

# Data Sheet

## C-Series OEM-Sensor Analog

### Magnetostrictive Linear Position Sensors

Document Part No.  
551408 Revision B

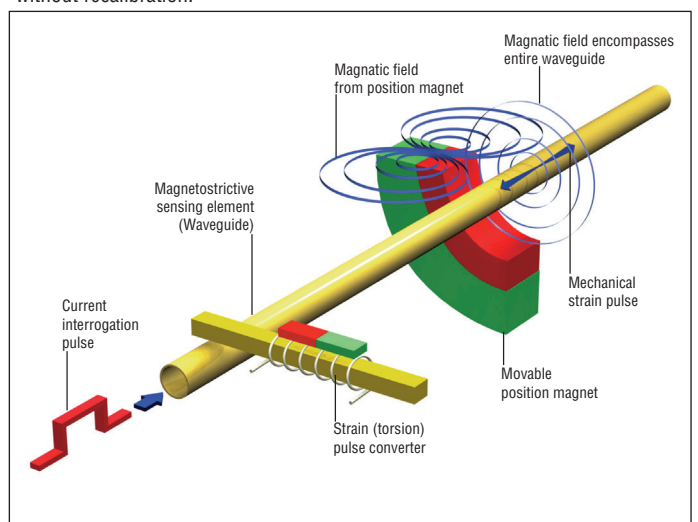


- Contactless measurement – entirely wear-free
- Low weight – ideal for small portable OEM products
- Cost-efficient
- Space-saving – the smallest sensor in the market offers all advantages of magnetostrictive measurement technology
- Low energy requirement – can be operated from 5 VDC or 12 VDC supply
- No wear – no need for periodic re-adjustment
- Available with various position magnets
- Optional: direct or inverse analog output signal
- Optional: assignment of output signal to measuring length

**The OEM sensor is designed as a built-in product. The sensor is a function of the customer requirements according to the application, and considering the environment, environmental influences, including EMI protection effects.**

#### Magnetostriction

The absolute Temposonics linear position sensors are based on the proprietary magnetostrictive measuring principle. This combines various magneto-mechanical effects and uses the physically exact velocity measurement of an ultrasonic wave (torsion pulse in its sensor element) for position detection. The sensor-integrated signal processing converts the measured values directly into commercially available outputs. The non-contact principle - an external moving magnet marks the position - eliminates the problems of wear, noise and false signals and guarantees best durability without recalibration.



## Technical Data

### Input

Measured variables: Position  
 Stroke length: 72, 109, 128, 148, 162, 186, 194, 217, 250 mm

### Output

Analog: 0.1 - 4.9 VDC  
 Resolution: analog output signal  
 Signal without magnet: not specified  
 Feature: At 5 VDC operating voltage output is ratiometric to operating voltage

### Accuracy

Linearity: ± 0.15 mm by means of magnet 401842, between 5 % and 95 % of stroke length  
 Zero tolerance: ± 1 mm  
 Hysteresis: ± 25 µm  
 Repeatability: ± 25 µm  
 Temperature variation: ± 0.005 % pro °C  
 Update time: 500 Hz (2 ms)

### Operation conditions

Operating temperature: -40°C...+75°C  
 Storage temperature: -20°C...+85°C

### Pressure

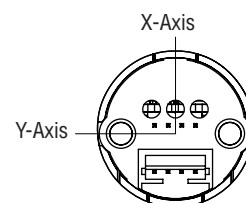
up to 2500 m altitude

### IP Protection

IP30  
 3 - DIN 40 050 Part 9 – Protection against foreign bodies – Protected against foreign bodies from Ø2,5 mm  
 0 - DIN 40 050 Part 9 – Protection against water – No protection

### Environmental testing

Shock test: IEC-68-2-27  
 10g (11ms) → Single hit  
 10g (11ms) 1000 shocks per axis  
 Vibration test: IEC 60068-2-6 (10...2000 Hz) 10g Sinus (resonance frequencies excluded)  
 EMC-test: Emission according to EN 61000-6-4  
 CISPR 16-2-3 – Disturbance field strength (measurement distance 3 m)  
 CISPR 16-2-1 – Disturbance current (DC voltage supply)  
 Immunity according to EN 61000-6-2  
 EN 61000-4-2 – Electrostatic discharge (ESD) (Compliance only with corresponding protection housing, see H2 and M1)  
 EN 61000-4-3 – Radiated electrosolenoidic radio-frequency, free radiated (Compliance only with corresponding protection housing, see H2 and M1)  
 EN 61000-4-4 – Electrical fast transient (Burst)  
 EN 61000-4-5 – Surge  
 EN 61000-4-6 – Conducted radio-frequency, line guided  
 EN 61000-4-8 – Power frequency solenoidic field



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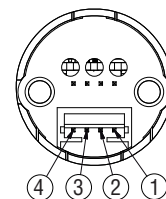
### Form factor, material

