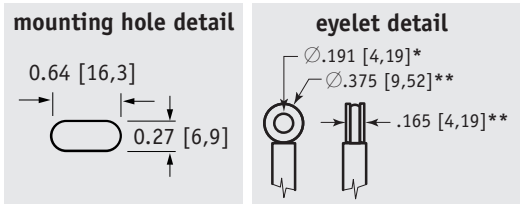
1. select PT9101 model — **PT9101-0100-111-1110**
2. remove "PT" from the model number — ~~PT~~ **9101-0100-111-1110**
3. add "VLS" — **VLS + 9101-0100-111-1110**
4. completed model number ! — **VLS9101-0100-111-1110**

Fig. 2 – Outline Drawing (36 oz. cable tension only)



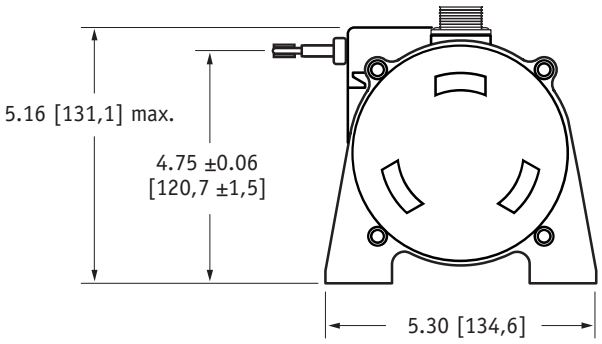


DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.



A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
75	n/a	0.22	0.29	0.37
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	1.61	n/a	n/a

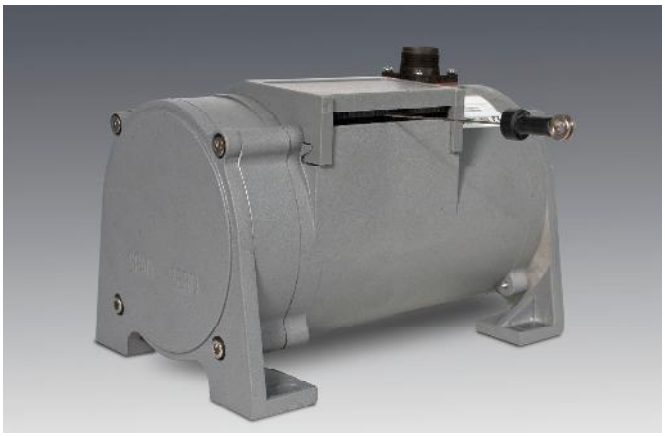


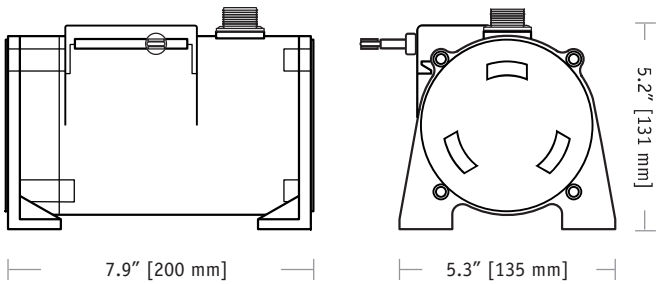
* tolerance = +.005 –.001 [+.13 –.03]
** tolerance = +.005 –.005 [+.13 –.13]

PT9420

Heavy Industrial • 4...20mA, 0...20mA

Absolute Linear Position to 550 inches (1400 cm)
Aluminum or Stainless Steel Enclosure Options
VLS Option To Prevent Free-Release Damage
IP68 • NEMA 6 Protection • Hazardous Area Certification





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	stainless steel or thermoplastic
Enclosure Material	powder-painted aluminum or 303 stainless steel
Sensor	plastic-hybrid precision potentiometer
Potentiometer Cycle Life	≥ 250,000
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	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, Zero Adjust	up to 50% of full stroke range
Output Signal, Span Adjust	to 50% of factory set span

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 to 2000 Hz maximum
Thermal Effects, Zero	0.01% f.s./°F, max.
Thermal Effects, Span	0.01%/°F, max.

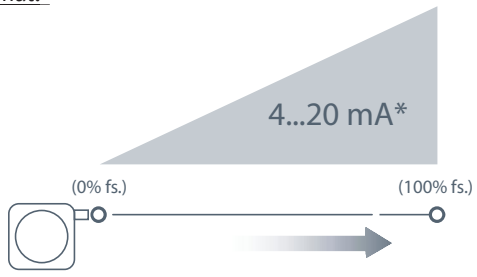
EMC COMPLIANCE PER DIRECTIVE 89/336/EEC

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".

Output Signal:



**Optional 3-wire, 0...20mA output signal available.*

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measurement SPECIALTIES™
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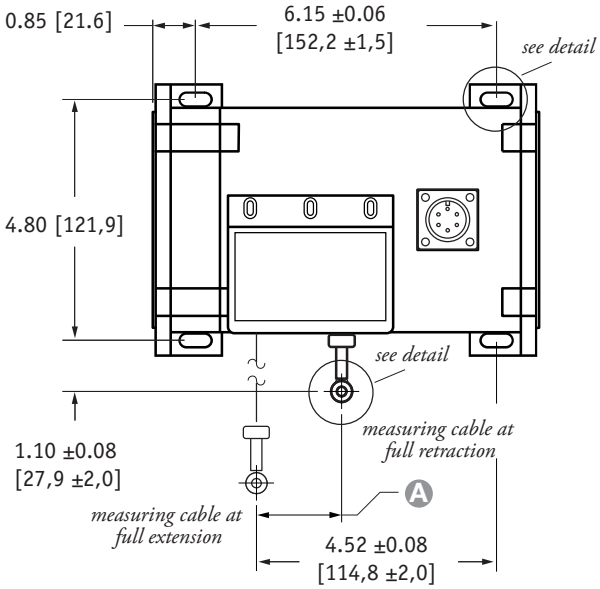
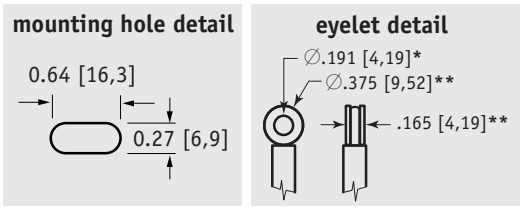
Fig. 1 – Outline Drawing (18 oz. cable tension only)





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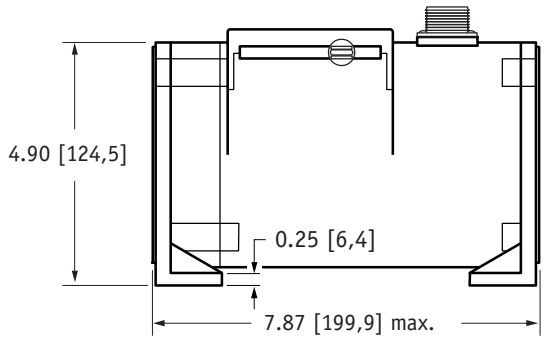
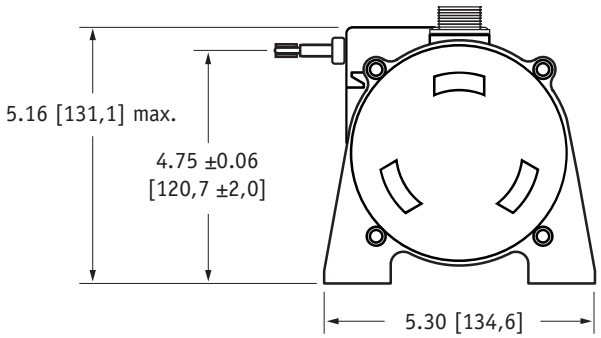
550	1.61	1.61	n/a	n/a





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]

Ordering Information:

Model Number:

PT9420- ____ Ⓡ **-** __ Ⓐ __ Ⓑ __ Ⓒ **-** 1 Ⓓ __ Ⓔ __ Ⓕ 0 Ⓖ
order code:

Sample Model Number:
PT9420 - 0500 - 111 - 1110

Ⓡ	range:	500 inches
Ⓐ	enclosure/cable tension:	aluminum/18 oz.
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	cable exit:	front
Ⓔ	output signal:	4...20 mA, 2-wire
Ⓕ	electrical connection:	6-pin plastic connector

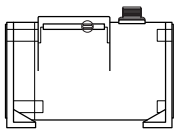
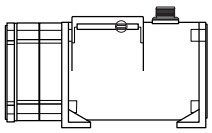
Full Stroke Range:

Ⓡ *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.

** – 36 oz. cable tension strongly recommended*

Ordering Information (cont.):

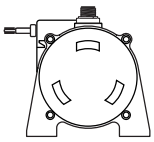
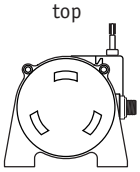
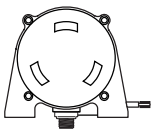
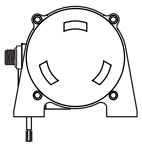
Enclosure Material and Measuring Cable Tension:

Ⓐ order code:	1	3	2	4
tension (±30%):	18 oz.		36 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	4
	∅.034-inch nylon-coated stainless steel	∅.047-inch stainless steel	∅.062-inch thermoplastic	∅.031-inch stainless steel
	*available in **all** ranges*	*all ranges up to **500 inches***	*all ranges up to **400 inches***	***550 inch** range only*

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 – 34 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

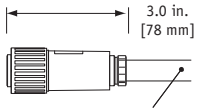
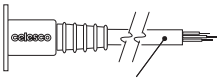
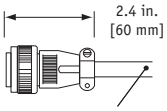
Cenelec
LCIE EEx
ia IIc T4

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

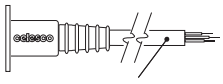
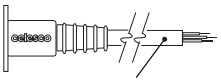
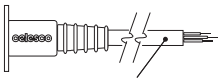
Ordering Information (cont.):

Electrical Connection:

F *order code:*

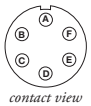
1	2	3	4
6-pin plastic connector w/mating plug	10-ft. [3 M] waterproof cable	6-pin metal connector w/mating plug	25-ft. [7.5 M] instrumentation cable
IP 67, NEMA 4X,6**	**IP 67, NEMA 4X**, 6**	**IP 65, NEMA 4**	**IP 67, NEMA 6**
			
1/2 - 5/16" [14 - 8 mm] cable dia. 16 AWG max conductor size connector: 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...34 vdc***	14...29 vdc
B	4...20 mA out	common
C	–	0...20 mA out
D	case ground	–



contact view

Waterproof Cable

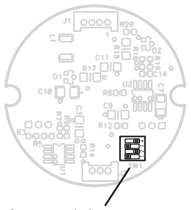
color code	2-wire	3-wire
WHITE	8...34 vdc***	14...29 vdc
BLACK	4...20 mA out	common
GREEN	case ground	0...20 mA out

Instrumentation Cable

color code	2-wire	3-wire
RED	8...34 vdc***	14...29 vdc
BLACK	4...20 mA out	common
WHITE	n/a	n/a
GREEN	case ground	0...20 mA out

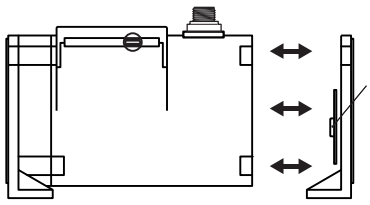
Notes:
- * *–Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours.*
- ** *–NEMA 4X applies to stainless steel enclosure only.*
- *** *–14-32 VDC for hazardous area option.*

Output Signal Selection (not available with intrinsically safe option):

output signal	*switch setting*	*signal board*
0...20 mA *or* 4...20 mA		
20...0 mA *or* 20...4 mA		*dip-switch location*

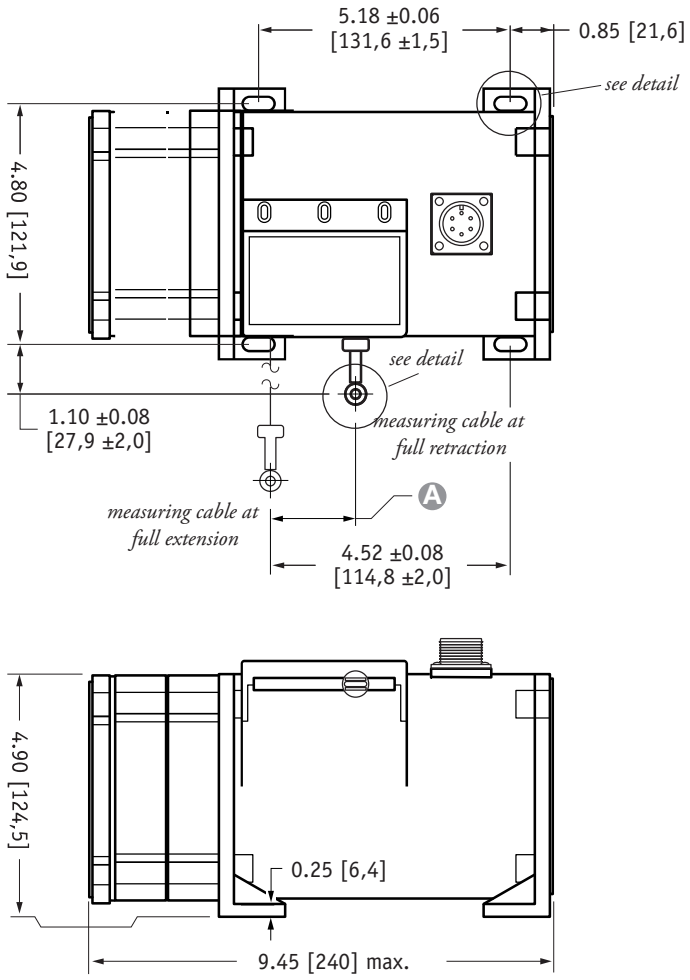
The output signal direction can be reversed at any time by simply changing the dip-switch settings found on the internal signal board. After the settings have been changed, adjustment of the Zero and Span trimpots will be required to precisely match signal values to the beginning and end points of the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

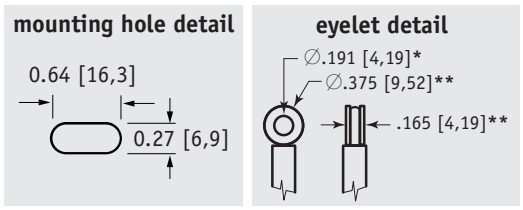
To gain access to the signal board, remove four Allen-Head Screws and remove end cover bracket.



