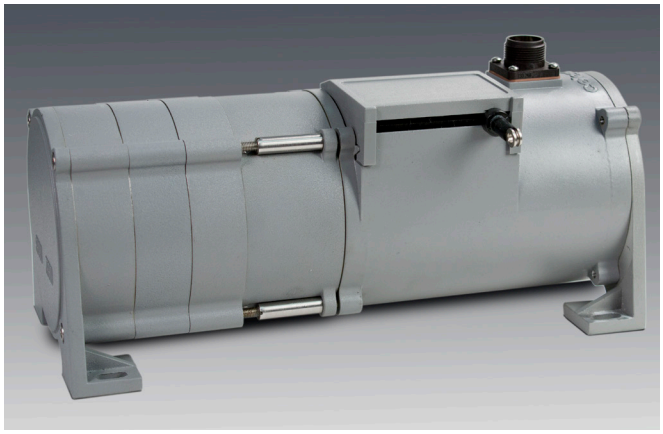
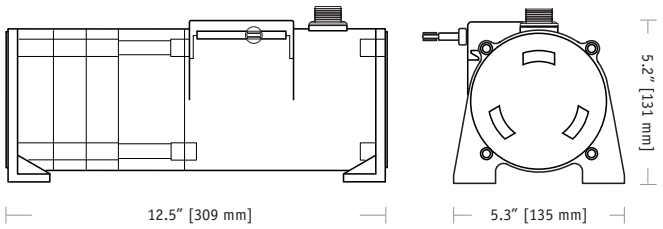
# PT9CN (Extended Range)

## Heavy Industrial • J1939 CANBus

**Linear Position/Velocity to 1700 inches (4300 cm)**
**Stroke Range Options: 0-600 to 0-1700 inches**
**VLS Option To Prevent Free-Release Damage**
**IP68 • NEMA 6 Protection**






### GENERAL

| | |
|---|---|
| Full Stroke Range Options (on this datasheet) | 0-600 to 0-1700 inches |
| Electrical Signal Interface | CANbus SAE J1939 |
| Protocol | Proprietary B |
| Accuracy | ± 0.10% full stroke |
| Repeatability | ± 0.02% full stroke |
| Resolution | ± 0.003% full stroke |
| Measuring Cable Options | nylon-coated stainless stee |
| 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 | 14 lbs. (28 lbs.), max. |

### ELECTRICAL

| | |
|---|---|
| Input Voltage | 7 - 18 VDC |
| Input Current | 60 mA max. |
| Address Setting/Node ID | 0...63 set via DIP switches |
| Baud Rate | 125K, 250K or 500K set via DIP switches |
| Update Rate | 10 ms. (20 ms. available, contact factory) |

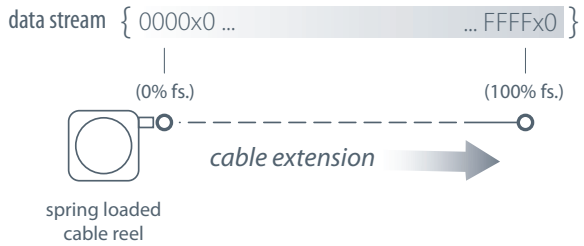
### ENVIRONMENTAL

| | |
|---|---|
| Enclosure | NEMA 4/4X/6, IP 67 |
| Operating Temperature | -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 1700".

As a member of our 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.

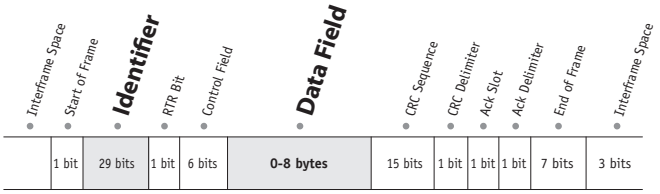
Output Signal:




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

celesco

# 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.

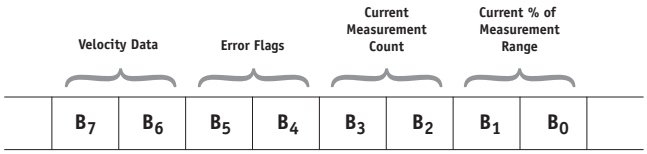
## • Data Field

**$B_0$** = 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:

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

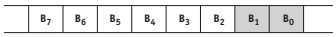
Sample Conversion:

