

Data Sheet

C-Series Off-Highway

Magnetostrictive Linear Position Sensors

- 4...20 mA output for mobile hydraulic standards
- Rugged design for off-highway applications
- Stroke length up to 275 mm



MEASURING TECHNOLOGY

The absolute, linear position sensors provided by Temposonics rely on the company's proprietary magnetostrictive technology, which can determine position with a high level of precision and robustness. Each Temposonics® position sensor consists of a ferromagnetic waveguide, a position magnet, a strain pulse converter and supporting electronics. The magnet, connected to the object in motion in the application, generates a magnetic field at its location on the waveguide. A short current pulse is applied to the waveguide. This creates a momentary radial magnetic field and torsional strain on the waveguide. The momentary interaction of the magnetic fields releases a torsional strain pulse that propagates the length of the waveguide. When the ultrasonic wave reaches the beginning of the waveguide it is converted into an electrical signal. Since the speed of the ultrasonic wave in the waveguide is precisely known, the time required to receive the return signal can be converted into a linear position measurement with both high accuracy and repeatability.

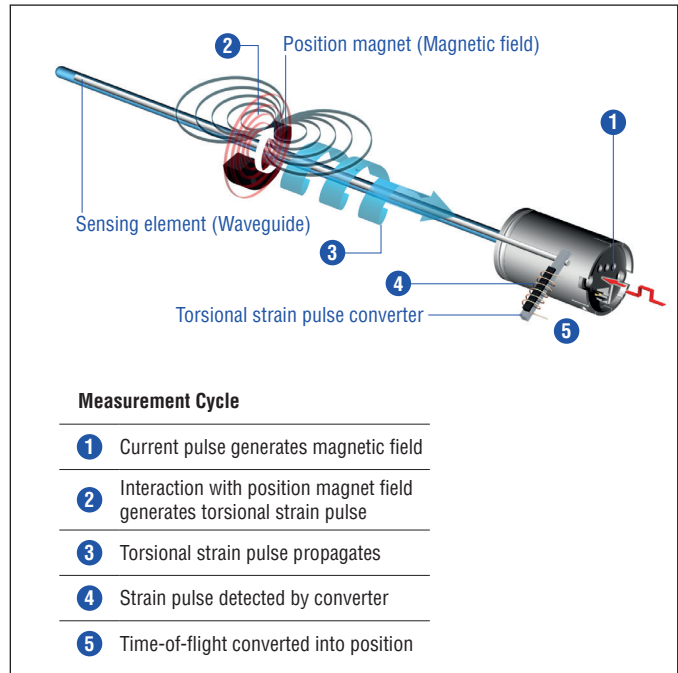


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

C-SERIES SENSOR

The Temposonics® C-Series is the smallest sensor series on the market that offers all the advantages of magnetostrictive measurement technology. The C-Series mobile sensor is designed for battery powered off-highway applications found on mobile paving machines, agricultural equipment, watercraft, recreational vehicles, and others. It is ideal for measuring small cylinder strokes that are restricted by size and weight. Due to the contact-free measuring principle, the sensor is completely wear-free and does not have to be readjusted again.



Fig. 2: Typical applications

TECHNICAL DATA

Output	
Analog	4...20 mA
Measured variable	Position
Measurement parameters	
Resolution	072 ... 148 mm < 0.15 mm 162 ... 275 mm < 0.30 mm
Linearity	±0.5 mm
Zero tolerance	±1 mm
Hysteresis	072 ... 148 mm < 0.15 mm 162 ... 275 mm < 0.30 mm
Repeatability	072 ... 148 mm < 0.15 mm 162 ... 275 mm < 0.30 mm
Update time	500 Hz (2 ms)
Operating conditions	
Storage temperature	-20...+85 °C
Operating temperature standard	-40...+85 °C
Ingress protection	IP30
Shock test	Survival test with pressure pipe: IEC 60068-2-27, 100 g (6 ms) single shock per axis; IEC 60068-2-29, 50 g (11 ms) at 1000 shocks per axis
Vibration test	Survival random vibration test with pressure pipe: IEC 60068-2-64 15 g RMS 20...2000 Hz 12 h per axis Operational sine vibration test with pressure pipe: IEC 60068-2-6 (5...2000 Hz) 25 g (10 mm) 6 sweeps per axis
EMC test	Compliant with: ISO 13766-1:2018 EN ISO 14982:2009 EN 13309:2010 ISO 16750-2:2012
EMI	Tested with bare sensor and unshielded harness: 200 V/m (ISO 11452-2:2019 200...2000 MHz) 200 mA (ISO 11452-4:2011 20...200 MHz)
Pressure	Up to 300 bar according DIN EN ISO 19879 (with optional pressure pipe)
Design	
Screw mounting	User determined, provisions for two M3 screws, 37 mm or longer (knock out of plastic seal barriers required)
Stroke length	72, 109, 128, 148, 162, 186, 194, 217, 250, 275 mm
Electrical connection	
Operating voltage	12/24 VDC (8...32 VDC)
Power consumption	Max. 1 W
Overvoltage protection (VDC-GND)	Up to +36 VDC
Polarity protection (GND-VDC)	Up to -36 VDC