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

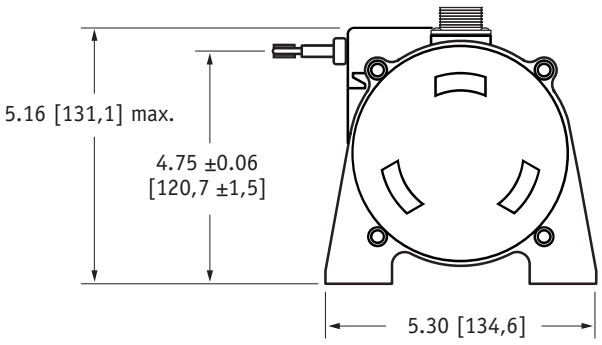
Fig. 2 – Outline Drawing (36 oz. cable tension only)





A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
75	n/a	0.22	0.29	0.37
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	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]

VLS Option - Free Release Protection

The patented 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 the single spring option and 40 to 80 inches per second for the higher tension dual spring option.

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.

How To Configure Model Number for VLS Option:

VLS 9420 - ____ **-** ____ ____ ____ **-** ____ ____ ____ ____
R A B C D E F G

creating VLS model number (example)...

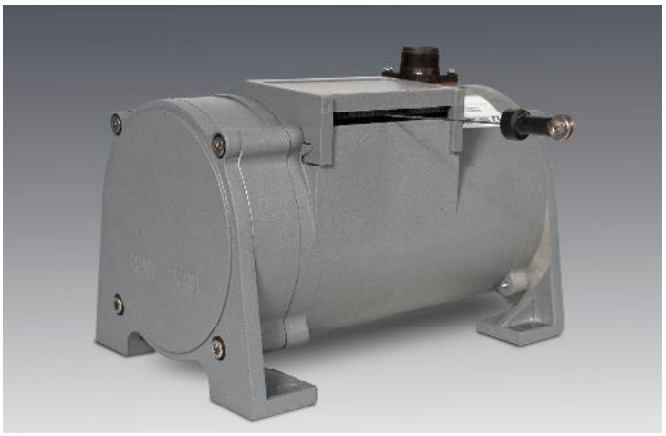
1. select PT9420 model — **PT9420-0100-111-1110**
2. remove "PT" from the model number — ~~PT~~ **9420-0100-111-1110**
3. add "VLS" — **VLS + 9420-0100-111-1110**
4. completed model number ! — **VLS9420-0100-111-1110**

PT9510

Heavy Industrial • 0...5 Vdc, 0...10 Vdc

Absolute Linear Position to 550 inches (1400 cm)
Aluminum or Stainless Steel Enclosure Options
VLS Option To Prevent Free-Release Damage
IP68 • NEMA 6 Protection • Hazardous Area Certification

CE



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	stainless steel or thermoplastic
Enclosure Material	powder-painted aluminum or 303 stainless steel
Sensor	plastic-hybrid precision potentiometer
Potentiometer Cycle Life	≥ 250,000
Maximum Retraction Acceleration	see ordering information
Maximum Velocity	see ordering information
Weight, Aluminum (Stainless Steel) Enclosure	8 lbs. (16 lbs.) max.

ELECTRICAL

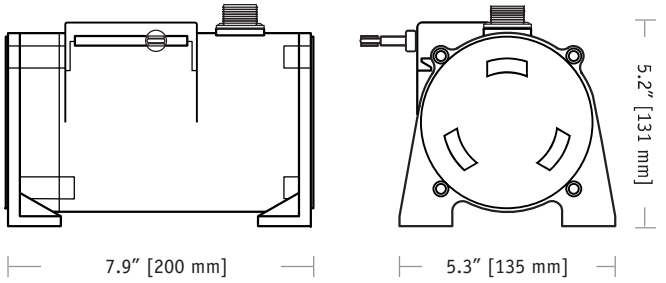
Input Voltage	14.5-40VDC (10.5-40VDC for 0-5 volt output)
Input Current	10 mA maximum
Output Impedance	1000 ohms
Maximum Output Load	5000 ohms
Output Signal, Zero Adjust	up to 50% of full stroke range
Output Signal, Span Adjust	to 50% of factory set span

ENVIRONMENTAL

Enclosure	NEMA 4/4X/6, IP 67/68
Operating Temperature	-40° to 200°F (-40° to 90°C)
Vibration	up to 10 g to 2000 Hz maximum

EMC COMPLIANCE PER DIRECTIVE 89/336/EEC

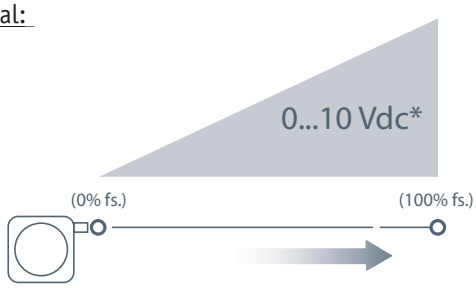
Emission / Immunity	EN50081-2 / EN50082-2



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. It provides a 0 - 5 or 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".

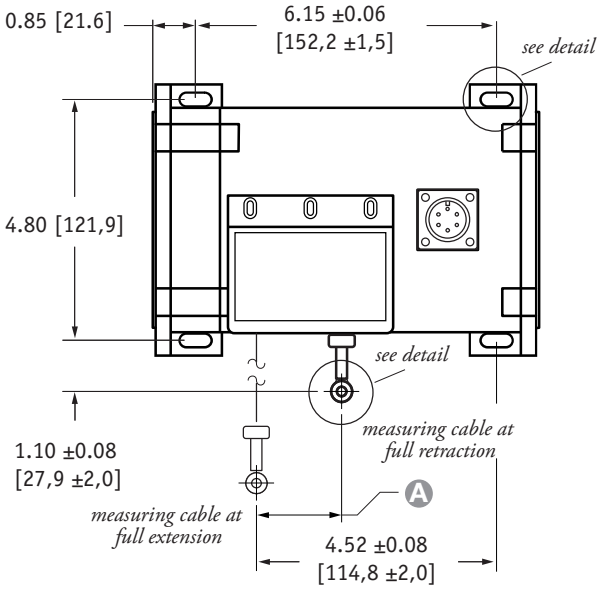
Output Signal:

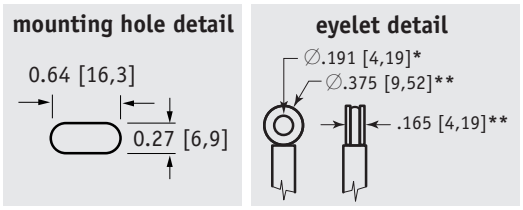


**Additional Output Options: 0...5, ⁻5...⁺5, ⁻10...⁺10 Vdc*

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

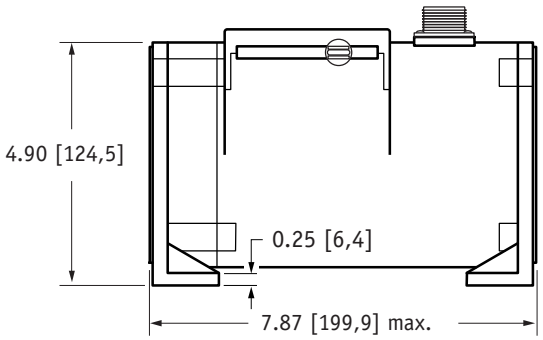
Fig. 1 – Outline Drawing (18 oz. cable tension only)

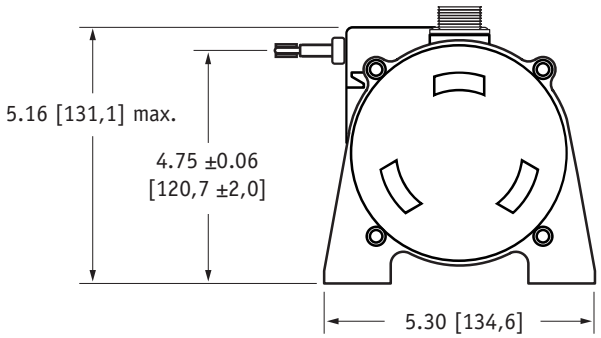




A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
75	n/a	0.22	0.29	0.37
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	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]

Ordering Information:

Model Number:

PT9510-_____ **-** _____ **-** **1** _____ **0**
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:

PT9510 - 0500 - 111 - 1110

Ⓡ	range:	500 inches
Ⓐ	enclosure/cable tension:	aluminum/18 oz.
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	cable exit:	front
Ⓓ	output signal:	0...10 vdc
Ⓕ	electrical connection:	6-pin plastic connector

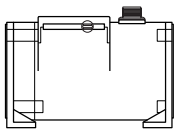
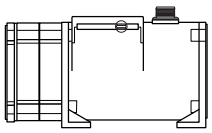
Full Stroke Range:

Ⓡ *order code:*	**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.

** – 36 oz. cable tension strongly recommended*

Ordering Information (cont.):

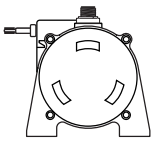
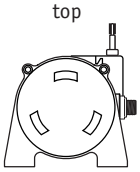
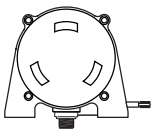
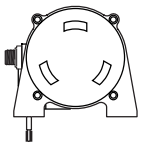
Enclosure Material and Measuring Cable Tension:

Ⓐ order code:	1	3	2	4
tension (±30%):	18 oz.		36 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	4
	∅.034-inch nylon-coated stainless steel	∅.047-inch stainless steel	∅.062-inch thermoplastic	∅.031-inch stainless steel
	*available in **all** ranges*	*all ranges up to **500 inches***	*all ranges up to **400 inches***	***550 inch** range only*

Cable Exit:

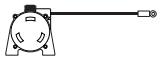
Ⓒ order code:	1	2	3	4
	front	top	back	down
				

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
	0 10	10 0	0 5	5 0	-10 +10	+10 -10	-5 +5	+5 -5
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			

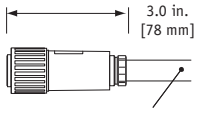
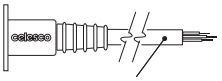
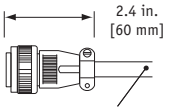
example:

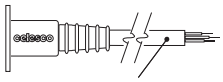
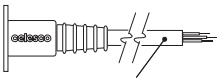
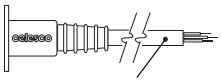
ordercode = **1** = 0...10 VDC ➡ 0 vdc = 

10 vdc = 

Ordering Information (cont.):

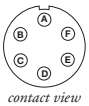
Electrical Connection:

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	signal
A	input voltage
B	output signal
C	common



contact view

Waterproof Cable

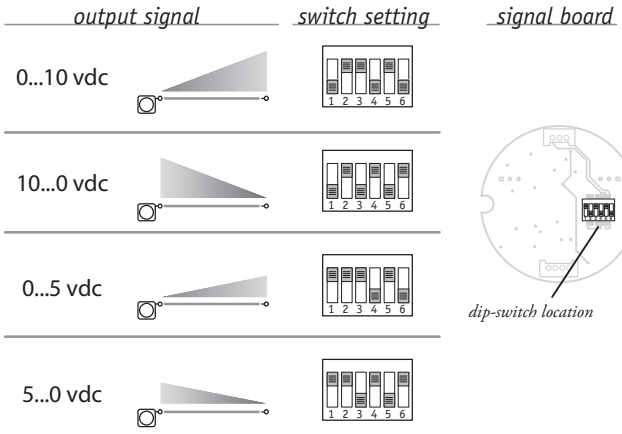
color code	signal
WHITE	input voltage
GREEN	output signal
BLACK	common

Instrumentation Cable

color code	signal
RED	input voltage
GREEN	output signal
BLACK	common

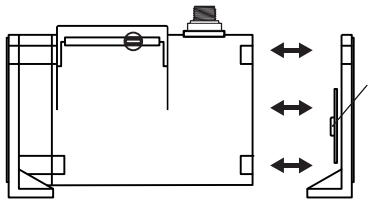
Notes: { * –*Test pressure: 100 feet [30 meters] H_2O (40 PSID); Test Medium: Air; Duration: 2 hours.*
** –*NEMA 4X applies to stainless steel enclosure only.*

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.