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% |

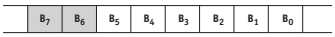



### Error Flags

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

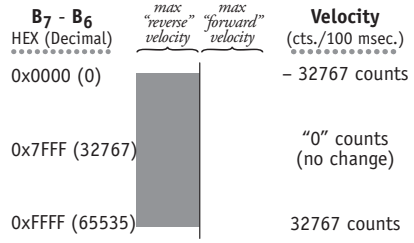
**0xAA** (red LED on controller board) indicates that the sensor has moved well beyond the calibrated range of the internal position potentiometer.

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.

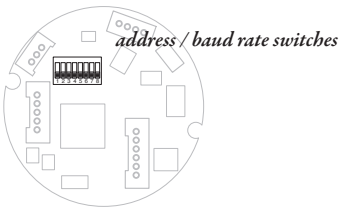
The DIP switch settings are binary starting with switch number **1** (= $2^0$) and ending with switch number **6** (= $2^5$).

### 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.

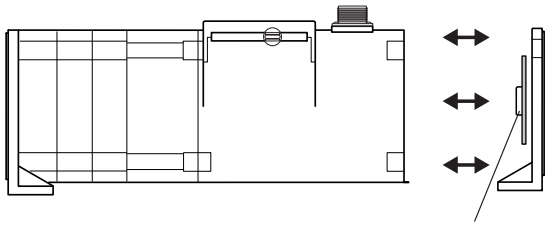
### CANBus Controller Board




| 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 |

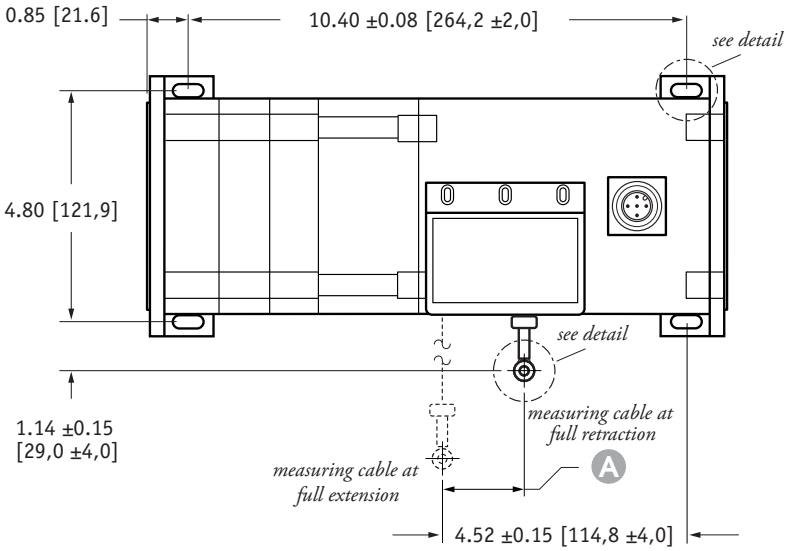


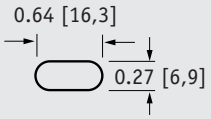
**internal dip switches & controller board**

