



mm PT5CN

Description

- Absolute Linear Position to 250 inches (6350 mm)
- Hard Anodized Aluminum Enclosure
- High Cycle Applications
- IP67 · NEMA 6 Protection



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

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

GENERAL

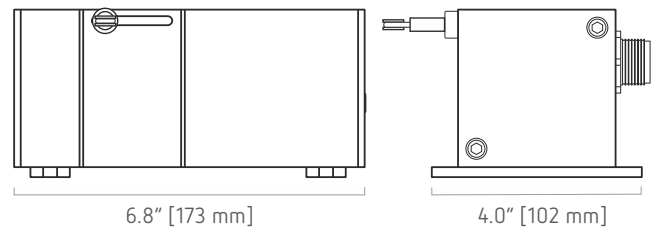
Full Stroke Ranges	0-10 to 0-250 inches
Electrical Interface	CANbus SAE J1939
Protocol	Proprietary B
Accuracy	± 0.25% to ± 0.10% full stroke
Repeatability	± 0.02% full stroke
Resolution	± 0.003% full stroke
Measuring Cable	stainless steel or thermoplastic
Enclosure Material	hard anodized aluminum
Sensor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

ELECTRICAL

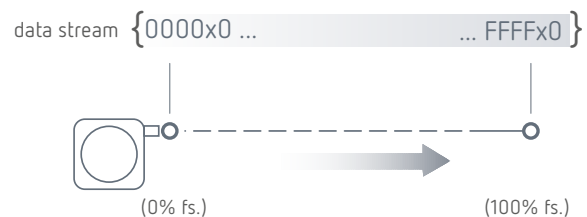
Input Voltage	7 - 18 VDC
Input Current	60 mA max.
Baud Rate	125K, 250K, or 500K via DIP switches
Update Rate	10 ms. (20 ms. available—contact factory)

ENVIRONMENTAL

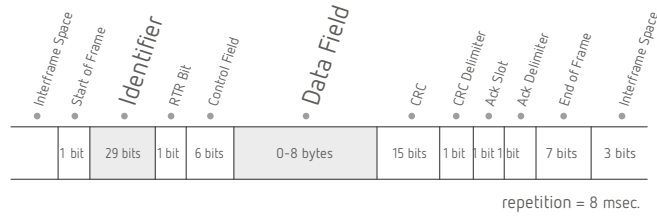
Environmental Suitability	NEMA 4/6, IP 65/67
Operating Temperature	-40° to 185°F (-40° to 85°C)
Vibration	up to 10 g to 2000 Hz maximum



Output signal



I/O Format and Settings



Identifier

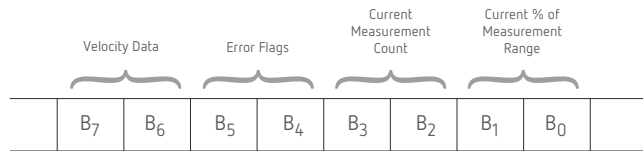
	Message Priority		Future Use		J1939 Reference Proprietary B								Data Field Type*						Not Used		Node ID**												
Example	1	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	1	0	0	1	1	0	0	1	1	0	0	1	1	1	1	1	1
Identifier Bit No.	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
Hex Value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

B₀ = LSB current % of measurement range byte
 B₁ = MSB current % of measurement range byte
 B₂ = LSB current measurement count byte
 B₃ = MSB current measurement count byte

B₄ = error flag
 B₅ = error flag
 B₆ = LSB velocity data byte
 B₇ = MSB velocity data byte



B ₇	B ₆	B ₅	B ₄	B ₃	B ₂	B ₁	B ₀
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B ₇	B ₆	B ₅	B ₄	B ₃	B ₂	B ₁	B ₀
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B ₇	B ₆	B ₅	B ₄	B ₃	B ₂	B ₁	B ₀
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Current Measurement Count

The Current Measurement Count (CMC) is the output data that indicates the present position of the measuring cable. The CMC is a 16-bit value that occupies bytes B₂ and B₃ of the data field. B₂ is the LSB (least significant byte) and B₃ 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 measurement 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:

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

Sample Conversion:

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

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

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

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

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%

B ₇	B ₆	B ₅	B ₄	B ₃	B ₂	B ₁	B ₀
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Error Flags

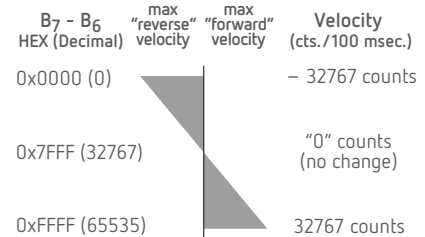
0x55 (yellow LED on controller board) indicates that the sensor has begun to travel beyond the calibrated range of the internal position potentiometer.

0xA8 (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 B₇ - B₆ 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

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

Sample Calculations

Cable Extension (positive direction):

B₇-B₆ = 0x89C6 (43462 Dec), full stroke = 60 in.

$$\left(\frac{35270 - 32767}{.1 \text{ sec}} \right) \times \left(\frac{60 \text{ in.}}{65,535} \right) = 22.92 \text{ in. / sec.}$$

Cable Retraction (negative direction):

B₇-B₆ = 0x61A8 (25000 Dec), full stroke = 60 in.

$$\left(\frac{25000 - 32767}{\text{sec}} \right) \times \left(\frac{60 \text{ in.}}{65,535} \right) = -71.11 \text{ in. / sec.}$$

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 (= 2⁰) and ending with switch number 6 (= 2⁵).

Baud Rate

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

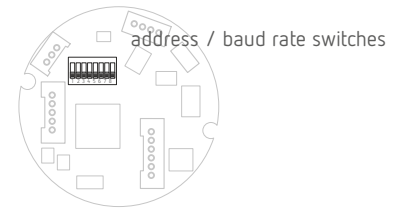
The baud rate can be set using switches 7 & 8 on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

DIP-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

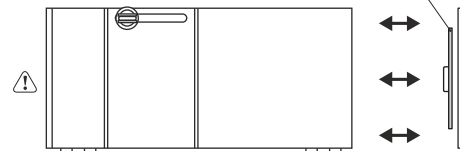
DIP-7	DIP-8	baud rate
0	0	125k
1	0	250k
0	1	500k
1	1	125k



CANBus Controller Board

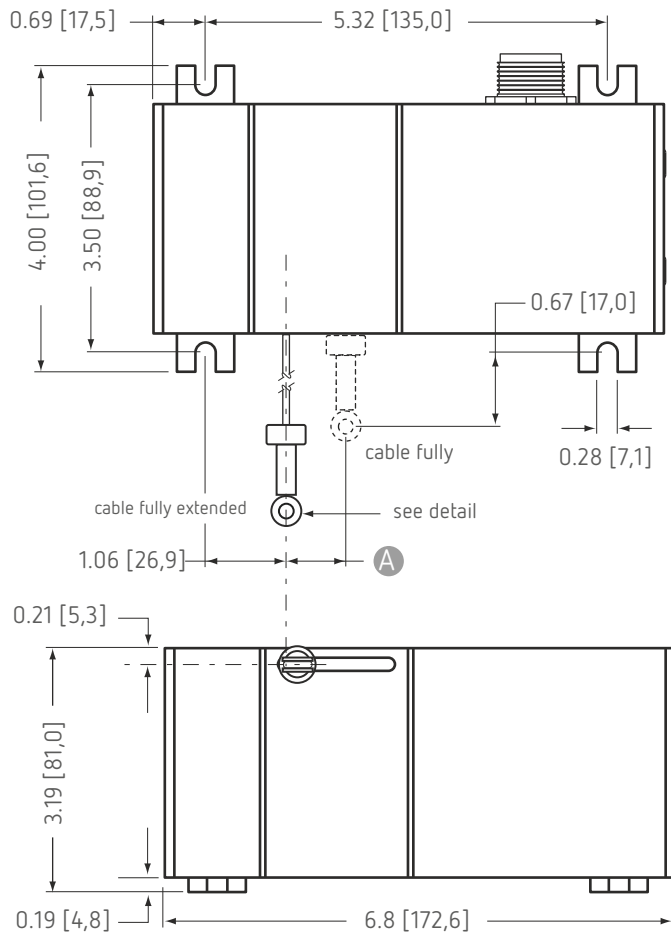


internal dip switches & controller board
to gain access to the controller board, remove four Allen-Head Screws and remove end cover bracket.

