

Temposonics®

Magnetostrictive, Absolute, Non-contact
Linear-Position Sensors



C-Series Core Sensor, Models CS and CM Analog Outputs (Voltage/Current)

Document Part Number
551020 Revision K

Product Specification

FEATURES

- **Non-Contact - No Wear**
such as found with pot wipers on conductive mylar, particularly when mounted on dithered actuators or vibrating installations
- **Stroke length 72 mm (2.83 in.) to 250 mm (9.84 in.)**
- **Low Power Needs - Allows use with printed circuit-level supplies of +5 Vdc**
- **No Drift - No periodic re-calibration needed**
- **Optional Supply Vdcages - Allows use in +12 Vdc systems**
- **Optional Housings - Allows exposed use by offering mounting options and several levels of environmental protection**
- **Optional Magnets - Other magnet configurations allow greater range of installation choices**
- **Customizable Active Zones - Offers full output sensitivity for smaller active zones**
- **Customizable Reading Direction - Forward or reverse acting analog output allows match to control requirements**

BENEFITS

- **Light Weight - Ideal for small portable OEM products**
- **Low Cost - Total Cost Competitive with linear pots or LVDT's - Initial cost + warranty +cost of goodwill.**
- **Short Operating Space - Half the space needed compared to LVDTs or rod and cylinder pots**
- **Small Size - This smallest package in the market that has all the benefits of magnetostrictive sensing and fits where no other sensor can**

APPLICATIONS

- **Externally Mounted Continuous Position or Liquid-Level Information**
- **OEM Products That Require an Embedded Sensor Solution**

MARKETS

- **Medical Treatment Equipment and Mobility Devices**
- **Entertainment Automation**
- **Marine Steering and Trim**
- **HVAC**
- **Food Preparation and Exercise Equipment**
- **Off-Road Equipment**
- **High-Volume Markets That Require Low-Cost, Embeddable Position Sensing**



C-Series Core Sensor, Models CS/CM shown with and without IP 67 H2 Housing Option

The C-Series modular sensor line was created to support industrial, medical and consumer product OEMs who recognize benefits gained by using magnetostrictive position sensing technology but do not have a product solution that could be tailored to their high-volume, low-cost driven sensing needs.

This product line is a reliable, no wear measurement system compared to traditional alternatives such as pots and Linear Variable Differential Transformers (LVDT's). No other magnetostrictive sensor manufacturer can offer such a small embeddable, or externally mountable, yet highly malleable sensor at high-volume pricing that is attractive for high-volume OEM products.

The C-Series Core Sensor is the common sensor for C-Series models. In addition, protective housings and accessories can be added to this C-Series Core Sensor.

Product Specifications

Product overview

The Core Sensor is a complete, functional sensor in every respect making it ideal for embedded sensor applications where the OEM product provides all the environmental protection necessary for the application and any additional sensor protective housing would be redundant, representing unnecessary cost in extremely cost sensitive moderate to high volume OEM products.

There are two C-Series models, the CS and CM. The CS is designed for general purpose applications and requires 5 Vdc power supply. The CM is designed specifically for mobile equipment applications by including additional protection from over Vdcage and reverse connection and allows the use of a 12 Vdc supply.

Connection is made using a four-pin, JST PHR-4 model mating connector for use with 24 AWG wire in MTS provided cables or discrete wire pigtails. The connection is also compatible with the JST KR-04-KR-06 insulation displacement 26 AWG connector – Contact MTS applications engineering for specifics.

