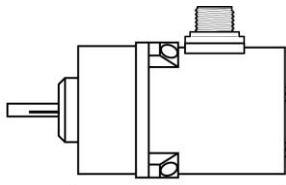


2.5" [64 mm]

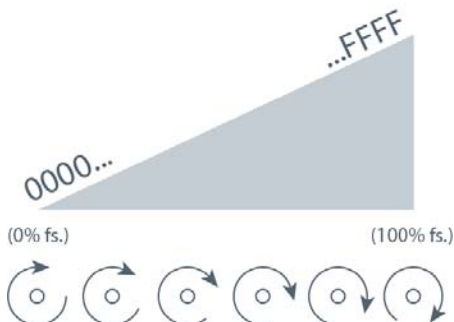


4.0" [102 mm]

Our model RT8CN communicates rotational position feedback to your PLC via the CANbus SAE J1939 interface. The heart of this sensor is a precision plastic-hybrid position potentiometer which provides an "absolute" position and does not ever have to be reset to a "home" position after a power loss or planned shutdown.

This innovative sensor is designed to meet tough NEMA-4 and IP67 environmental standards and is available in full-stroke measurement ranges of 1/8 to 200 turns.

### Output Signal



## RT8CN

0–45° to 0–200 Turns • CANbus J1939

**Industrial Grade Rotational Position Sensor**

**Absolute Rotary Position up to 200 turns**

**Aluminum or Stainless Steel Enclosure Options**

**IP68 / NEMA 6**

### General

<b>Full Stroke Range</b>	0-0.125 to 0-200 turns
<b>Electrical Interface</b>	CANbus SAE J1939
<b>Protocol</b>	Proprietary B
<b>Accuracy</b>	see ordering information
<b>Repeatability</b>	± 0.05% full stroke
<b>Resolution</b>	essentially infinite
<b>Enclosure Material Options</b>	powder-painted aluminum or stainless steel
<b>Sensor</b>	plastic-hybrid precision potentiometer
<b>Potentiometer Cycle Life</b>	see ordering information
<b>Shaft Loading</b>	up to 10 lbs. radial and 5 lbs. axial
<b>Starting Torque (25°C)</b>	2.0 in-oz., max.
<b>Weight, Aluminum (Stainless Steel) Enclosure</b>	3 lbs. (6 lbs.) max.

### Electrical

<b>Input Voltage</b>	see ordering information
<b>Input Voltage</b>	7 - 18 VDC
<b>Input Current</b>	60 mA max.
<b>Address Setting (Node ID)</b>	0..63 set via DIP Switches
<b>Baud Rate</b>	125K, 250K or 500K set via DIP Switches
<b>Update Rate</b>	10 ms. (20 ms. available—contact factory)
<b>Thermal Effects, Span</b>	0.01% f.s./°F, max.

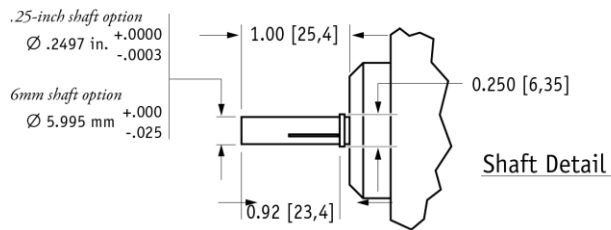
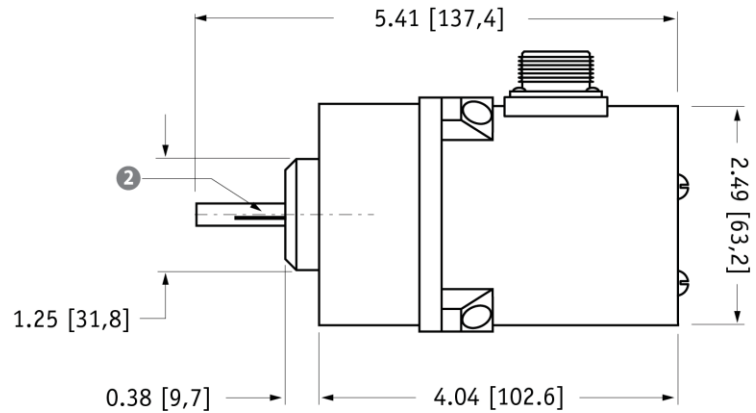
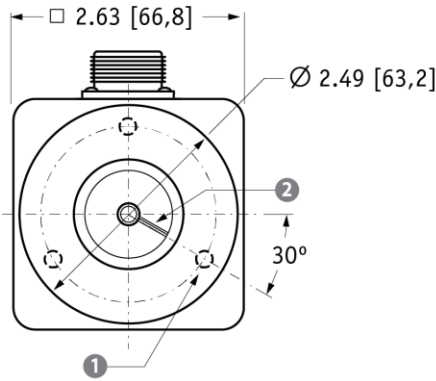
### Environmental