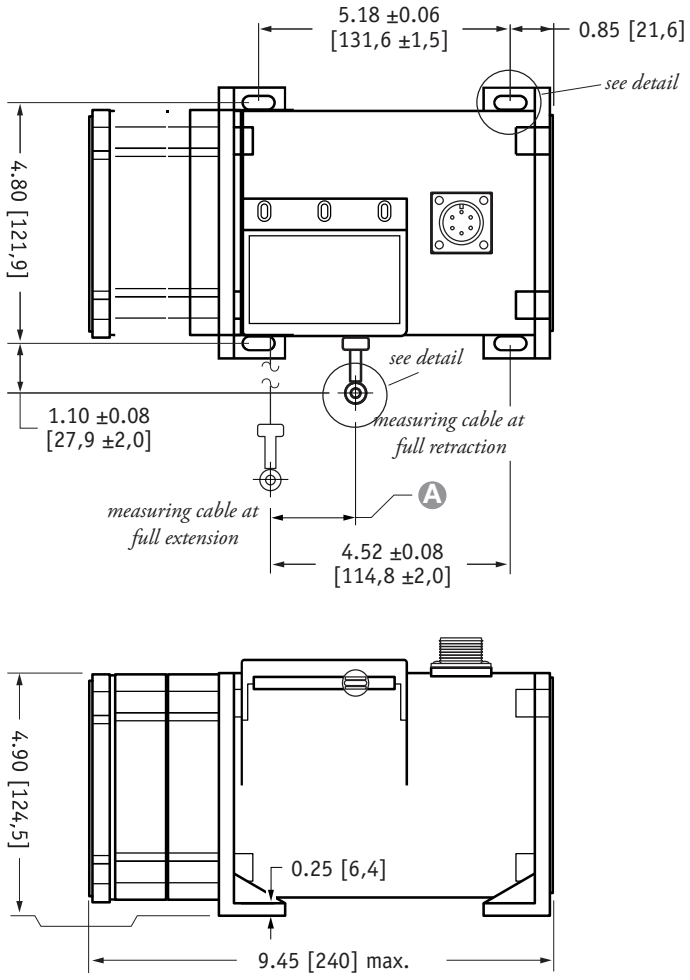
To gain access to the signal board, remove four Allen-Head Screws and remove end cover bracket.

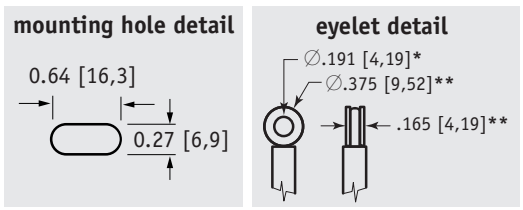


Caution! Do Not Remove Spring-Side End Cover

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

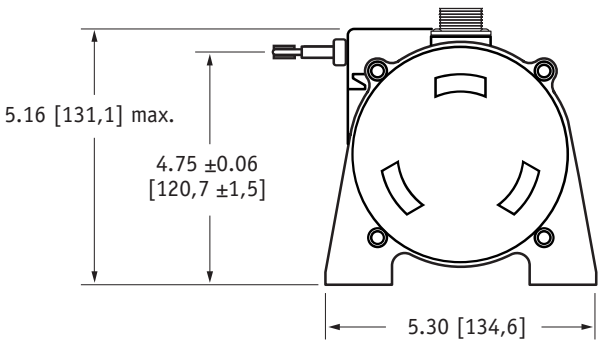
Fig. 2 – Outline Drawing (36 oz. cable tension only)





A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
75	n/a	0.22	0.29	0.37
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	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]

VLS Option - Free Release Protection

The patented 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 the single spring option and 40 to 80 inches per second for the higher tension dual spring option.

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.

How To Configure Model Number for VLS Option:

VLS9510 - ____ **-** ____ **-** ____

R A B C D E F G

creating VLS model number (example)...

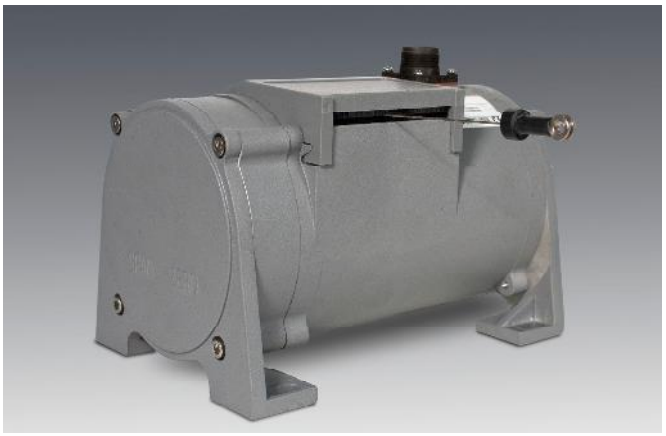
1. select PT9510 model — **PT9510-0100-111-1110**
2. remove "PT" from the model number — **~~PT~~ 9510-0100-111-1110**
3. add "VLS" — **VLS + 9510-0100-111-1110**
4. completed model number ! — **VLS9510-0100-111-1110**

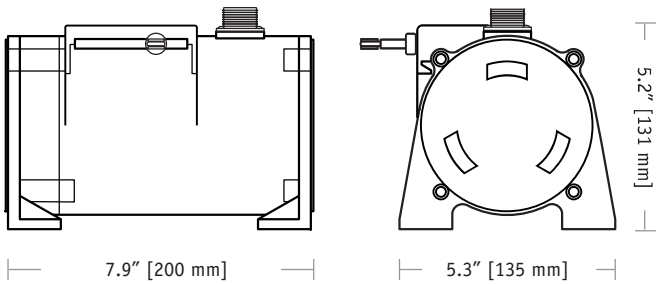
version: **10.0** last updated: **August 15, 2013**

PT9301

Heavy Industrial • Position/Velocity Output

Linear Position/Velocity to 550 inches (1400 cm)
Aluminum or Stainless Steel Enclosure Options
VLS Option To Prevent Free-Release Damage
IP68 • NEMA 6 Protection • Hazardous Area Certification





GENERAL

Full Stroke Range Options (on this datasheet)	0-75 to 0-550 inches
Measuring Cable Options	stainless steel or thermoplastic
Enclosure Material	powder-painted aluminum or 303 stainless steel
Sensor, Position	plastic-hybrid precision potentiometer
Sensor, Velocity	DC tach generator
Maximum Retraction Acceleration	see ordering information
Maximum Velocity	see ordering information
Weight, Aluminum (Stainless Steel) Enclosure	8 lbs. (16 lbs.) max.

POSITION

Output Signal	voltage divider (potentiometer)
Accuracy	± 0.10% full stroke
Repeatability	± 0.02% full stroke
Resolution	essentially infinite
Sensor, Position	plastic-hybrid precision potentiometer
Potentiometer Cycle Life	≥250,000
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
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

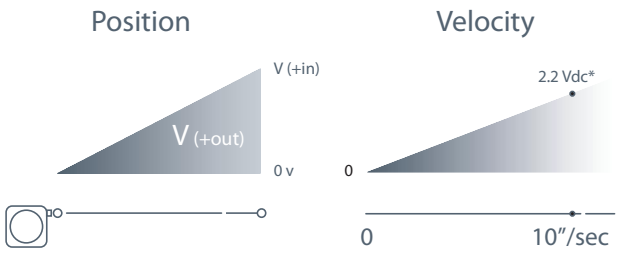
ENVIRONMENTAL

Enclosure	NEMA 4/4X/6, IP 67/68
Operating Temperature	-40° to 200°F (-40° to 90°C)
Vibration	up to 10 g 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".

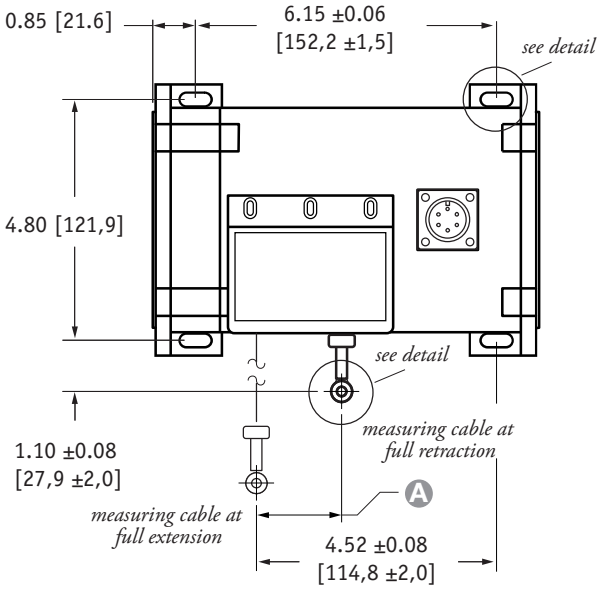
Output Signal:

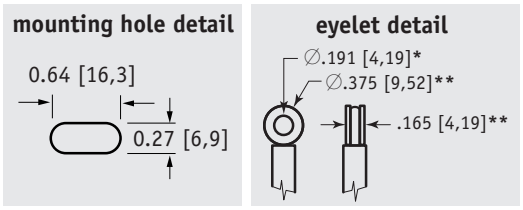


**velocity output rate = 361 mV ± 3% @ 100 inches per min.*

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

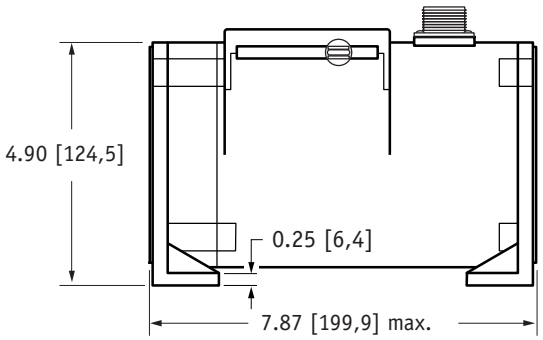
Fig. 1 – Outline Drawing (18 oz. cable tension only)

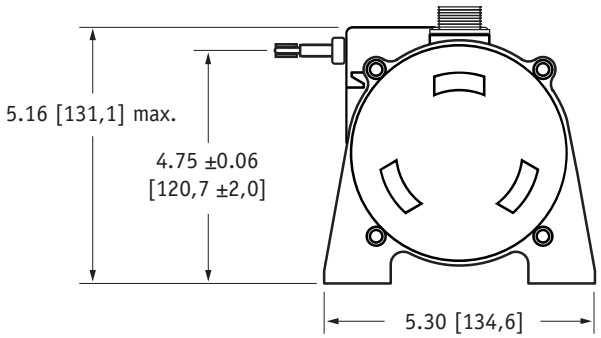




A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
75	n/a	0.22	0.29	0.37
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	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]

Ordering Information:

Model Number:

PT9301-_____ - __ __ __ - __ **1** __ **0**
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Sample Model Number:
PT9301 - 0500 - 111 - 1110

Ⓡ	range:	500 inches
Ⓐ	enclosure/cable tension:	aluminum/18 oz.
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	cable exit:	front
Ⓓ	output signal:	500 ohm position / DC tachometer velocity
Ⓕ	electrical connection:	6-pin plastic connector

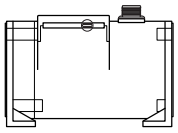
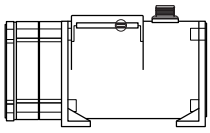
Full Stroke Range:

Ⓡ *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.

** – 36 oz. cable tension strongly recommended*

Ordering Information (cont.):

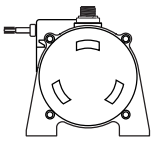
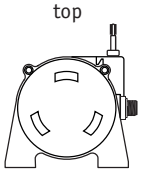
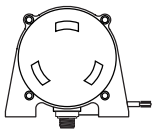
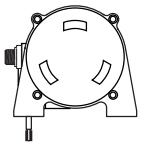
Enclosure Material and Measuring Cable Tension:

Ⓐ order code:	1	3	2	4
tension (±30%):	18 oz.		36 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	4
	∅.034-inch nylon-coated stainless steel	∅.047-inch stainless steel	∅.062-inch thermoplastic	∅.031-inch stainless steel
	*available in **all** ranges*	*all ranges up to **500 inches***	*all ranges up to **400 inches***	***550 inch** range only*

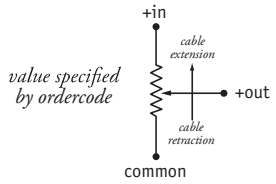
Cable Exit:

Ⓒ 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*

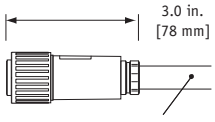
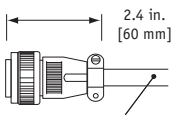
position sensing circuit



velocity sensing circuit

–tolerance = ±10%

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
	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	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*

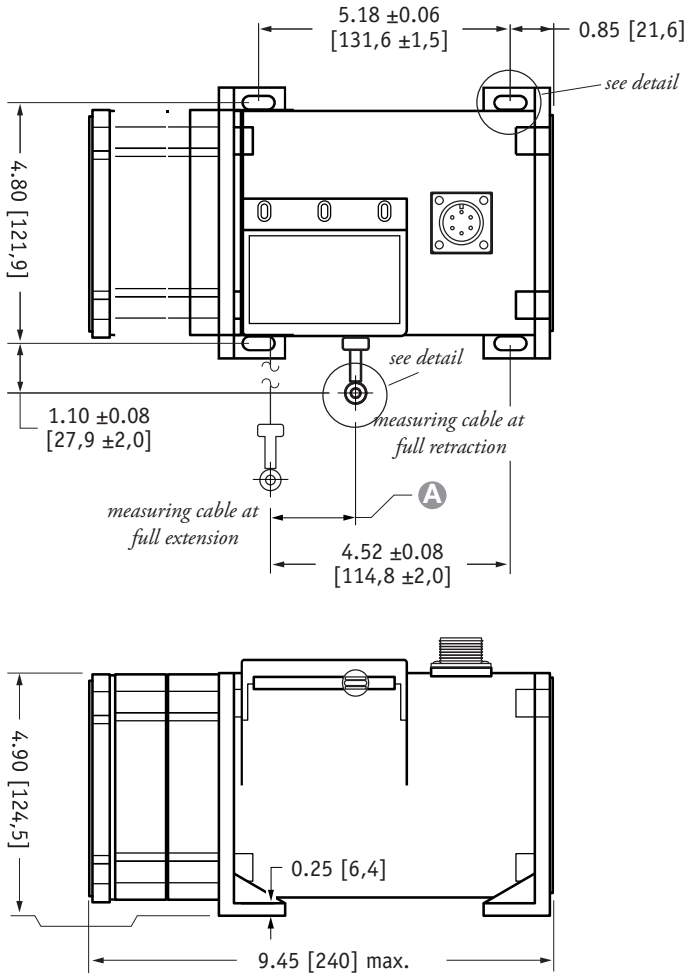
contact view

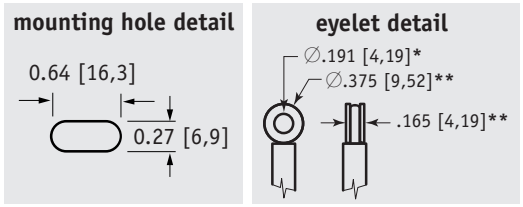
25-ft. instrumentation cable:

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

*–applies to stainless steel enclosure only

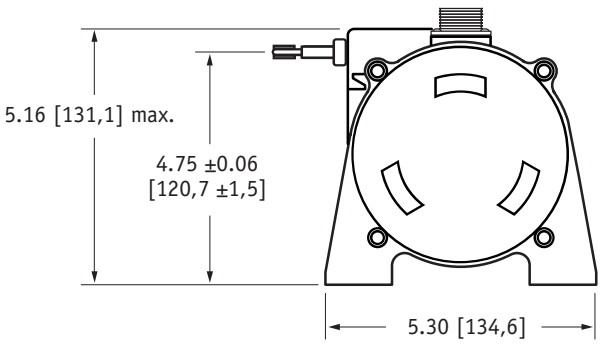
Fig. 2 – Outline Drawing (36 oz. cable tension only)





A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
75	n/a	0.22	0.29	0.37
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	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]

VLS Option - Free Release Protection

The patented 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 the single spring option and 40 to 80 inches per second for the higher tension dual spring option.

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.

How To Configure Model Number for VLS Option:

VLS9301 - ____ **-** ____ **-** ____ **-** ____ ____ ____ ____

Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

creating VLS model number (example)...

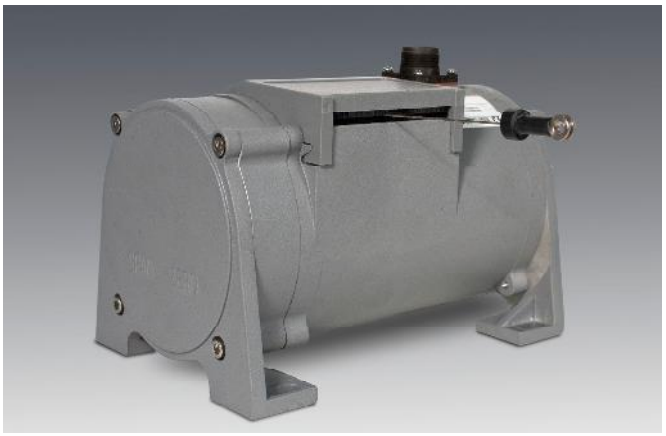
1. select PT9301 model — **PT9301-0100-111-1110**
2. remove "PT" from the model number — ~~PT~~ **9301-0100-111-1110**
3. add "VLS" — **VLS + 9301-0100-111-1110**
4. completed model number ! — **VLS9301-0100-111-1110**

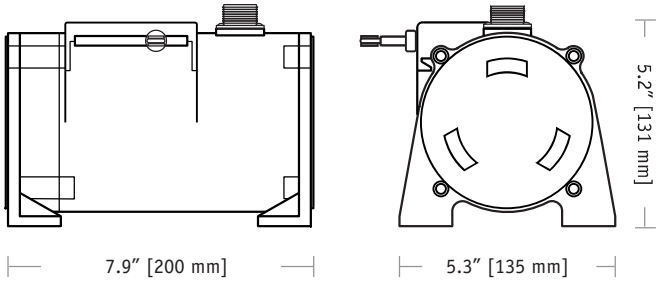
version: **7.0** last updated: **August 15, 2013**

PT9150

Heavy Industrial • Incremental Encoder

Linear Position to 550 inches (1400 cm)
Aluminum or Stainless Steel Enclosure Options
VLS Option To Prevent Free-Release Damage
IP67 • NEMA 6 Protection





GENERAL

Full Stroke Range Options (on this datasheet)	0-75 to 0-550 inches
Output Signal Options	incremental encoder (quadrature)
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	stainless steel or thermoplastic
Enclosure Material	powder-painted aluminum or 303 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

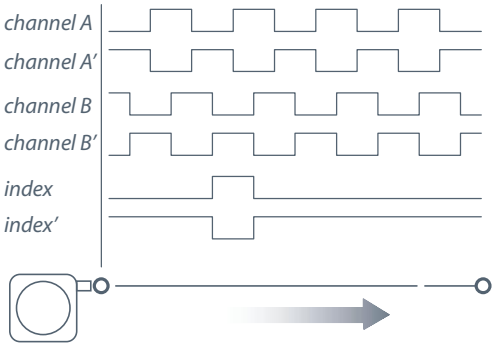
ENVIRONMENTAL

Enclosure	NEMA 4/4X/6, IP 67
Operating Temperature	0° to 160°F (-17° to 71°C)
Vibration	up to 10 g 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. This model is available in a wide variety of resolutions and output stages to fit virtually any requirement.

It can measure up to 550", 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.

Output Signal:



-- see ordering information for available channels

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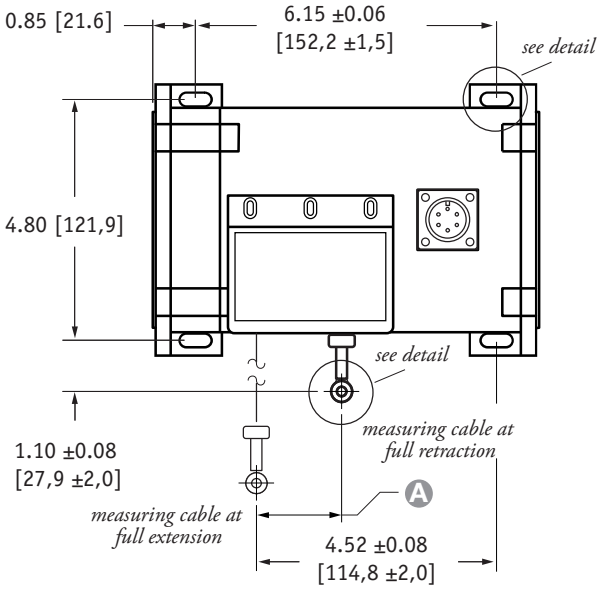
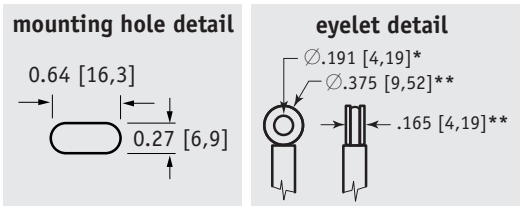
measurement SPECIALTIES™
celesco
celesco.com • info@celesco.com

Fig. 1 – Outline Drawing (18 oz. cable tension only)





A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
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450	n/a	1.31	1.77	n/a
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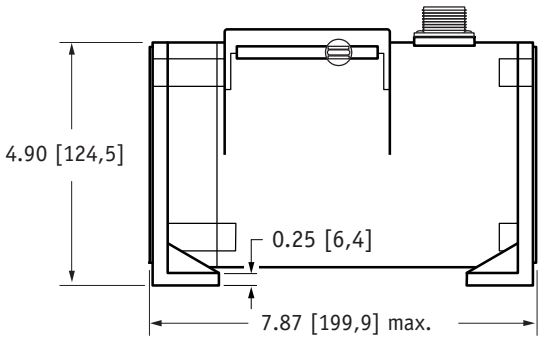
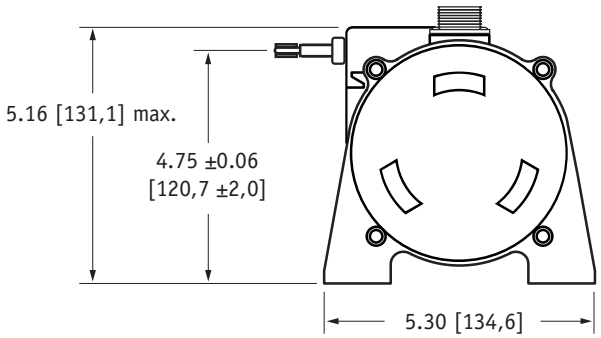
550	1.61	1.61	n/a	n/a





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]

Ordering Information:

Model Number:

PT9150- _____ Ⓡ **-** ___ Ⓐ ___ Ⓑ ___ Ⓒ **-** ___ Ⓓ ___ Ⓔ ___ Ⓕ **0** Ⓖ
order code:

Sample Model Number:
PT9150 - 0500 - 111 - 1110

Ⓡ	range:	500 inches
Ⓐ	enclosure/cable tension:	aluminum/18 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.

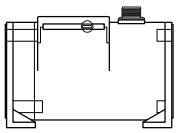
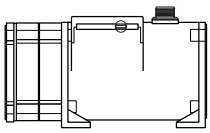
metric ranges

Ⓡ *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

** – 36 oz. cable tension strongly recommended*

Ordering Information (cont.):

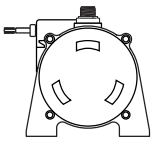
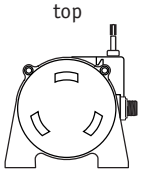
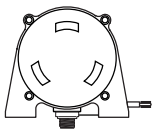
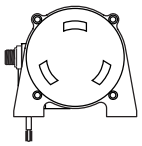
Enclosure Material and Measuring Cable Tension:

Ⓐ order code:	1	3	2	4
tension (±30%):	18 oz.		36 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.*	

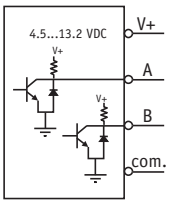
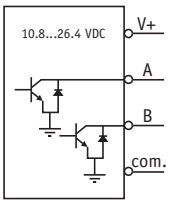
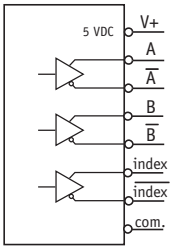
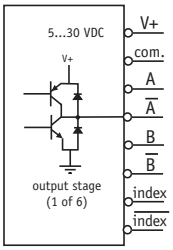
Measuring Cable:

Ⓑ order code:	1	2	3	4
	∅.034-inch nylon-coated stainless steel	∅.047-inch stainless steel	∅.062-inch thermoplastic	∅.031-inch stainless steel
	*available in **all** ranges*	*all ranges up to **500 inches***	*all ranges up to **400 inches***	***550 inch** range only*

Cable Exit:

Ⓒ order code:	1	2	3	4
	front	top	back	down
				

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
				

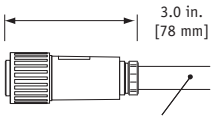
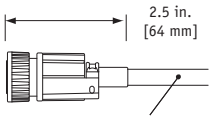
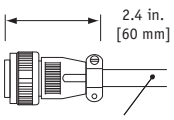
Resolution:

Ⓔ order code:	1	2	3	4
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

Ordering Information (cont.):

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.*

VLS Option - Free Release Protection

The patented 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 the single spring option and 40 to 80 inches per second for the higher tension dual spring option.

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.

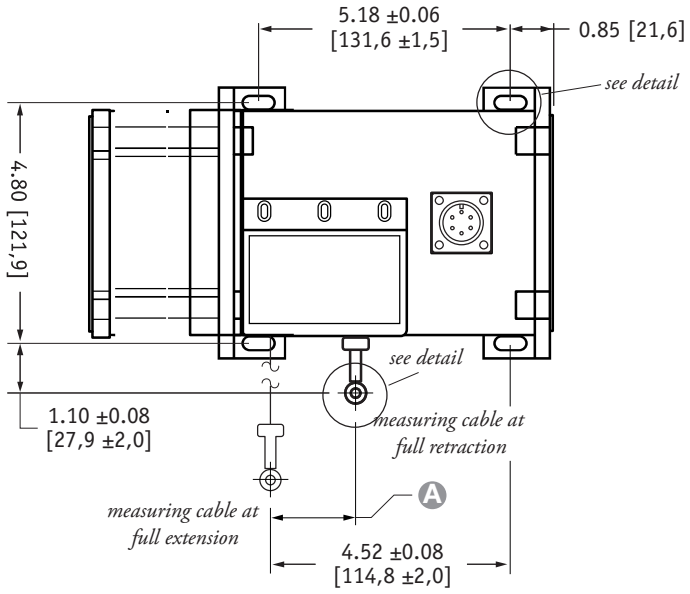
How To Configure Model Number for VLS Option:

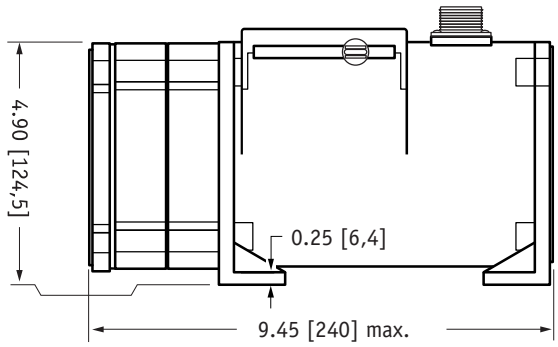
VLS9150 - ____ Ⓡ **-** ___ Ⓐ ___ Ⓑ ___ Ⓒ **-** ___ Ⓓ ___ Ⓔ ___ Ⓕ ___ Ⓖ

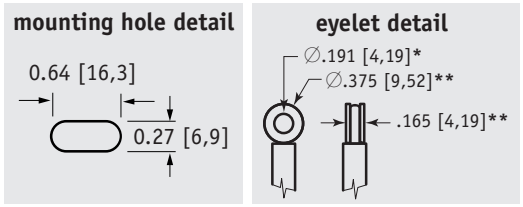
creating VLS model number (example)...