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

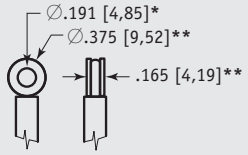
## Outline Drawing




**mounting hole detail**

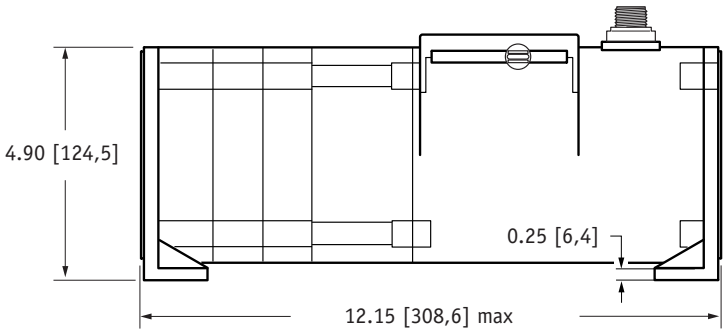


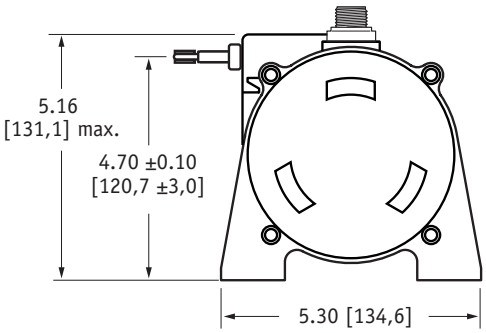

**eyelet detail**




**A DIMENSION**

| RANGE | inches [mm] |
|---|---|
| 600 | 1.76 [44,7] |
| 800 | 1.58 [40,1] |
| 1000 | 1.98 [50,2] |
| 1200 | 1.98 [50,2] |
| 1500 | 1.86 [47,2] |
| 1700 | 2.11 [53,6] |




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 - 1200ALFR - J50032SC5**

| | | | |
|---|---|---|---|
| Ⓡ | range: | **1200** | (1200 inches) |
| Ⓐ | enclosure | **AL** | (aluminum) |
| Ⓑ | 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: | **600** | **800** | **1000** | **1200** | **1500** | **1700** |
|---|---|---|---|---|---|---|
| full stroke range, min: | 600 in. | 800 in. | 1000 in. | 1200 in. | 1500 in. | 1700 in. |
| cable tension (±35%): | 27 oz. | 24 oz. | 20 oz. | 19 oz. | 18 oz. | 17 oz. |
| measuring cable: | .034-in. dia. nylon-coated stainless | .019-in. dia. nylon-coated stainless | .019-in. dia. nylon-coated stainless | .019-in. dia. nylon-coated stainless | .014-in. dia. nylon-coated stainless | .014-in. dia. nylon-coated stainless |

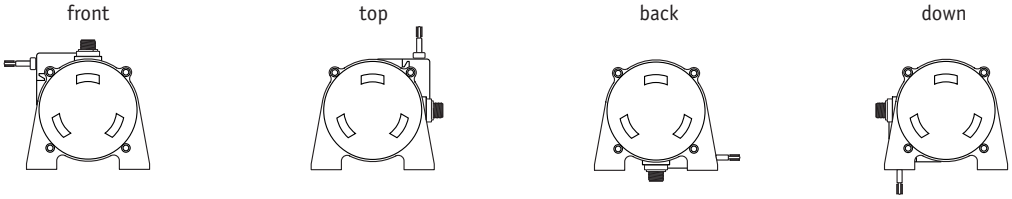
## Enclosure Material:

| Ⓐ order code: | **AL** | **SS** |
|---|---|---|
| enclosure material: | powder-painted aluminum | 303 stainless steel |
| max. acceleration: | 1g | 1g |
| max. velocity: | 60 inches/sec. | 60 inches/sec. |

## Cable Exit:

Ⓑ order code:

| **FR** | **UP** | **BK** | **DN** |
|---|---|---|---|
| front | top | back | down |



## Baud Rate:

Ⓓ order code:

| **125** | **250** | **500** |
|---|---|---|
| 125 kbaud | 250 kbaud | 500 kbaud |

## Node ID:

Ⓔ order code:

| **0** | **1** | **2** | **3** | ... | **61** | **62** | **63** |
|---|---|---|---|---|---|---|---|

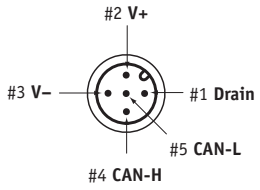
select address (0 - 63 Decimal)

## Electrical Connection:

Ⓕ order code:

**blank**

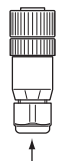
5-pin micro-connector
*(no mating plug supplied)*




connector
(contact view)

**MC5**

5-pin micro-connector
w/ mating plug



0.16" - 0.32" OD Cable (THIN)

**SC5**

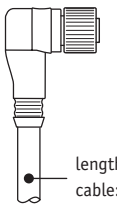
5-pin micro-connector
and 5 meter length cordset
w/straight mating plug



length: 16ft [5M]
cable: Thin

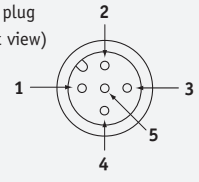
**NC5**

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 |