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

# RT8CN

0–45° to 0–200 Turns • CANbus J1939

## Outline Drawing



- 1 mounting holes:  
for .25 in. shaft option, mounting holes are threaded #10-32 x 0.375 deep 120° apart on a 2.00 inch dia. BC  
  
for 6mm shaft option, mounting holes are threaded M6 x 9 mm deep 120° apart on a 50,8 mm dia. BC
- 2 reference mark:  
full counter-clockwise position - align mark on shaft to mark on face for start of measurement range

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

## Ordering Information

### Model Number:

**RT8CN** - \_\_\_\_\_ **J** - \_\_\_\_\_  
order code:                    **R**        **A**        **B**        **C**        **D**        **E**        **F**        **G**

### Sample Model Number:

**RT8CN - 100 - AL - 25 - FL - J - 500 - 32 - SC5**

- R** range: 100 turns
- A** enclosure: powder-painted aluminum
- B** shaft: .25-in diameter
- C** mounting style: flange
- D** interface: CANbus SAE J1939
- E** baud rate: 500 k bits/sec.
- F** node ID: 32
- G** electrical connection: 5-meter cordset with straight plug

### Full Stroke Range:

<b>R</b> order code:	R125	R25	R50	1	2	3	5	10	20
clockwise shaft rotations, min:	0.125	0.25	0.50	1	2	3	5	10	20
accuracy (% of f.s.):	1.25%	1.25%	0.5%	0.5%	0.5%	0.2%	0.2%	0.15%	0.15%
potentiometer cycle life*:	2.5 x 10 <sup>6</sup>	2.5 x 10 <sup>6</sup>	2.5 x 10 <sup>6</sup>	2.5 x 10 <sup>6</sup>	2.5 x 10 <sup>6</sup>	5 x 10 <sup>5</sup>	5 x 10 <sup>5</sup>	2.5 x 10 <sup>5</sup>	2.5 x 10 <sup>5</sup>

<b>R</b> order code:	30	40	50	80	100	120	140	180	200
clockwise shaft rotations, min:	30	40	50	80	100	120	140	180	200
accuracy (% of f.s.):	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%
potentiometer cycle life*:	2.5 x 10 <sup>5</sup>	2.5 x 10 <sup>5</sup>	2.5 x 10 <sup>5</sup>	2.5 x 10 <sup>5</sup>	2.5 x 10 <sup>5</sup>	2.5 x 10 <sup>5</sup>	2.5 x 10 <sup>5</sup>	2.5 x 10 <sup>5</sup>	2.5 x 10 <sup>5</sup>

\*-number of times the sensor shaft can be cycled back and forth from beginning to end and back to the beginning before any measurable signal degradation may occur.