Product specifications

SENSOR ELECTRONICS AND INTERCONNECT

Parameters	Specifications
OUTPUTS	
Measured output variables:	Analog (Forward acting): Model CS: 0.1 to 4.9 Vdc @ +5 Vdc supply, ratiometric. (Contact MTS about customized reverse acting or redefined active zones.) Model CM: 0.1 to 4.9 Vdc fixed output @ +12 Vdc supply, ratiometric @ 5 Vdc supply (Contact MTS about customized reverse acting or redefined active zones.)
Non-linearity:	± 0.15 mm (0.01 in.) without correction, using the MTS recommended magnet, part no.: 401842 measured between 5% and 95% of active stroke.
Repeatability:	± 25 microns
Hysteresis:	± 25 microns
Position measurement:	Stroke range availability: 72 mm (2.85 in.), 109 mm (4.31 in.), 128 mm (5.05 in.), 148 mm (5.83 in.), 162 mm (6.39 in.), 186 mm (7.34 in.), 194 mm (7.65 in.), 217 mm (8.56 in.), and 250 mm (9.85 in.). Update rate/times: 500 kHz / 2 millisecond period

ELECTRONICS

Operating Vdcage:	Model CS: 5 Vdc -5%, +10% Model CM: 12 Vdc ± 25% or 5 Vdc -5%, +10%
Current drain:	40 mA typical
Temperature drift:	Vdcage ± 20 micron/°C
Output load:	Analog: 6k ≤ R ≤ 10kΩ

Parameters	Specifications
ENVIRONMENTAL	
Operating conditions:	Operating temperature: -40 °C (-40 °F) to +75 °C (+185 °F) Contact factory for higher temperatures.
RF Emissions/Immunity:	Contact factory
Vibration rating:	1 g / 10-150 Hz / IEC standard 68-2-6
WIRING	
Connection types:	Mating connector: JST PHR-4 socket female (24 AWG) crimp pin, JST 04KR-6 (26 AWG) insulation displacement
MECHANICAL PACKAGING	
Sealing:	Core IP 40, IP 67 with housing
Zero tolerance:	±1.0 mm (0.039 in.)
Mounting:	2 M3 x 37 screws
Magnet types:	Part no. 401842 (float and other magnets optional)

Model CS/CM/H2 Sensor Dimension References

The C-Series core sensor is available in two models, CS and CM. The C-Series model CS is designed for general purpose applications and requires a 5 Vdc power supply. The C-Series model CM is designed specifically for mobile equipment applications and provides additional protection from over Vdcage, reverse connection and supports a 12 Vdc power supply. The C-Series core sensor can be ordered with the IP 67 H2 Housing option for applications that require additional protection.

MODEL CS/CM CORE SENSOR

Stroke length note:
Stroke lengths are calculated from the side of the magnet facing the sensor's head.

Drawing is for reference only, contact applications engineering for tolerance specific information.

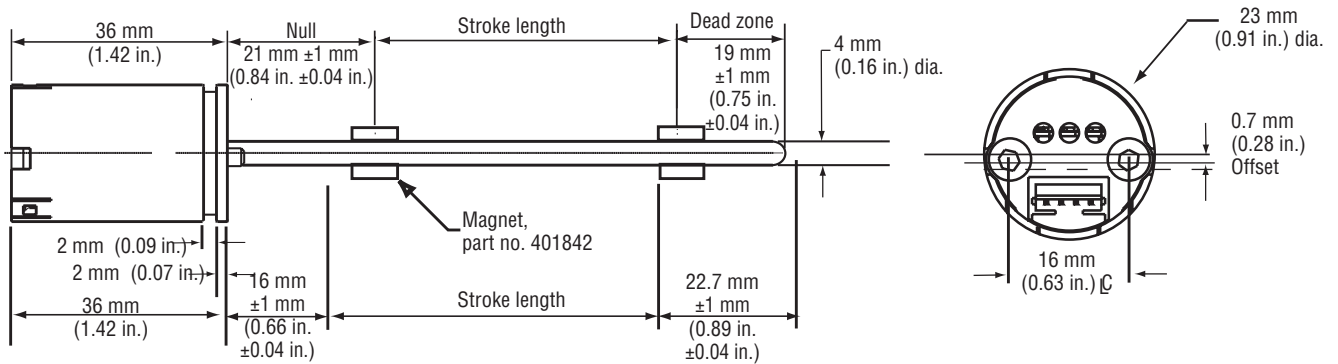


Figure 1. C-Series Core sensor, Models CS/CM dimension references

MODEL CS/CM CORE SENSOR WITH IP 67 H2 HOUSING OPTION

Drawing is for reference only, contact applications engineering for tolerance specific information.