1. select PT9510 model — **PT9150-0100-111-1110**
2. remove "PT" from the model number — ~~PT~~ **9150-0100-111-1110**
3. add "VLS" — **VLS + 9150-0100-111-1110**
4. completed model number ! — **VLS9150-0100-111-1110**

Fig. 2 – Outline Drawing (36 oz. cable tension only)







A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
75	n/a	0.22	0.29	0.37
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150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
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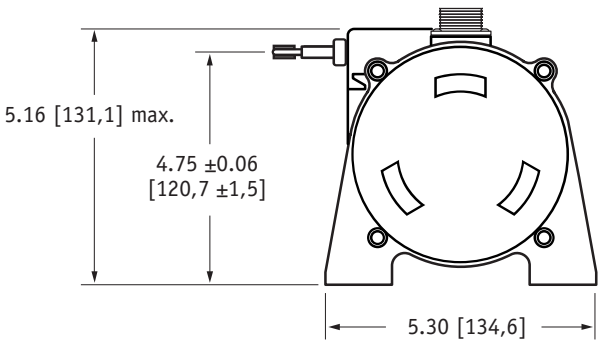


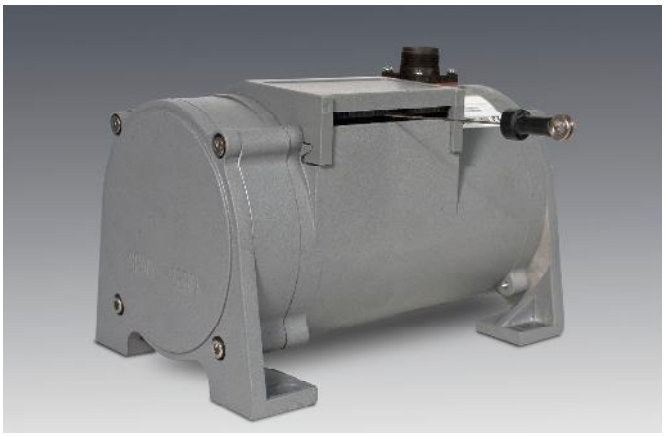
DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

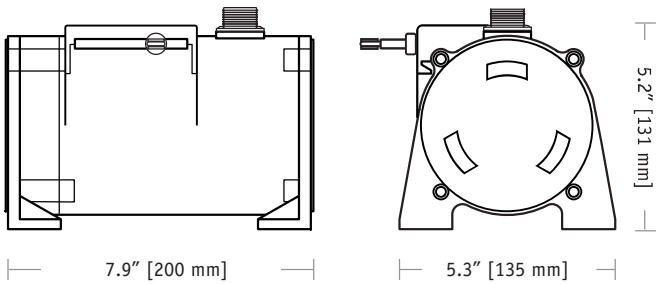
* tolerance = +.005 –.001 [+.13 –.03]
** tolerance = +.005 –.005 [+.13 –.13]

PT9232

Heavy Industrial • RS232 Communication

Linear Position/Velocity to 550 inches (1400 cm)
Aluminum or Stainless Steel Enclosure Options
VLS Option To Prevent Free-Release Damage
IP68 • NEMA 6 Protection • Hazardous Area Certification





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 or thermoplastic
Enclosure Material	powder-painted aluminum or 303 stainless steel
Sensor	plastic-hybrid precision potentiometer
Potentiometer Cycle Life	≥ 250,000 cycles
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

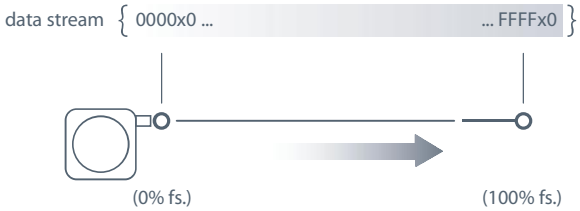
ENVIRONMENTAL

Enclosure	NEMA 4/4X/6, IP 67/68
Operating Temperature	-40° to 200°F (-40° to 90°C)
Vibration	up to 10 g 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.

Output Signal:



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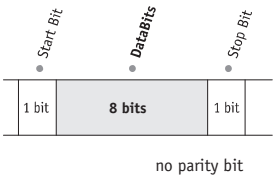
I/O Format

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 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

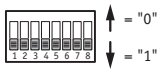
This is a 2 byte value showing the date of currently installed firmware. This value ranges from 01011 - 12319 (decimal). Format is MMDDY. While the month and day are expressed as two digit numbers the year is expressed in a single digit only.

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

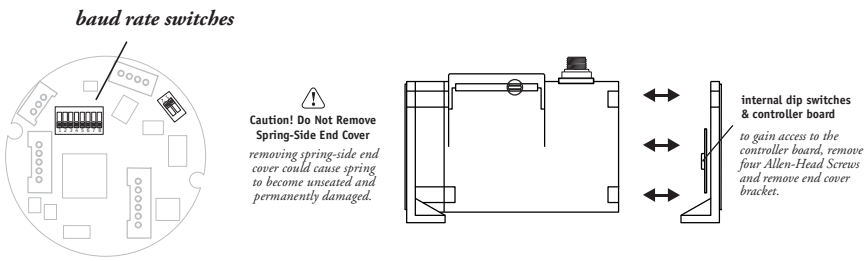
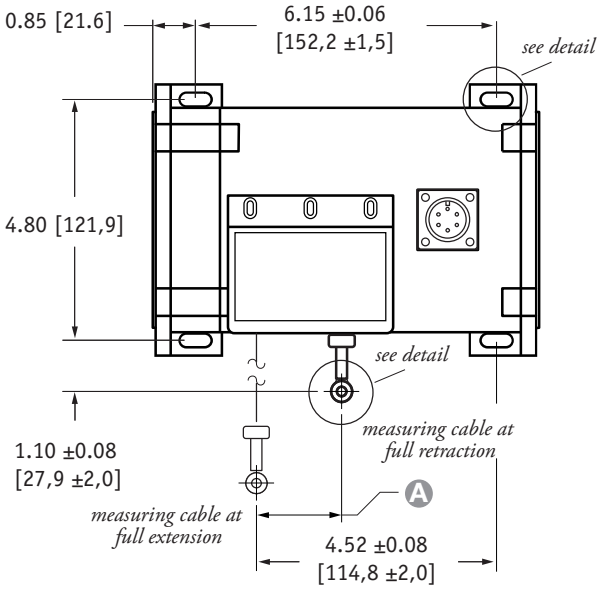
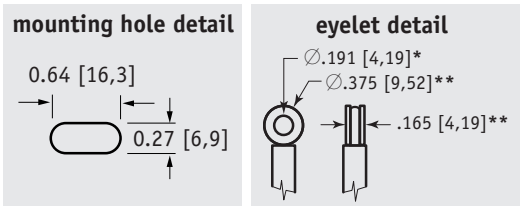


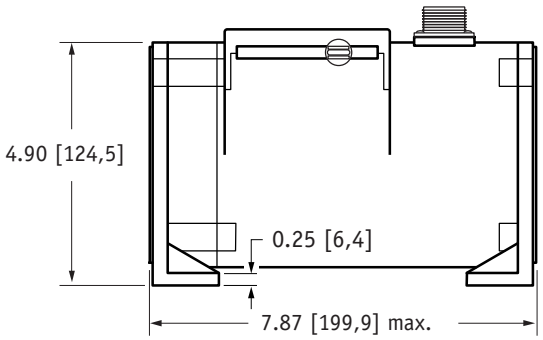
Fig. 1 – Outline Drawing (18 oz. cable tension only)

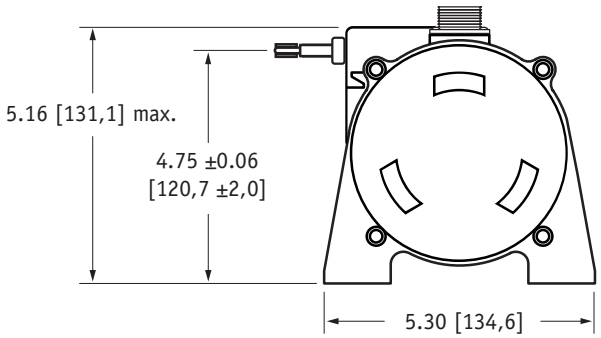




A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
75	n/a	0.22	0.29	0.37
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	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]

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:	18 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.

** – 36 oz. cable tension strongly recommended*

Ordering Information (cont.):

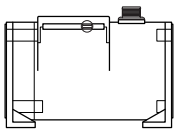
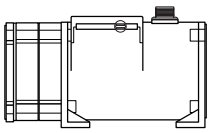
Enclosure Material:

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

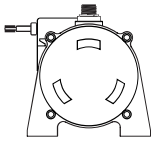
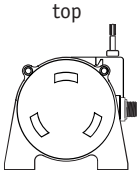
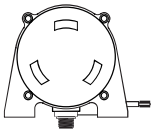
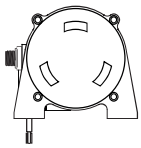
Measuring Cable:

Ⓑ order code:	N34	S47	V62	S31
	∅.034-inch nylon-coated stainless steel	∅.047-inch stainless steel	∅.062-inch thermoplastic	∅.031-inch stainless steel
	*available in **all** ranges*	*all ranges up to **500 inches***	*all ranges up to **400 inches***	***550 inch** range only*

Measuring Cable Tension:

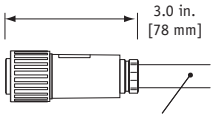
Ⓒ order code:	26		52	
tension (30%):	18 oz.		36 oz.	
enclosure material:	*aluminum*	*stainless steel*	*aluminum*	*stainless steel*
max. acceleration:	1 G	.33 G	5 G	2 G
max. velocity:	60 inches/sec	20 inches/sec	200 inches/sec	80 inches/sec
	 standard housing *see fig 1.*		 dual-spring housing *see fig 2.*	

Cable Exit:

Ⓓ order code:	FR	UP	BK	DN
	front	top	back	down
				

Electrical Connection:

Ⓔ order code:	M6	C25
	6-pin plastic connector with mating plug **IP 67, NEMA 6, NEMA 4X** (stainless enclosure only)	25-ft. instrumentation cable 24 AWG, shielded **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

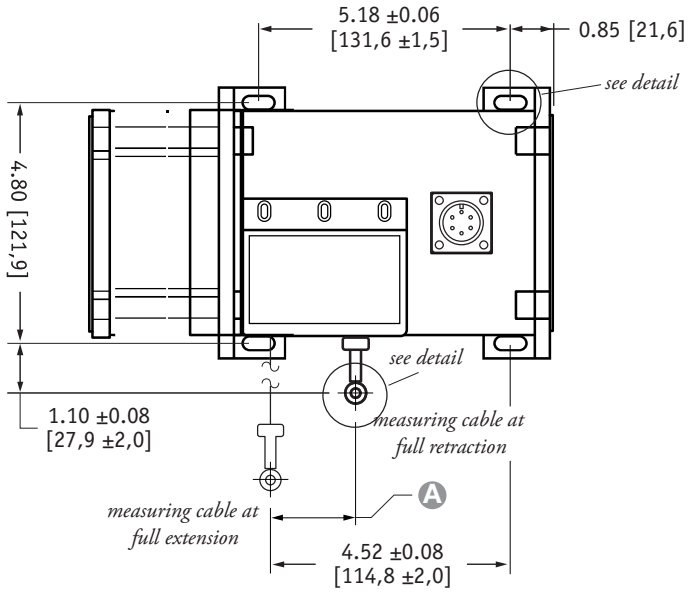
contact view

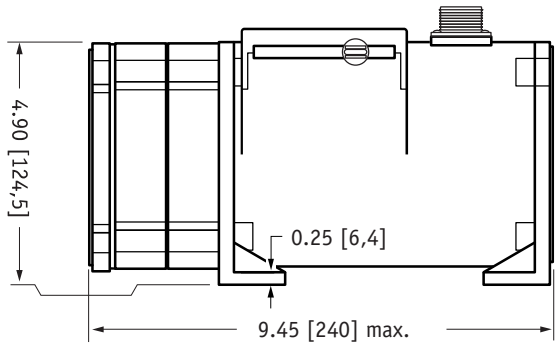
pin	signal
A	9...22 VDC
B	common
C	–
D	Transmitted Data
E	Received Data
F	common

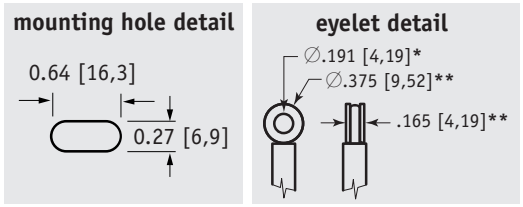
25 ft. x 0.2-in. dia.
[7,5 M x 5 mm dia.]
24 AWG, shielded

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

Fig. 2 – Outline Drawing (36 oz. cable tension only)







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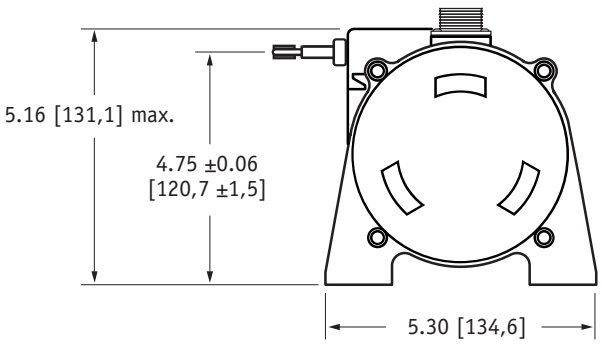
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	1.61	n/a	n/a



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]

VLS Option - Free Release Protection

The patented 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 the single spring option and 40 to 80 inches per second for the higher tension dual spring option.