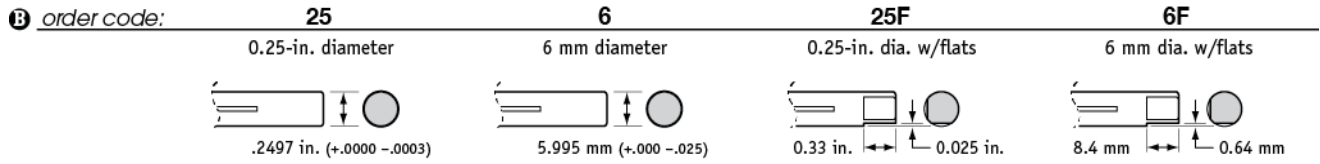
### Enclosure Material:

<b>A</b> order code:	<b>AL</b>	<b>SS</b>
	powder-painted aluminum	303 stainless steel

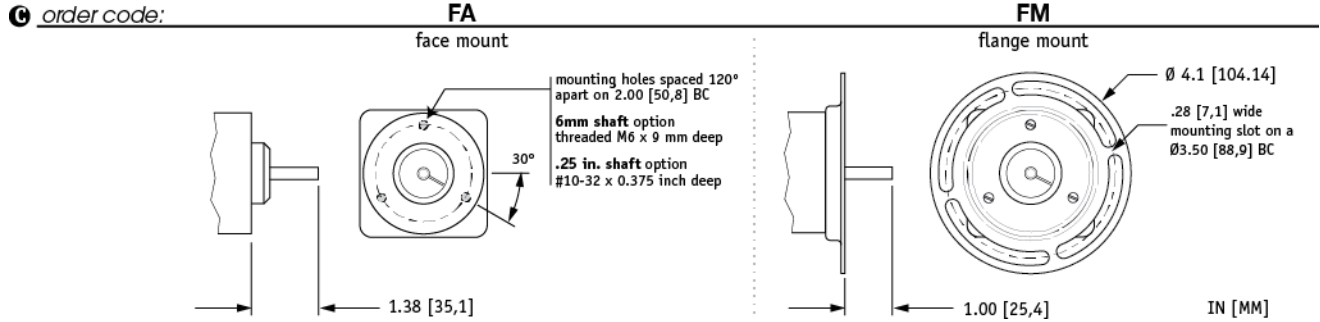
# RT8CN

0-45° to 0-200 Turns • CANbus J1939

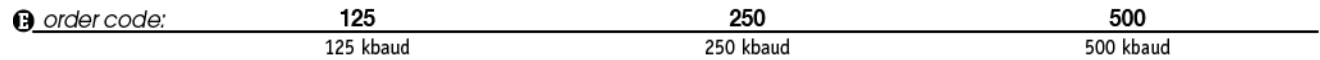
## Shaft Diameter:



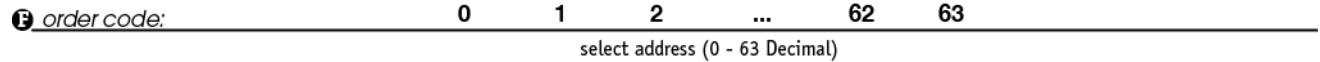
## Mounting Style:



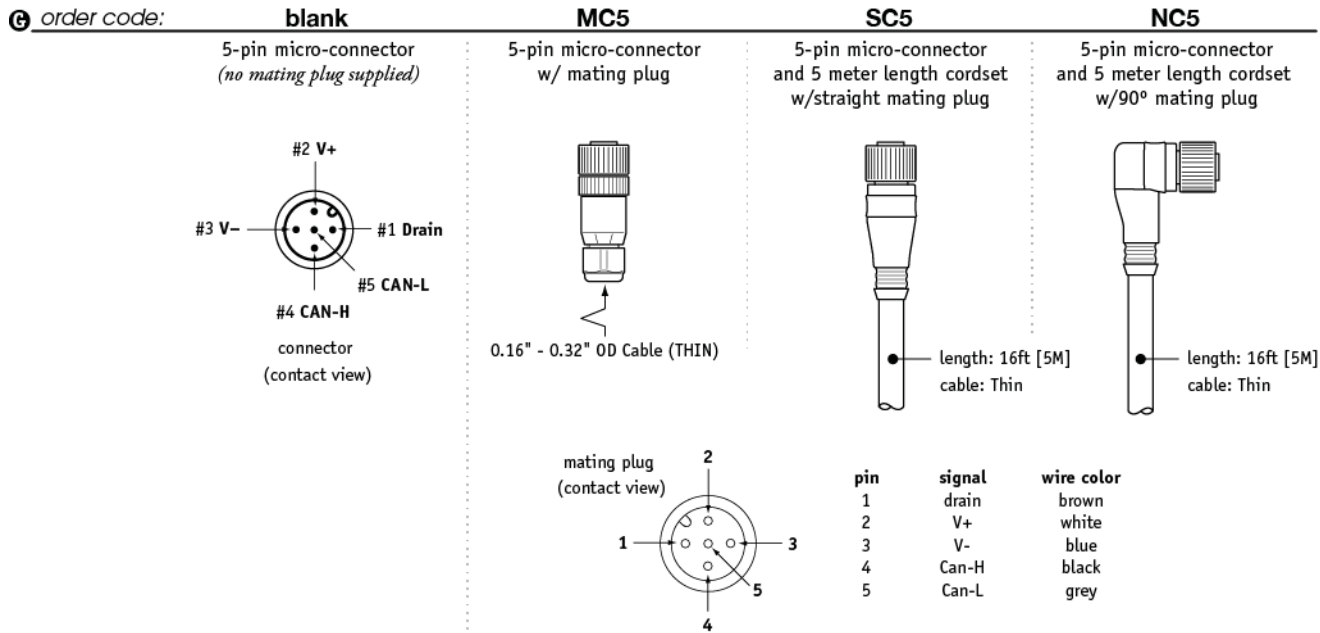
## Baud Rate:



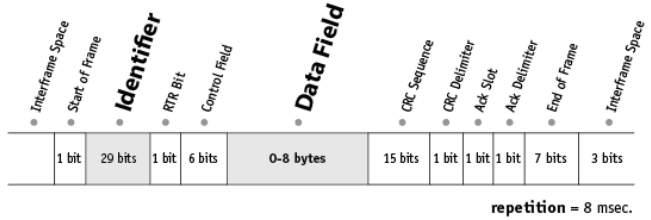
## Node ID:



## Electrical Connection:



# I/O Format and Settings



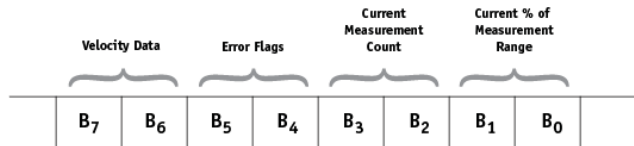
## • Identifier

	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	1	1	0	1	0	1	0	0	1	1	0	0	1	1	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	1	1	1	1	1	1	1	1
Hex Value –	0					F								5								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<sub>0</sub> = LSB current % of measurement range byte
- B<sub>1</sub> = MSB current % of measurement range byte
- B<sub>2</sub> = LSB current measurement count byte
- B<sub>3</sub> = MSB current measurement count byte
- B<sub>4</sub> = error flag
- B<sub>5</sub> = error flag
- B<sub>6</sub> = LSB velocity data byte
- B<sub>7</sub> = MSB velocity data byte



B <sub>7</sub>	B <sub>6</sub>	B <sub>5</sub>	B <sub>4</sub>	B <sub>3</sub>	B <sub>2</sub>	B <sub>1</sub>	B <sub>0</sub>
----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------

B <sub>7</sub>	B <sub>6</sub>	B <sub>5</sub>	B <sub>4</sub>	B <sub>3</sub>	B <sub>2</sub>	B <sub>1</sub>	B <sub>0</sub>
----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------

B <sub>7</sub>	B <sub>6</sub>	B <sub>5</sub>	B <sub>4</sub>	B <sub>3</sub>	B <sub>2</sub>	B <sub>1</sub>	B <sub>0</sub>
----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------

### 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 B<sub>2</sub> and B<sub>3</sub> of the data field. B<sub>2</sub> is the **LSB** (least significant byte) and B<sub>3</sub> is the **MSB** (most significant byte).