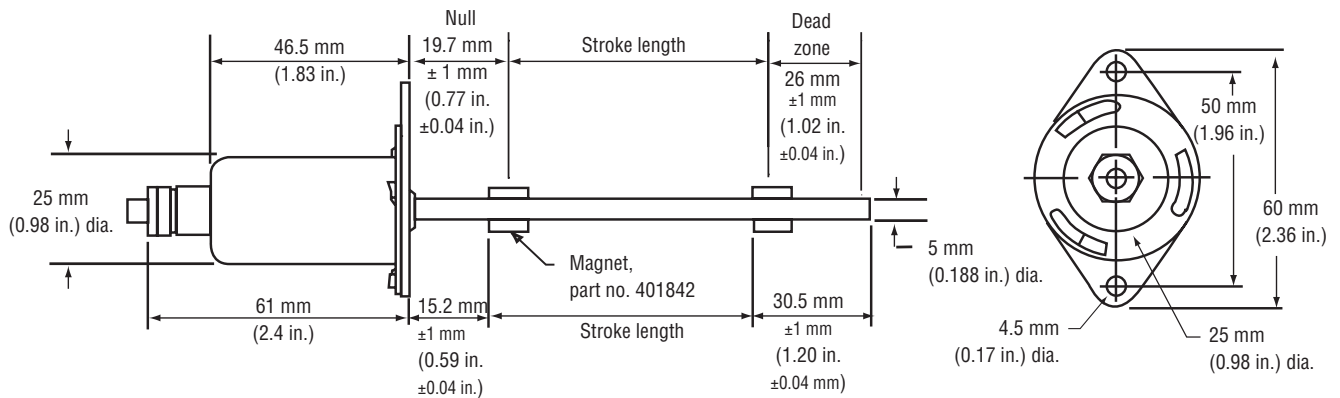


Figure 2. C-Series Core sensor, Models CS/CM (with IP 67 H2 housing option) dimension references

Models CS/CM Sensor Mounting and Installation

C-SERIES CORE SENSOR MOUNTING

The C-Series Core Sensor features two mounting holes with sealed paths (see Figure 4). When mounting the sensor using the two holes, both sealed paths contain a breakaway plastic layer that can be gently tapped with a mounting screw and screwdriver end (or similar tool). An O-ring groove is provided for embedded sealing (see Figure 3). Refer to 'Installation guidelines, Understanding the influence of magnets and magnetic fields', document number 551056, for magnet installation recommendations inside metallic structures.

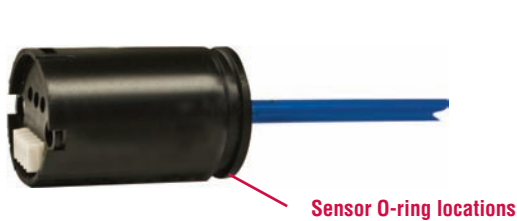


Figure 3. C-Series core sensor O-ring location (for embedded applications)

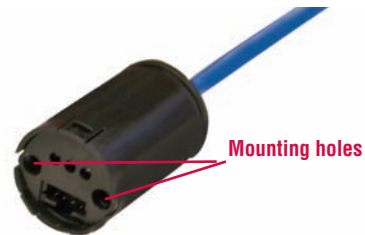


Figure 4. C-Series core sensor mounting hole locations

Connections and wiring

Connection is made using a three wire, 1 meter pigtail cable with 24 AWG wire. Refer to the 'Sensor Connection Designations' table for pinout, wire colors and functions. A mating connector and cable assembly (part no.: 253396), or insulation displacement mating connector, (part no.:370500) shown in 'Figure 5', are available as options.

