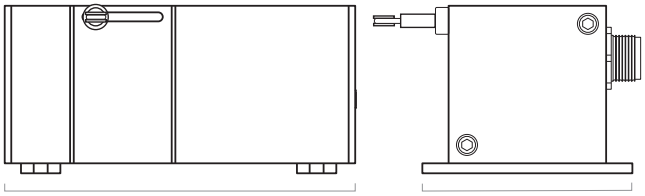
PT5CN

CANbus • SAE J1939 Output Signal

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





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*)

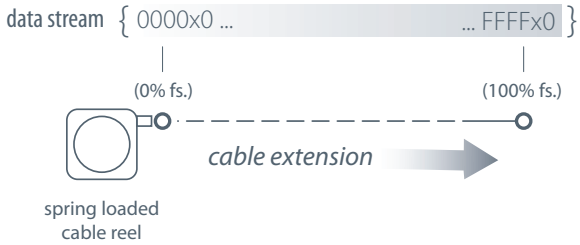
ENVIRONMENTAL

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

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.

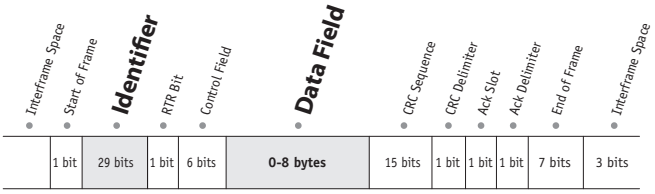
Because the PT5CN uses a potentiometer as it's sensing element, the position signal is "absolute" and does not have to be reset to a "home" position upon startup.

Output Signal:



20630 Plummer Street • Chatsworth, CA 91311 • Meas-Spec.com
tel: 800.423.5483 • +1.818.701.2750 • fax: +1.818.701.2799

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.

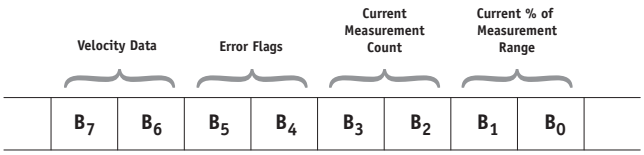
• Data Field

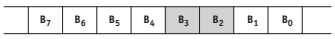
B_0 = LSB current % of measurement range byte
B_1 = MSB current % of measurement range byte

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:

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

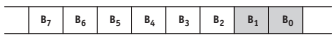
Sample Conversion:

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,

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



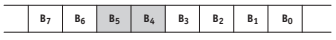
Current % of Measurement Range

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%

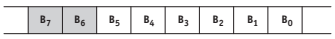


Error Flags

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

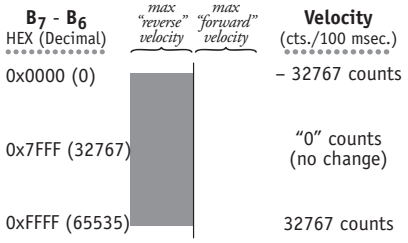
0xAA (red LED on controller board) indicates that the sensor has moved well beyond the calibrated range of the internal position potentiometer.

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 = 0x89C6 (43462 Dec), **full stroke = 60 in.**

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

Cable Retraction (negative direction):

B_7–B_6 = 0x61A8 (25000 Dec), **full stroke = 60 in.**

$$\left(\frac{25000 - 32767}{.1 \text{ sec}}\right) \text{X} \left(\frac{60 \text{ in.}}{65{,}535}\right) = -71.11 \text{ in./sec.}$$

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.

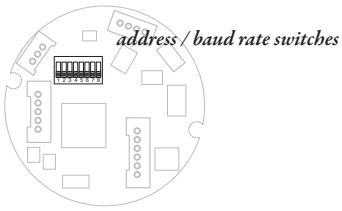
The DIP switch settings are binary starting with switch number **1** (= 2^0) and ending with switch number **6** (= 2^5).