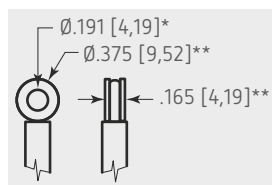


Caution! Do Not Remove Spring-Side End Cover
removing spring-side end cover could cause spring to become unseated and permanently damaged.

Outline Drawing

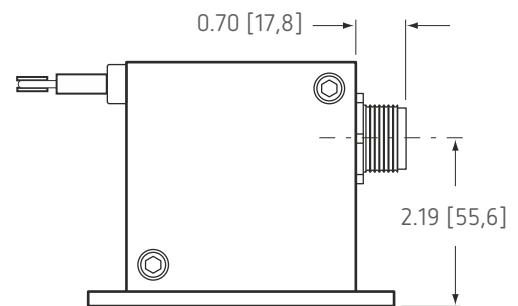


eyelet detail



A DIMENSION (inches[mm])

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

■ Setting the Address (Node ID) and Baud Rate

Model Number:

PT5CN - - - - - - -
order code: R A B C D E F

Sample Model Number:

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

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

Full Stroke Range:

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

Measuring Cable:

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

Cable Exit:

B order code:	UP up	DN down	FR front	BK back
	inches [mm]			

Baud Rate:

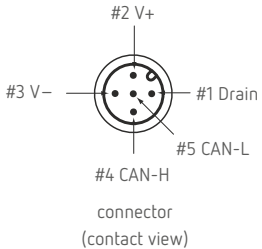
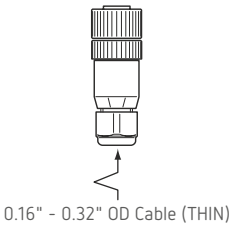
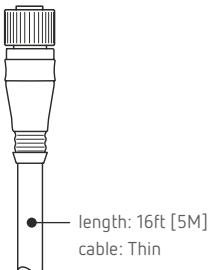
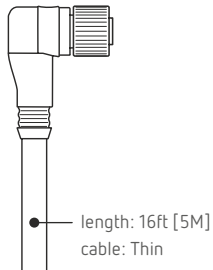
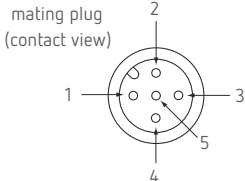
D Order code:	125	250	500
	125 kbaud	250 kbaud	500 kbaud

Node ID:

E order code:	0	1	2	...	62	63
	select address (0 - 63 Decimal)					

Ordering information (cont.)

Electrical Connection:

order code:	blank	MC5	SC5	NC5																		
	5-pin micro-connector (no mating plug supplied)	5-pin micro-connector w/ mating plug	5-pin micro-connector and 5 meter length cordset w/straight mating plug	5-pin micro-connector and 5 meter length cordset w/90° mating plug																		
	 <p>connector (contact view)</p>	 <p>0.16" - 0.32" OD Cable (THIN)</p>	 <p>length: 16ft [5M] cable: Thin</p>	 <p>length: 16ft [5M] cable: Thin</p>																		
		 <p>mating plug (contact view)</p>	<table border="1"> <thead> <tr> <th>pin</th> <th>signal</th> <th>wire color</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Drain</td> <td>brown</td> </tr> <tr> <td>2</td> <td>V+</td> <td>white</td> </tr> <tr> <td>3</td> <td>V-</td> <td>blue</td> </tr> <tr> <td>4</td> <td>Can-H</td> <td>black</td> </tr> <tr> <td>5</td> <td>Can-L</td> <td>grey</td> </tr> </tbody> </table>		pin	signal	wire color	1	Drain	brown	2	V+	white	3	V-	blue	4	Can-H	black	5	Can-L	grey
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