Sensor Connection Designations

Pin No.	Wire Color	Function
1	White	Common
2	Green	Vdcage output
3	Brown	Supply Vdcage (+)
4	N/A	N/A

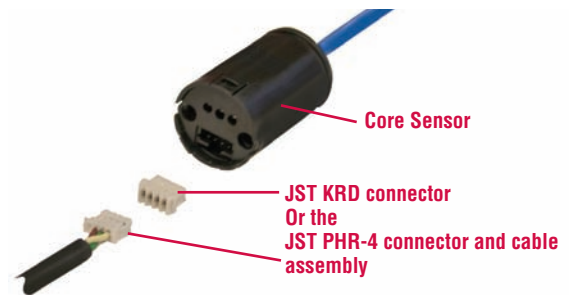
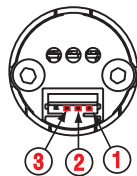

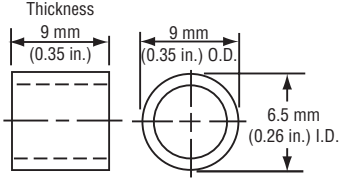

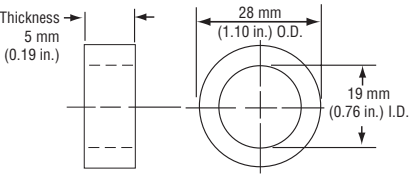


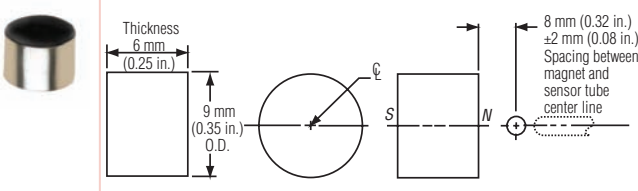
Figure 5. C-Series Core Sensor connection type options

Accessory options (Model CS/CM)

Magnet Options (must be ordered separately, one required per sensor)

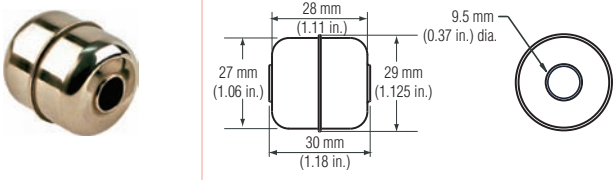
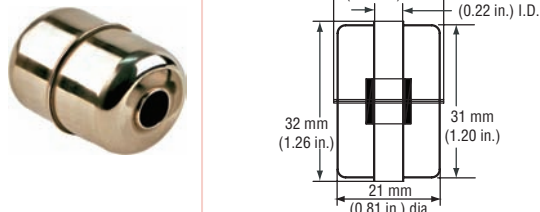
(Drawing dimensions are for reference only)

	Dimension Reference	Function	Description	Part number
		Standard magnet	Standard ring magnet O.D.: 9 mm (0.35 in.) I.D.: 6.5 mm (0.26 in.) Thickness: 9 mm (0.35 in.)	401842
		For applications that require a magnet to provide increased clearance.	Optional ring magnet O.D.: 28 mm (1.10 in.) I.D.: 19 mm (0.76 in.) Thickness: 5 mm (0.19 in.)	400424

Dimension Reference	Function	Description	Part number
 <p>Thickness: 6 mm (0.25 in.)</p> <p>9 mm (0.35 in.) O.D.</p> <p>8 mm (0.32 in.) ±2 mm (0.08 in.) Spacing between magnet and sensor tube center line</p>	<p>For applications that cannot use a ring or bar magnet (note operating clearance limits).</p>	<p>Button magnet O.D.: 9 mm (0.35 in.) Tube Center Line Spacing: 8 mm (0.32 in.) ± 2 mm (0/08 in.) Thickness: 6 mm (0.25 in.)</p>	<p>253619</p>



Float Options (must be ordered separately, one required per sensor)

(Drawing dimensions are for reference only)