The CMC starts at 0x0000 with the shaft in the full counter-clockwise position (at reference mark) and continues upward to the end of the stroke range stopping at 0xFFFF. This holds true for all ranges.

### Converting CMC to Degrees

If required, the CMC can easily be converted a rotary measurement expressed in degrees instead of simply counts.

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

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

Example:

If the full stroke range is **1 turn (360 degrees)** and the current position is **0x0FF2 (4082 Decimal)** then,

$$\left( \frac{4082}{65,535} \right) \times 360 \text{ degrees} = 22.4 \text{ degrees}$$

### 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 <sub>7</sub>	B <sub>6</sub>	B <sub>5</sub>	B <sub>4</sub>	B <sub>3</sub>	B <sub>2</sub>	B <sub>1</sub>	B <sub>0</sub>
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### Error Flags

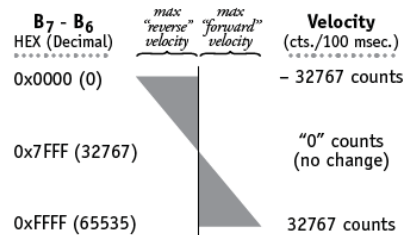
**0x55** (yellow LED on controller board) indicates that the sensor has begun to travel beyond the calibrated range of the internal position potentiometer.

**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<sub>7</sub> - B<sub>6</sub> is the change and direction of the CMC (current measurement count) over a 100 msec time period. This data can then be used to calculate velocity and direction 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

Clockwise Shaft Rotation (positive direction):

**B<sub>7</sub>-B<sub>6</sub> = 0x89C6 (43462 Dec.), full stroke = 1 Turn**

$$\left( \frac{35270 - 32767}{.1 \text{ sec}} \right) \times \left( \frac{1 \text{ Turn}}{65,535} \right) = .38 \text{ turns/ sec.}$$

Counter-Clockwise Shaft Rotation (negative direction):

**B<sub>7</sub>-B<sub>6</sub> = 0x61A8 (25000 Dec.), full stroke = 1 Turn**

$$\left( \frac{25000 - 32767}{.1 \text{ sec}} \right) \times \left( \frac{1 \text{ Turn}}{65,535} \right) = -.12 \text{ turns/ sec.}$$

**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.

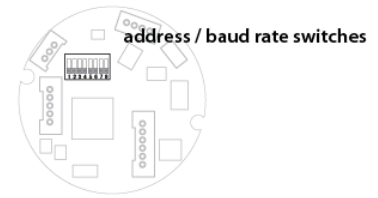
The DIP switch settings are binary starting with switch number 1 (= 2<sup>0</sup>) and ending with switch number 6 (= 2<sup>5</sup>).

**Baud Rate**

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

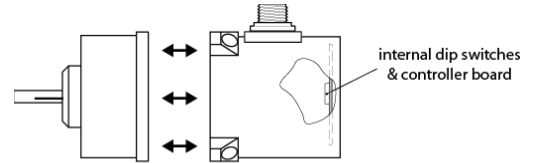
The baud rate can be set using switches 7 & 8 on the 8-pole DIP switch found on the DeviceNET controller board located inside the transducer.

**CANBus Controller Board**



DIP-1 (2 <sup>0</sup> )	DIP-2 (2 <sup>1</sup> )	DIP-3 (2 <sup>2</sup> )	DIP-4 (2 <sup>3</sup> )	DIP-5 (2 <sup>4</sup> )	DIP-6 (2 <sup>5</sup> )	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



*to gain access to the controller board,  
remove four Allen-Head Screws and  
separate case halves*

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