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.

How To Configure Model Number for VLS Option:

VLS9232 - ____ **-** ____ **-** ____ **-** ____ ____ ____ ____

R A B C D E F G

creating VLS model number (example)...

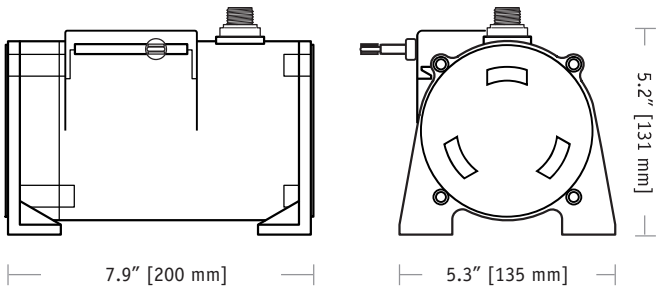
1. select PT9232 model — **PT9232-0100-111-1110**
2. remove "PT" from the model number — **~~PT~~ 9232-0100-111-1110**
3. add "VLS" — **VLS + 9232-0100-111-1110**
4. completed model number ! — **VLS9232-0100-111-1110**

version: **9.0** last updated: **August 15, 2013**

PT9DN

Heavy Industrial • DeviceNET®

Linear Position/Velocity to 550 inches (1400 cm)
Aluminum or Stainless Steel Enclosure Options
VLS Option To Prevent Free-Release Damage
IP67 • NEMA 6 Protection



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 cycles
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 max.
Address Setting/Node ID	0...63 set via DIP switches (default: 63)
Baud Rate	125K, 250K or 500K set via DIP switches
EDS File	available @ http://celesco.com/downloads

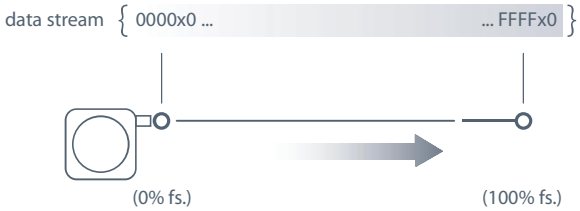
ENVIRONMENTAL

Enclosure	NEMA 4/4X/6, IP 67
Operating Temperature	-40° to 200°F (-40° to 90°C)
Vibration	up to 10 g 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.

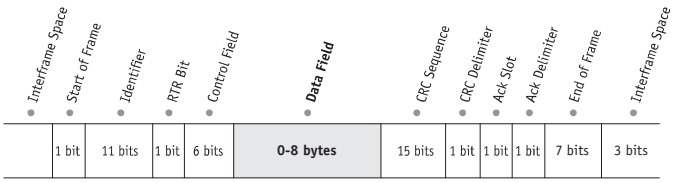
Output Signal:



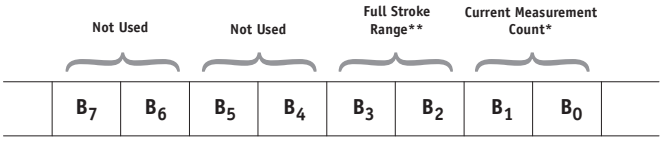
20630 Plummer Street • Chatsworth, CA 91311
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799
measurement SPECIALTIES™
celesco
celesco.com • info@celesco.com

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.

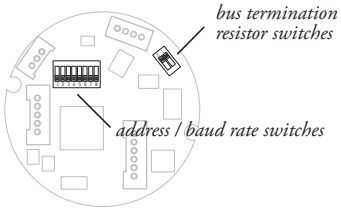
DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k

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.

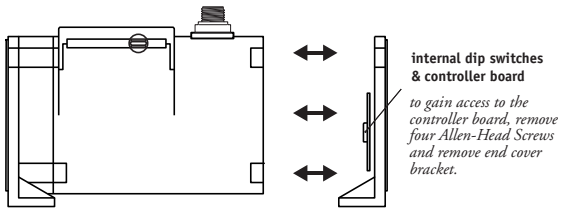
The bus termination resistor is activated setting switches **1** & **2** on the 2-pole DIP switch (located on the internal DeviceNET controller board) to the "ON" position.

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.



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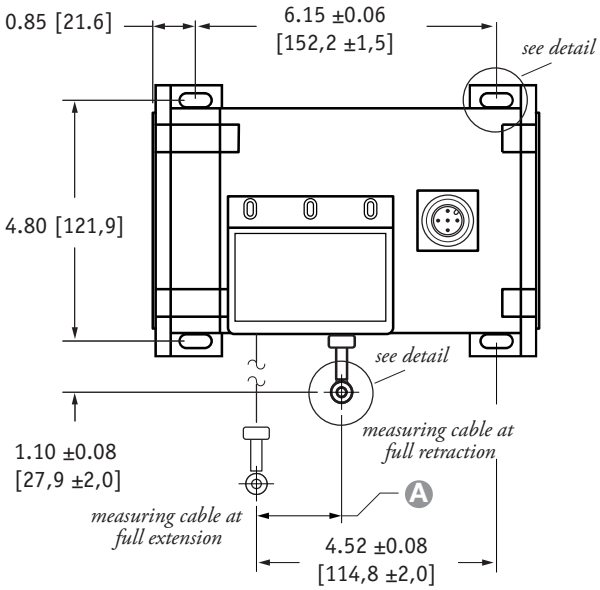

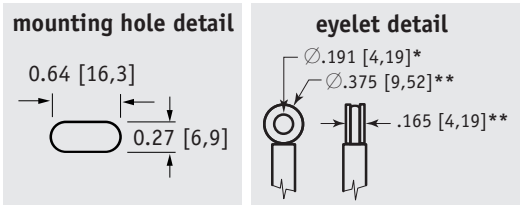

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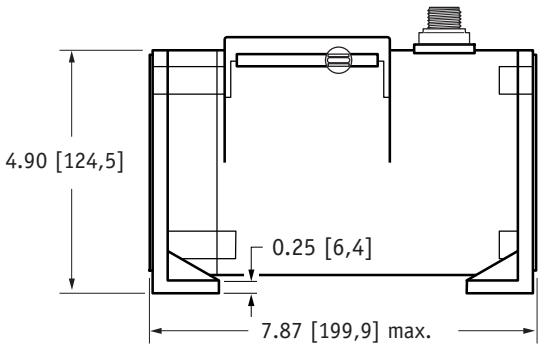
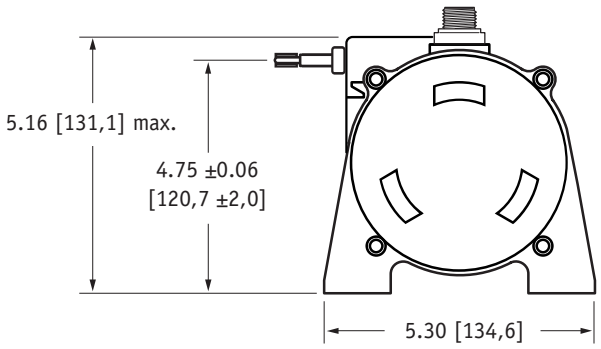
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	1.61	n/a	n/a





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]

VLS Option - Free Release Protection

The patented 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 the single spring option and 40 to 80 inches per second for the higher tension dual spring option.

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.

How To Configure Model Number for VLS Option:

VLS9DN - ____ - ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___
R A B C D E F G

creating VLS model number (example)...

1. select PT9DN model — **PT9DN-200-N34-26...**
2. remove "PT" from the model number — **~~PT~~9DN-200-N34-26...**
3. add "VLS" — **VLS + DN-200-N34-26...**
4. completed model number ! — **VLSDN-200-N34-26...**

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:	18 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.

** – 36 oz. cable tension strongly recommended*

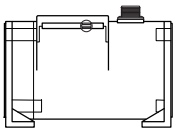
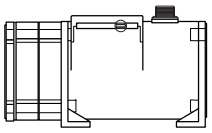
Enclosure Material:

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

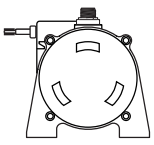
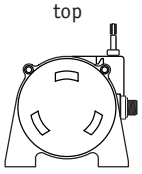
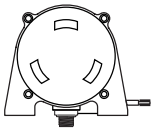
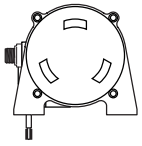
Measuring Cable:

Ⓑ order code:	N34	S47	V62	S31
	∅.034-inch nylon-coated stainless steel	∅.047-inch stainless steel	∅.062-inch thermoplastic	∅.031-inch stainless steel
	*available in **all** ranges*	*all ranges up to **500 inches***	*all ranges up to **400 inches***	***550 inch** range only*

Measuring Cable Tension:

Ⓒ order code:	26		52	
tension (30%):	18 oz.		36 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

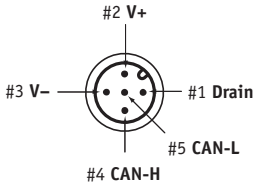
Ordering Information (cont.):

Terminating Resistor:

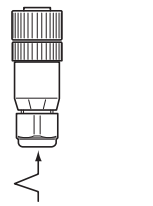
Ⓕ order code:	TR	NR
	terminating resistor	no terminating resistor

Electrical Connection:

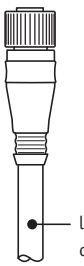
Ⓖ order code:	blank	MC5	SC5	NC5
	5-pin micro-connector *(no mating plug supplied)*	5-pin micro-connector w/ mating plug	5-pin micro-connector and 5 meter length cordset w/straight mating plug	5-pin micro-connector and 5 meter length cordset w/90° mating plug



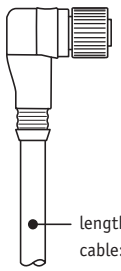
connector
(contact view)



0.16" - 0.32" OD Cable (THIN)

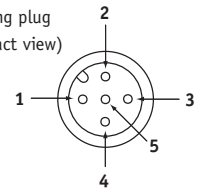


length: 16ft [5M]
cable: Thin



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

VLS Option - Free Release Protection

The patented 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 the single spring option and 40 to 80 inches per second for the higher tension dual spring option.

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.

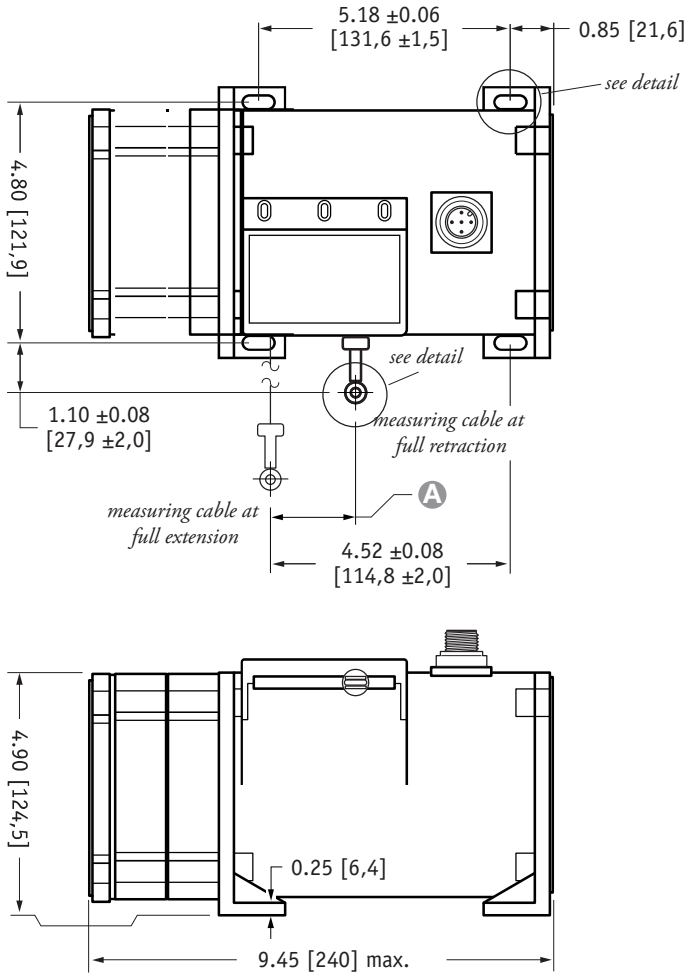
How To Configure Model Number for VLS Option:

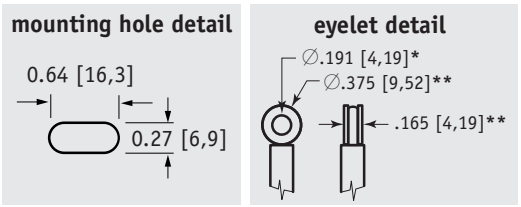
VLS9DN - ____ Ⓡ - ___ Ⓐ - ___ Ⓑ - ___ Ⓒ - ___ Ⓓ - ___ Ⓔ - ___ Ⓕ - ___ Ⓖ

creating VLS model number (example)...