Dimension Reference	Function	Description	Part number
 <p>28 mm (1.11 in.)</p> <p>27 mm (1.06 in.)</p> <p>29 mm (1.125 in.)</p> <p>30 mm (1.18 in.)</p> <p>9.5 mm (0.37 in.) dia.</p>	<p>Standard wide float with magnet.</p>	<p>Standard wide float O.D.: 29 mm (1.3 in.) I.D.: 9 mm (0.36 in.) Depth: 30 mm (1.18 in.) Specific gravity: 0.81 g/cm³ Max. Material: 316L stainless steel</p>	<p>201611</p>
 <p>22 mm (0.87 in.) O.D.</p> <p>6 mm (0.22 in.) I.D.</p> <p>32 mm (1.26 in.)</p> <p>31 mm (1.20 in.)</p> <p>21 mm (0.81 in.) dia.</p>	<p>Standard slim float with magnet</p>	<p>Standard slim float O.D.: 22 mm (0.87 in.) I.D.: 6 mm (0.22 in.) Depth: 32 mm (1.2 in.) Specific gravity: 0.67 g/cm³ max. Material: 316L stainless steel</p>	<p>201656</p>


Mating Connector and Cable Assembly Options

(Drawing dimensions are for reference only)

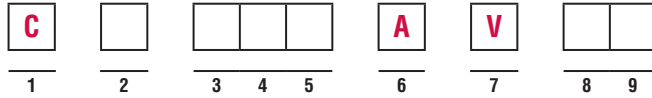
Connector Reference	Function	Description	Part number
	<p>Insulation displacement mating connector for 26 AWG wire</p>	<p>JST KRD connector</p>	<p>370500</p>
	<p>Mating connector with 1 meter, 24 AWG cable (Analog output)</p>	<p>JST PHR-4 connector with 1 meter cable</p>	<p>253396</p>

H2 Protective Housing Accessory Options

(Drawing dimensions are for reference only)

Dimension Reference	Function	Description	Part number
	<p>Use with the IP 67 H2 housing option</p>	<p>Gasket (CPDM)</p>	<p>402809-1</p>
	<p>Use with the IP 67 H2 housing option</p>	<p>Gasket (PTFE)</p>	<p>402809-2</p>

C-Series Core Sensor, Models CS/CM
Ordering Information



	SENSOR MODEL _____ =	<input type="text" value="C"/>	1
C	= C-Series Core Sensor (<i>Order one magnet or magnet float per sensor separately. Refer to Accessory options</i>)		
	STANDARD OR MOBILE SUPPLY _____ =	<input type="text"/>	2
S	= 5 Vdc standard input		
M	= 12 Vdc		
	STROKE LENGTHS _____ =	<input type="text"/> <input type="text"/> <input type="text"/>	3 - 5
	Enter three digit code (3 - 5) with no decimals as shown below		
072	= 72 mm (2.85 in.)109.3 mm		
109	= 109.5 mm (4.31 in.)148.0 mm		
128	= 128 mm (5.05 in.)217.3 mm		
148	= 148 mm (5.83 in.)		
162	= 162 mm (6.39 in.)		
186	= 186 mm (7.34 in.)		
194	= 194 mm (7.65 in.)		
217	= 217 mm (8.56 in.)		
250	= 250 mm (9.85 in.)		
	SENSOR CONNECTION TYPE _____ =	<input type="text" value="A"/>	6
A	= JST PHR-4 connector		
	OUTPUT _____ =	<input type="text" value="V"/>	7
V	= Analog		
	IP 67 (H2) HOUSING OPTION _____ =	<input type="text"/> <input type="text"/>	8 - 9
	(Enter the two-digit code if you are ordering the H2 housing option with a core sensor, otherwise leave fields (8-9) blank)		
H2	= IP 67 housing, includes JST PHR-4 mating connector and 1 meter cable, part no. 253396 <i>(Order accessories and optional connectors and cable assemblies separately, Refer to Accessories on pages 4-5)</i>		



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