Housing: POM  
 Protective pipe: nylon blue

### Electrical connection

Supply voltage: CS: 5 VDC (tolerance range 4.75 - 5.5 VDC), CM: 12 VDC (tolerance range 9 - 15 VDC)  
 Max. power consumption: max. 40 mA  
 Output load: analog: >= 10 kΩ  
 Overvoltage protection: CS: up to 19 VDC short term  
 CM: up to 29 VDC short term  
 Polarity protection: VDC - GND

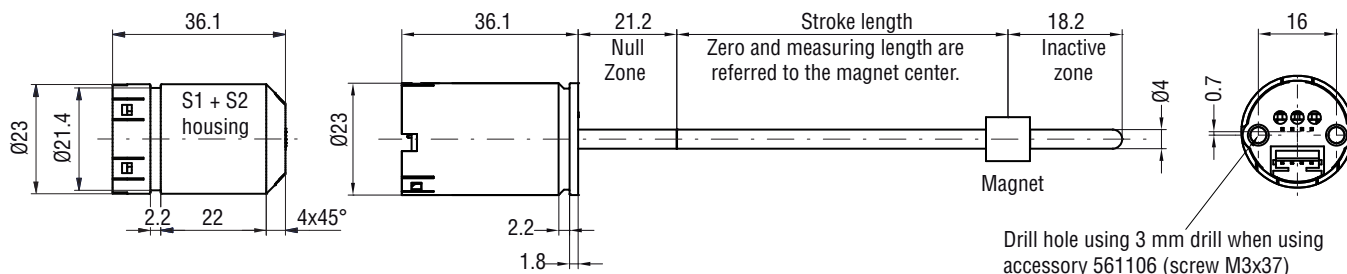
Pin	Signal
1	DC Ground
2	Output signal
3	Supply voltage
4	



Operating voltage quality:  
 Load control: CS: 5 VDC ± 0.1 %      CS: 12 VDC ± 0.15 %  
 Grid control: ± 0.05 %      ± 0.05 %  
 Ripple: < 50 mVpp      < 100 mVpp  
 for U<sub>a</sub> at I<sub>a</sub> 0 - 100 %  
 for U<sub>a</sub> at U<sub>emin</sub> - U<sub>emax</sub>

### Mechanical connection

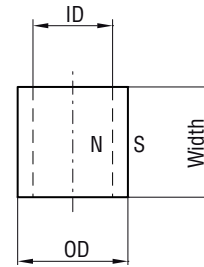
Screw connection: 2 screws M3x 37, max. tightening torque 0.4 Nm, with 3 mm bore hole  
 Terminal connection: by means of O rings (consultation with Temposonics required)



**Accessories**

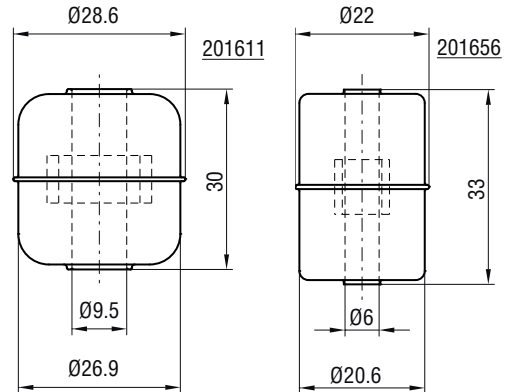
**Ring magnets**

Description	Article No.	Inside Ø	Outside Ø	Width
Ring magnet 6.5 mm	401842	6.5 mm	9 mm	9 mm
Ring magnet 19.3 mm	400424	19.3 mm	28 mm	4.9 mm
Ring magnet 13.5 mm	254012	13.5 mm	20 mm	10.5 mm