1. select PT9DN model — **PT9DN-200-N34-26...**
2. remove "PT" from the model number — **~~PT~~9DN-200-N34-26...**
3. add "VLS" — **VLS + DN-200-N34-26...**
4. completed model number ! — **VLSDN-200-N34-26...**

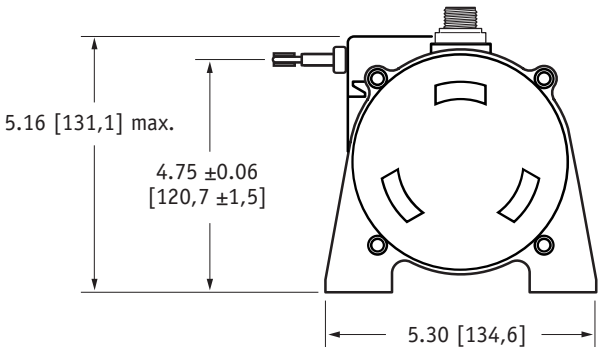
Fig. 2 – Outline Drawing (36 oz. cable tension only)





A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
75	n/a	0.22	0.29	0.37
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	1.61	n/a	n/a



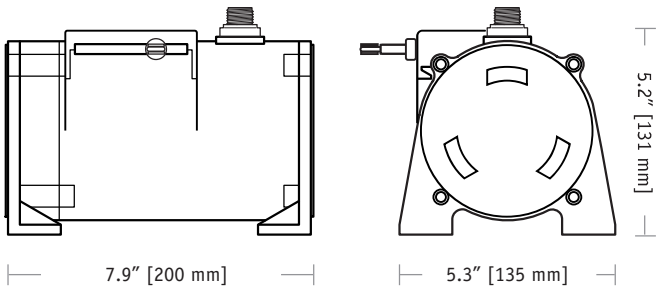
DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

PT9CN

Heavy Industrial • J1939 CANbus

Linear Position/Velocity to 550 inches (1400 cm)
Aluminum or Stainless Steel Enclosure Options
VLS Option To Prevent Free-Release Damage
IP67 • NEMA 6 Protection



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 cycles
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)

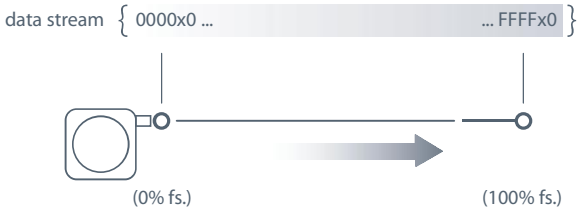
ENVIRONMENTAL

Enclosure	NEMA 4/4X/6, IP 67
Operating Temperature	-40° to 200°F (-40° to 90°C)
Vibration	up to 10 g to 2000 Hz maximum

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".

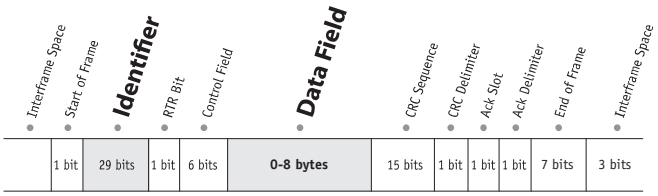
As a member of Celesco's innovative family of NEMA 4 rated cable-extension transducers, the PT9CN installs in minutes by simply mounting it's body to a fixed surface and attaching it's cable to the movable object. Perfect parallel alignment not required.

Output Signal:



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

I/O Format and Settings



repetition = 8 msec.

• Identifier

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

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

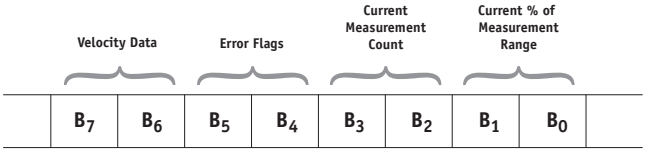
• Data Field

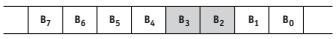
B_0 = LSB current % of measurement range byte
B_1 = MSB current % of measurement range byte

B_2 = LSB current measurement count byte
B_3 = MSB current measurement count byte

B_4 = error flag
B_5 = error flag

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





Current Measurement Count

The **C**urrent **M**easurement **C**ount (**CMC**) is the output data that indicates the present position of the measuring cable. The CMC is a 16-bit value that occupies 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).

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.

Converting CMC to Linear Measurement

To convert the current measurment count to inches or millimeters, simply divide the count by 65,535 (total counts over the range) and then multiply that value by the full stroke range:

$$\left(\frac{\text{current measurement count}}{65{,}535}\right) \text{X} \text{ full stroke range}$$

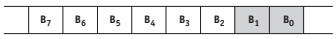
Sample Conversion:

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

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

If the full stroke range is **625 mm** and the current position is **0x0FF2** (4082 Decimal) then,

$$\left(\frac{4082}{65{,}535}\right) \text{X } 625 \text{ mm} = 39 \text{ mm}$$



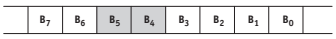
Current % of Measurement Range

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%

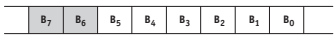


Error Flags

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

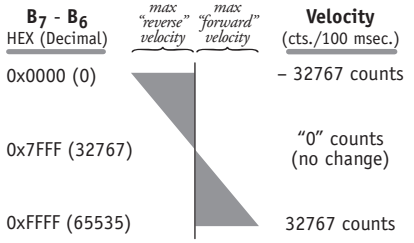
0xAA (red LED on controller board) indicates that the sensor has moved well beyond the calibrated range of the internal position potentiometer.

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.



Velocity

Data in bytes B_7 - B_6 is the change in the **CMC** (current measurement count) over a 100 msec time period. This data can then be used to calculate velocity in a post processing operation.



Velocity Calculation

$$\left(\frac{\text{count change} - 32767}{.1 \text{ sec. time period}}\right) \text{X} \left(\frac{\text{full stroke range}}{65{,}535}\right)$$

Sample Calculations

Cable Extension (positive direction):

B_7–B_6 = 0x80C6 (32966 Dec), **full stroke = 200 in.**

$$\left(\frac{32966 - 32767}{.1 \text{ sec}}\right) \text{X} \left(\frac{200 \text{ in.}}{65{,}535}\right) = 6.07 \text{ in./sec.}$$

Cable Retraction (negative direction):

B_7–B_6 = 0x7F1A (32538 Dec), **full stroke = 200 in.**

$$\left(\frac{32538 - 32767}{.1 \text{ sec}}\right) \text{X} \left(\frac{200 \text{ in.}}{65{,}535}\right) = -6.99 \text{ in./sec.}$$

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.

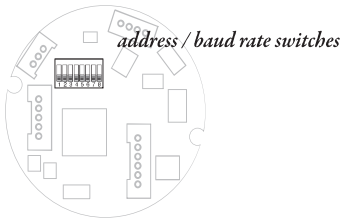
The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

Baud Rate

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

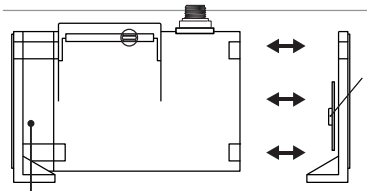
The baud rate can be set using switches **7** & **8** on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

CANBus Controller Board



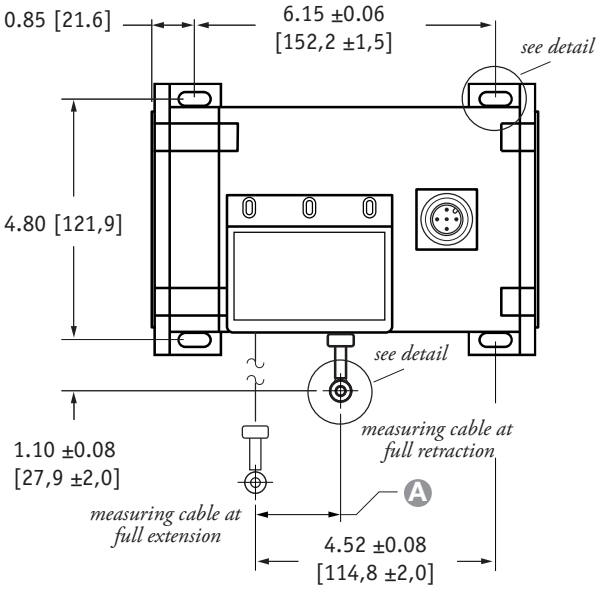
DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
...	...	...	...	...	...	...
1	1	1	1	1	1	63

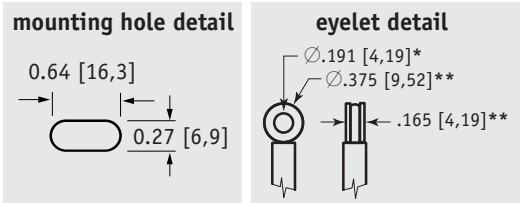
DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k



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

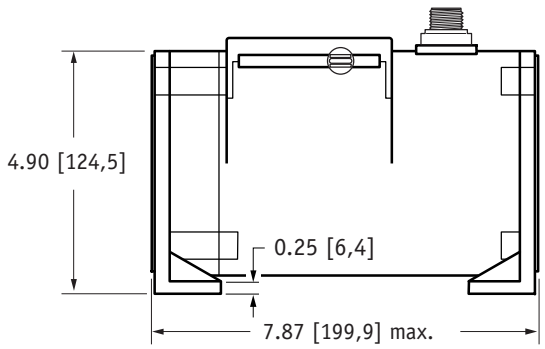
Fig. 1 – Outline Drawing (18 oz. cable tension only)

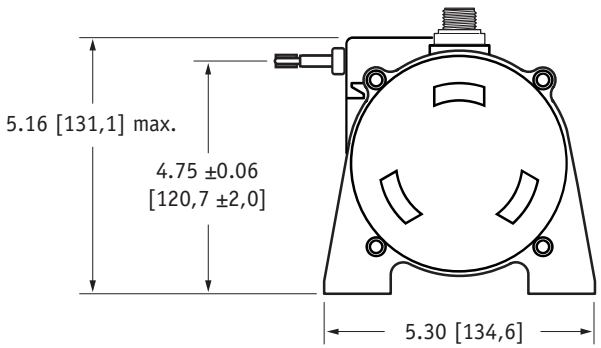




A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
75	n/a	0.22	0.29	0.37
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	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]

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:	18 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.

** – 36 oz. cable tension strongly recommended*

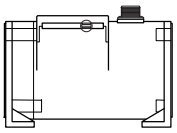
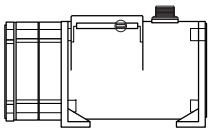
Enclosure Material:

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

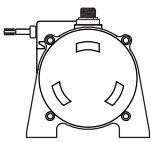
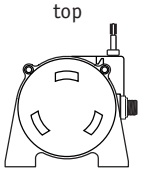
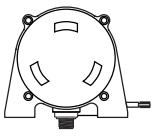
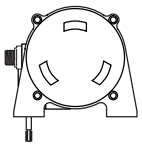
Measuring Cable:

Ⓑ order code:	N34	S47	V62	S31
	∅.034-inch nylon-coated stainless steel	∅.047-inch stainless steel	∅.062-inch thermoplastic	∅.031-inch stainless steel
	*available in **all** ranges*	*all ranges up to **500 inches***	*all ranges up to **400 inches***	***550 inch** range only*

Measuring Cable Tension:

Ⓒ order code:	26		52	
tension (30%):	18 oz.		36 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 (cont.):

Node ID:

Ⓖ order code: 0 1 2 3 ... 61 62 63

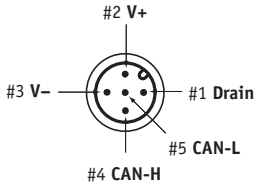
select address (0 - 63 Decimal)

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)

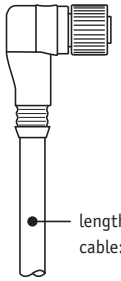
SC5

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

length: 16ft [5M]
cable: Thin

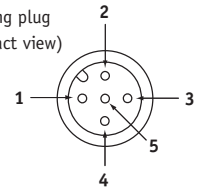
NC5

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

VLS Option - Free Release Protection

The patented 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 the single spring option and 40 to 80 inches per second for the higher tension dual spring option.

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.

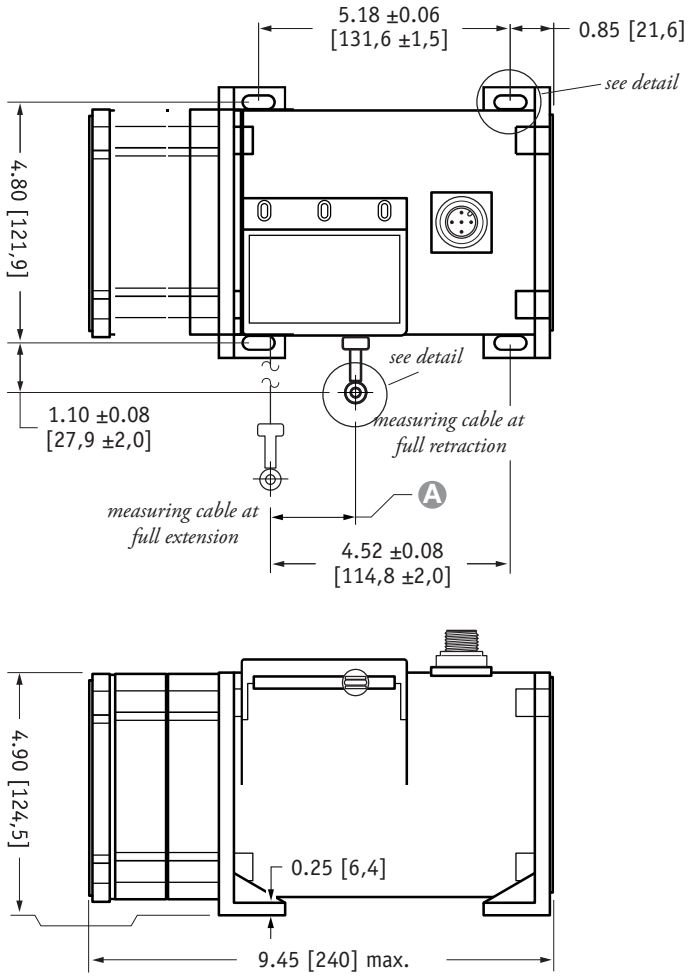
How To Configure Model Number for VLS Option:

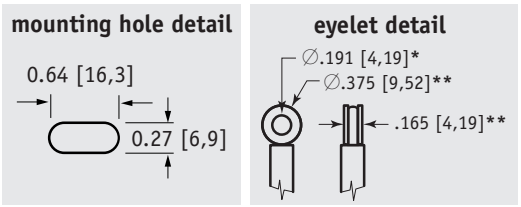
VLS9CN - ___Ⓡ - ___Ⓐ - ___Ⓑ - ___Ⓒ - ___Ⓓ - **J**Ⓔ - ___Ⓕ - ___Ⓖ - ___Ⓗ

creating VLS model number (example)...