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

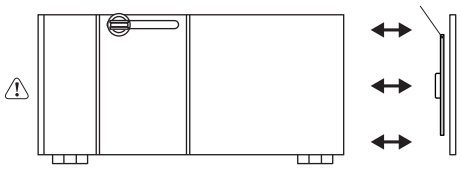


DIP-1 (2^0)	DIP-2 (2^1)	DIP-3 (2^2)	DIP-4 (2^3)	DIP-5 (2^4)	DIP-6 (2^5)	*address* (decimal)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
0	1	0	0	0	0	2
...	...	...	...	...	...	...
1	1	1	1	1	1	63

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

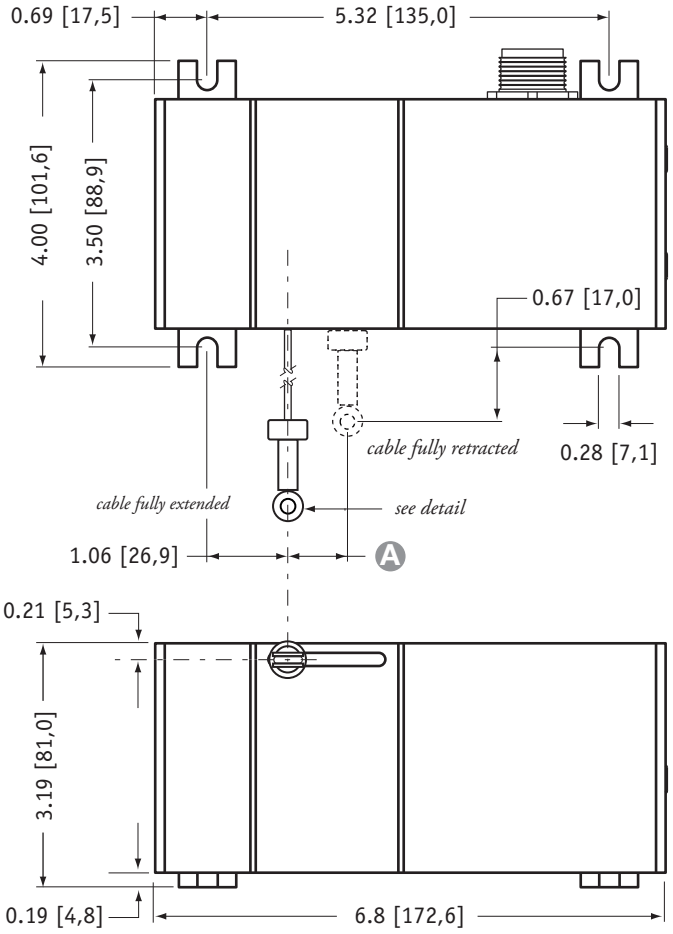


internal dip switches & controller board
to gain access to the controller board, remove four Allen-Head Screws and remove end cover bracket.

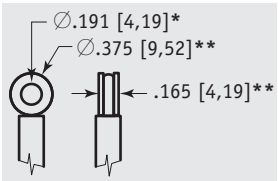


Caution! Do Not Remove Spring-Side End Cover
removing spring-side end cover could cause spring to become unseated and permanently damaged.

Outline Drawing:

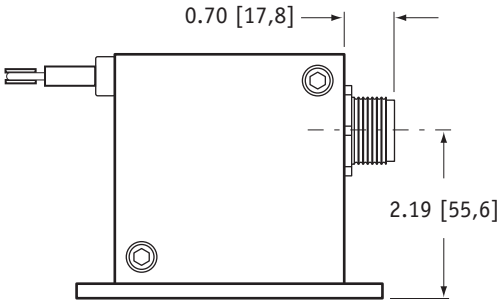


eyelet detail



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]

Ordering Information:

Model Number:

PT5CN - ____ ____ ____ - **J** ____ ____ ____

order code: Ⓡ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ

Sample Model Number:

PT5CN - 50S47FR - J50032SC5

Ⓡ	range:	**50**	(50 inches)
Ⓐ	measuring cable:	**S47**	(.047 bare stainless)
Ⓑ	measuring cable exit:	**FR**	(front)
Ⓒ	interface:	**J**	(CANbus SAE J1939)
Ⓓ	baud rate:	**500**	(500k bits/sec.)
Ⓔ	node ID:	**32**	(32 decimal)
Ⓕ	electrical connection:	**SC5**	(5-meter cordset with straight plug)

Full Stroke Range:

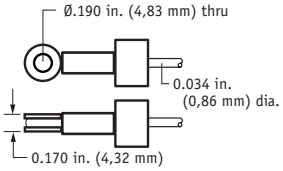
Ⓡ order code:	10	15	20	25	30	40	50	60	80	100	125	150	200	250
full stroke range, min:	10 in.	15 in.	20 in.	25 in.	30 in.	40 in.	50 in.	60 in.	80 in.	100 in.	125 in.	150 in.	200 in.	250 in.
accuracy (±% of f.s.):	.75%	.6%	.5%	.5%	.5%	.3%	.3%	.25%	.25%	.25%	.25%	.18%	.18%	.18%
repeatability (±% of f.s.):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

Measuring Cable:

Ⓐ order code:

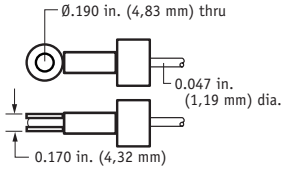
N34 — .034 nylon-coated stainless steel

available in all ranges



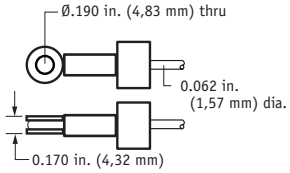
S47 — .047 stainless steel

all ranges up to 150 inches



V62 — .062 thermoplastic

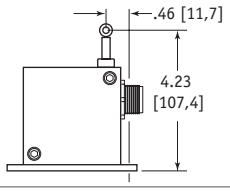
all ranges up to 150 inches



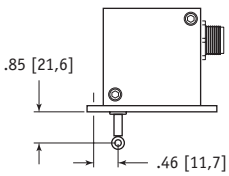
Cable Exit:

Ⓑ order code:

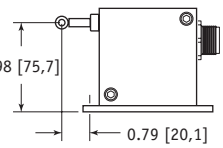
UP — up



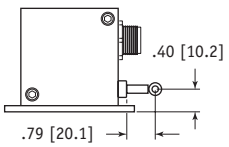
DN — down



FR — front



BK — back



inches [mm]

Baud Rate:

Ⓓ order code:

125	250	500
125 kbaud	250 kbaud	500 kbaud

Node ID:

Ⓔ order code: **0** **1** **2** ... **62** **63**

select address (0 - 63 Decimal)

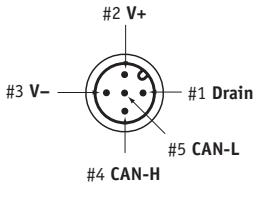
Ordering Information (cont.):

Electrical Connection:

order code:

blank

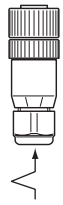
5-pin micro-connector
(no mating plug supplied)



connector
(contact view)

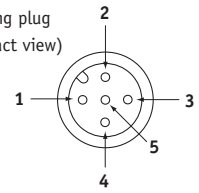
MC5

5-pin micro-connector
w/ mating plug



0.16" - 0.32" OD Cable (THIN)

mating plug
(contact view)



SC5

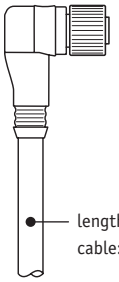
5-pin micro-connector
and 5 meter length cordset
w/straight mating plug



length: 16ft [5M]
cable: Thin

NC5

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



length: 16ft [5M]
cable: Thin

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