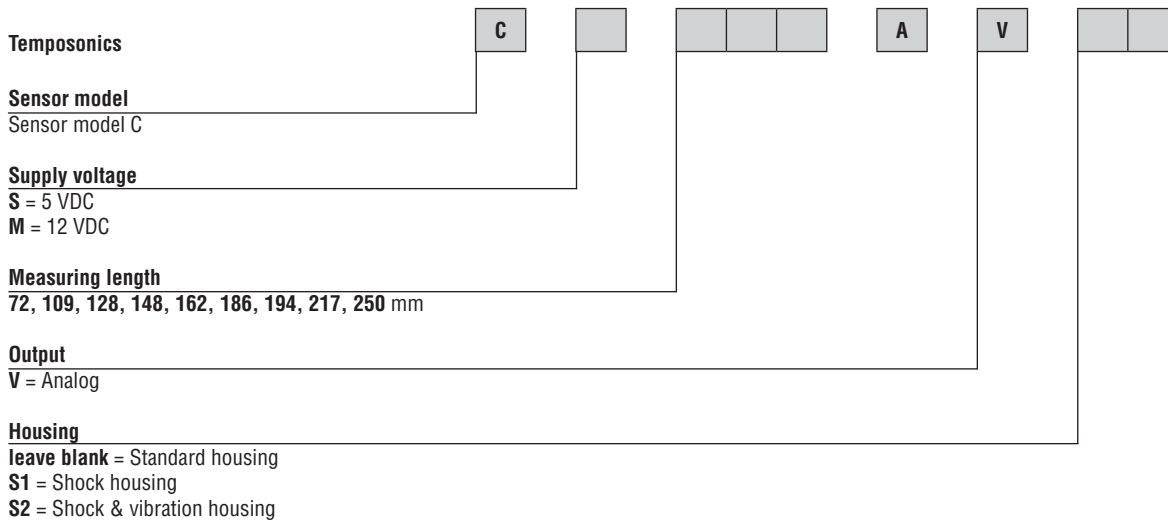
**Float**

Description	Article No.	Inside Ø	Outside Ø	Width
Float 1	201611	9.5 mm	28.6 mm	30 mm
Float 2	201656	6 mm	22 mm	33 mm



**Temposonics® Ordering**

**Ordering Information**



**Example:**

CS072AV      Sensor model C - Supply voltage 5 VDC - Measuring length 72 mm - Output analog - Standard housing  
 CM148AVS2      Sensor model C - Supply voltage 12 VDC - Measuring length 148 mm - Output analog - Shock & vibration housing

**Magnet and float options (An additional quantity of 1 unit per sensor should be ordered)**

Description	Function	Article No.
Ring magnet 6.5 mm	standard	401842
Ring magnet 19.3 mm	optional after approval for applications requiring a magnet with more clearance	400424
Ring magnet 13.5 mm	optional after approval for applications requiring a magnet with more clearance	254012
Float 1 with magnet	optional after approval for applications	201611
Float 2 with magnet	optional after approval for applications	201656

**Connection type**

Description	Function	Article No.
JST connector KRD	for insulation displacement connection without cable	370500
JST connector PHR-4	with cable 1m	253396-1000

**Mounting**

Description	Function	Article No.
Screw	M3x 37 - DIN 7500 (2 pcs. per sensor)	561106

## Application examples:

The target in customer solutions is a high degree of efficiency and synergy to the product. During the design phase measurements need to be taken which enable the product to meet customer requirements suitable for the application.

In this respect, close cooperative partnership between the customer and Temposonics is desirable.

All constructive measures relating to operating parameters (vibration, temperature and ESD) require consultation with Temposonics. This also includes the CE marking of components used for installation.



### Level measurement in medical technology

An analyser for immunodiagnostics applications uses magnetostrictive level sensors in containers to monitor the levels of consumables and of the collected waste products of the analysis. Through continuous measurement, it is always known how much fluid is in the containers. This enables continuous reloading without interruption of the analysis and anticipatory planning.



### Increased dosing accuracy, reduced consumption

The dosing accuracy during preparation of damping solution and precise control of the IPA concentration are of considerable importance for the production and process stability in printing systems. The continuous discussion relating to the toxic load of the ambient air at work places and the need for cost reduction in printing companies also requires further reduction of isopropyl alcohol in the damping solution. The Temposonics® OEM-sensor plays an important part for dosing of damping solutions and thus for decreasing the overall costs.



### Position feedback in process measurement and control systems

The valve position feedback combines well-proven sensor technology and state-of-the-art design for optimized applications.

Our development activity focused on the requirements and wishes expressed by our customers in the liquid processing industry.

In addition to safe control and monitoring of all functions of process valves in breweries, dairies, facilities for production of fruit juice and production plants in the pharmaceutical industry, the C series provides a high degree of efficiency.



### Position feedback in steering systems

The customer-specific sensors are used to monitor the steering position of rear drives and to provide position feedback. Based on the linear C-series position sensor, these sensors are equipped with a special housing, which was developed by the end user and realized by Temposonics. The sensors measure the stroke of steering cylinders on the port side and the bow side. Typically installed in multi-engine boats, the boat control system uses the sensor signal to permit control of the boat movement using a joystick: A solution termed "Steer-By-Wire".



### Cabin suspension

To reduce the human vibration, directive 2002/44/EC (human vibration directive) of the European Union has been implemented into national law in March 2007. This directive defines binding limit values (reference period of 8 hours < value  $0.5\text{m/s}^2$ ) for the hand-and-arm area as well as whole-body vibration values, which must not be exceeded.

These limit values are met by effectively reducing the induced vehicle vibration using C-series position sensors in a cabin suspension system.

The cabin suspension system permits reduction of the accelerations mainly in the Z axis. Due to this reduction, the vibration load acting on the driver is alleviated considerably, without affecting driving experience and operability.

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