1. select PT9CN model — **PT9CN-200-N34-26...**
2. remove "PT" from the model number — ~~PT~~**9CN-200-N34-26...**
3. add "VLS" — **VLS + CN-200-N34-26...**
4. completed model number ! — **VLSCN-200-N34-26...**

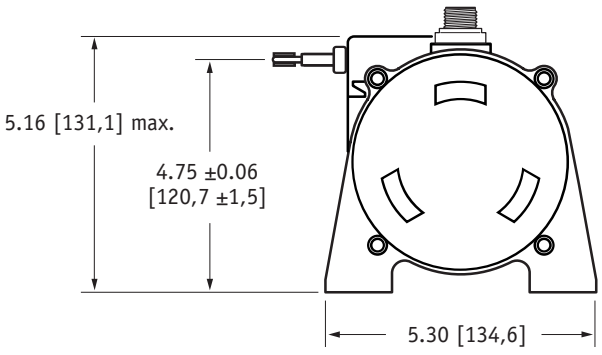
Fig. 2 – Outline Drawing (36 oz. cable tension only)





A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
75	n/a	0.22	0.29	0.37
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	1.61	n/a	n/a

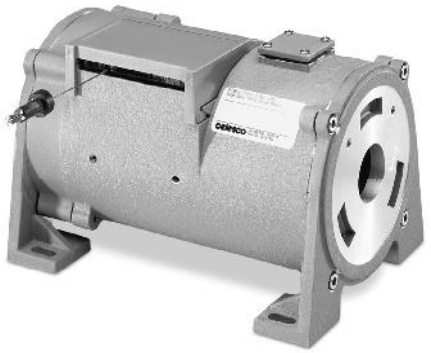


DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.03 IN. [0.5 MM] unless otherwise noted.

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

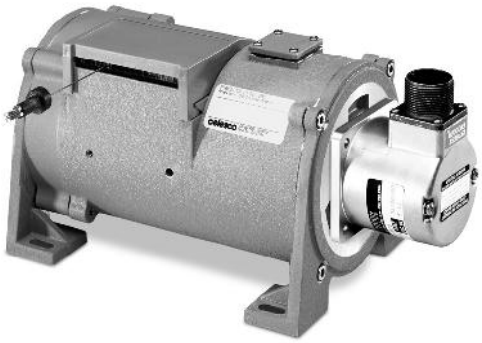
Mates to Virtually Any Encoder
Ranges: 0-75 to 0-550 inches
Available With or Without Encoder

PT9600



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.



Specification Summary:

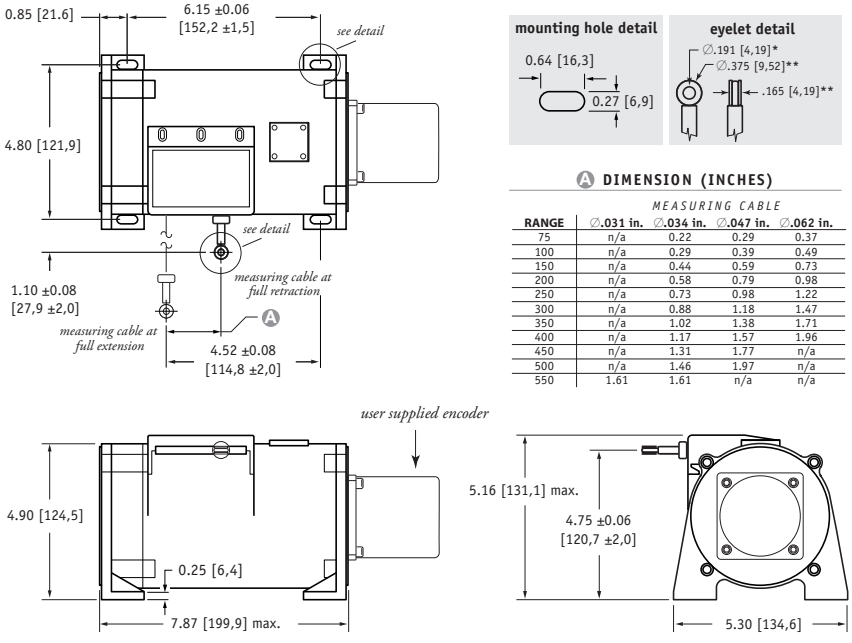
GENERAL

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 ..... -40º to 200ºF (-40º to 90ºC)

Fig. 1 – Outline Drawing (18 oz. cable tension only)



Ⓐ DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	∅.031 in.	∅.034 in.	∅.047 in.	∅.062 in.
75	n/a	0.22	0.29	0.37
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	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]

Ordering Information:

Model Number:

PT9600- _____ **-** ___ ___ ___ **-** _____
order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ

Sample Model Number:

PT9600 - 0200 - 111 - F01

Ⓡ	range:	200 inches
Ⓐ	enclosure / cable tension:	aluminum / 18 oz.
Ⓑ	measuring cable:	.034 nylon-coated stainless
Ⓒ	cable exit:	front
Ⓓ	rotational sensor mounting style:	F01 (2.5-in. sq. flange)

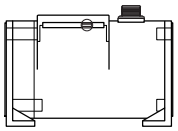
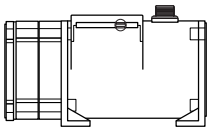
» Trying to reorder but can't find your existing model number? Please contact factory for help.

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.

** – 36 oz. cable tension strongly recommended*

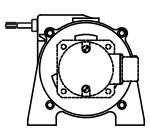
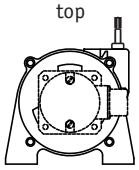
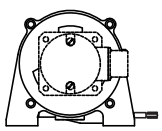
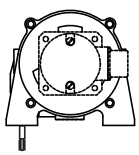
Enclosure Material and Measuring Cable Tension:

Ⓐ order code:	1	3	2	4
tension (±30%):	18 oz.		36 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	4
measuring cable:	.034 nylon-coated stainless steel	.047 stainless steel	.062 thermoplastic	.031 stainless steel
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.	1 turn = 12.664 ± 0.010 in.
conversion ratio, stainless enclosure:	1 turn = 12.579 ± 0.016 in.	1 turn = 12.620 ± 0.016 in.	1 turn = 12.661 ± 0.016 in.	1 turn = 12.569 ± 0.016 in.
	*available in **all** ranges*	*all ranges up to **500 inches***	*all ranges up to **400 inches***	***550 inch** range only*

Cable Exit:

Ⓒ order code:	1	2	3	4
	front	top	back	down
				

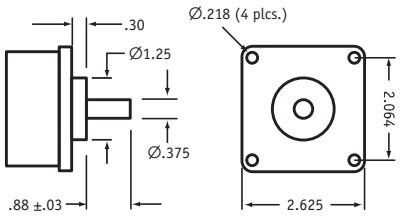
Ordering Information:

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

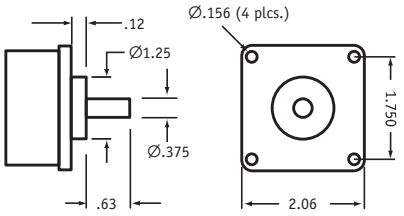
Note: If you don't see your encoder style, please contact factory. All encoder types supported.

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



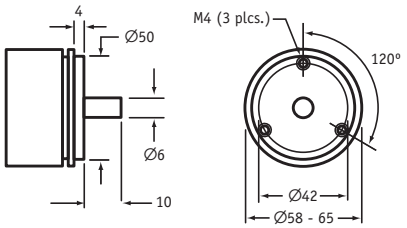
all dimensions are in ***inches***

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



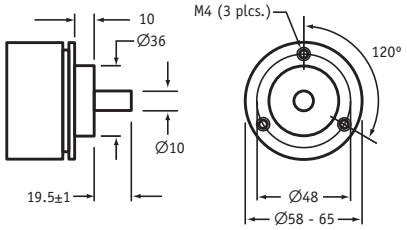
all dimensions are in ***inches***

S01 - Face-Mount (6mm shaft/M4 screws)



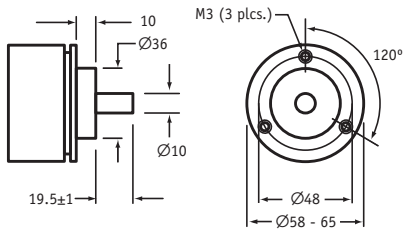
all dimensions are in ***mm***

S02 - Face-Mount (10mm shaft/M4 screws)



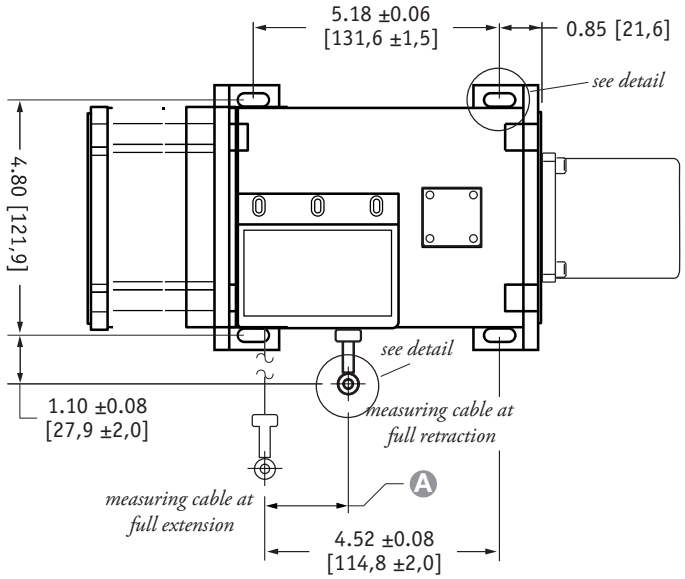
all dimensions are in ***mm***

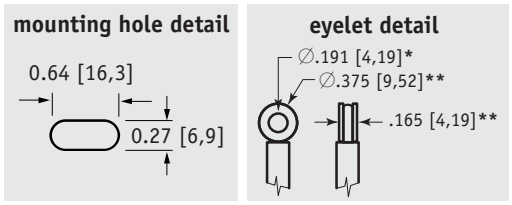
S04 - Face-Mount (10mm shaft/M3 screws)



all dimensions are in ***mm***

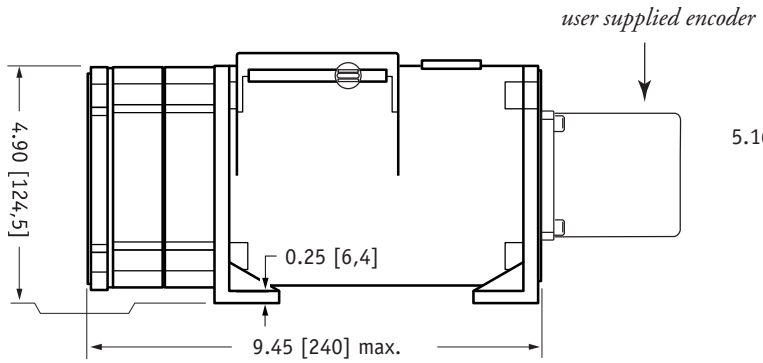
Fig. 2 – Outline Drawing (36 oz. cable tension only)

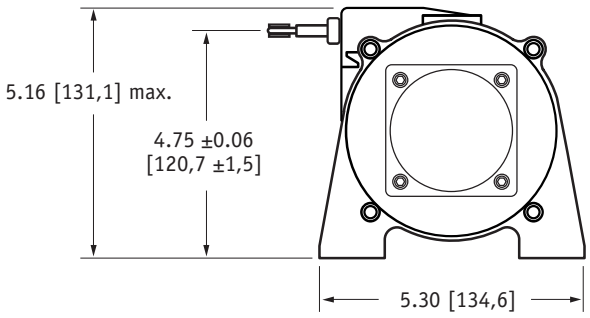




A DIMENSION (INCHES)

	MEASURING CABLE			
RANGE	**∅.031 in.**	**∅.034 in.**	**∅.047 in.**	**∅.062 in.**
75	n/a	0.22	0.29	0.37
100	n/a	0.29	0.39	0.49
150	n/a	0.44	0.59	0.73
200	n/a	0.58	0.79	0.98
250	n/a	0.73	0.98	1.22
300	n/a	0.88	1.18	1.47
350	n/a	1.02	1.38	1.71
400	n/a	1.17	1.57	1.96
450	n/a	1.31	1.77	n/a
500	n/a	1.46	1.97	n/a
550	1.61	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]