TECHNICAL DRAWING

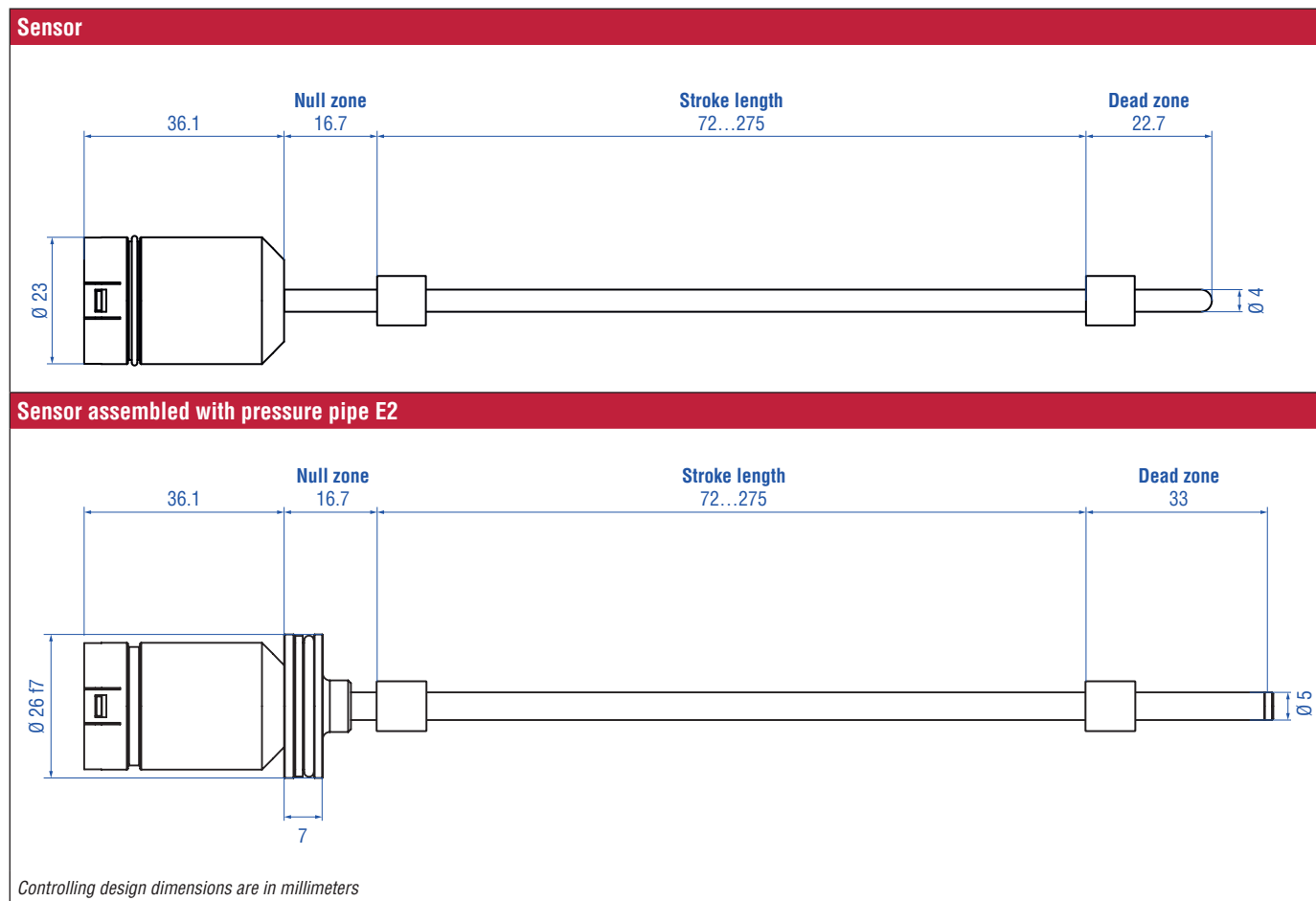


Fig. 3: Temposonics® C-Series sensor

CONNECTOR WIRING

Connector	Pin	Function
	1	DC Ground
	2	Signal
	3	VDC
	4	not connected

Fig. 4: Connector wiring

ORDER CODE

1	2	3	4	5	6	7	8	9
C	T				A	A		
a	b	c			d	e	f	

a	Type
C	C-Series Off-Highway

b	Operating voltage
T	12/24 VDC

c	Stroke length		
0	7	2	72 mm
1	0	9	109 mm
1	2	8	128 mm
1	4	8	148 mm
1	6	2	162 mm
1	8	6	186 mm
1	9	4	194 mm
2	1	7	217 mm
2	5	0	250 mm
2	7	5	275 mm

d	Connection type
A	Standard (Integrated connector)

e	Output
A	4...20 mA

f	Housing Type	
S	1	Sensor only
E	2	Sensor assembled with pressure pipe

DELIVERY

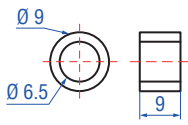


- Position sensor

Accessories have to be ordered separately

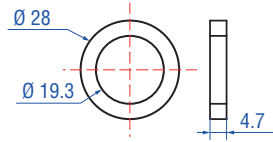
FREQUENTLY ORDERED ACCESSORIES

Position magnets



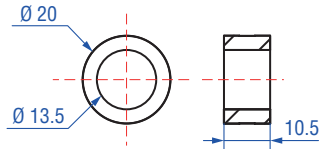
Ring magnet OD9
Part no. 401 842

Material: Strontium ferrite compound
nylon 12
Weight: ca. 1 g
Operating temperature:
-40...+85 °C (-40...+185 °F)



Ring magnet OD28
Part no. 400 424

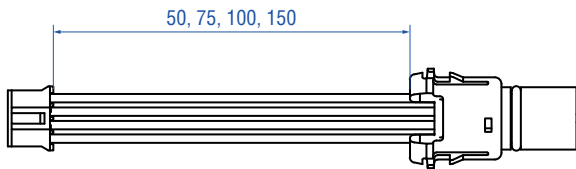
Material: Composite PA ferrite GF20
Weight: Approx. 6 g
Surface pressure: Max. 20 N/mm²
Operating temperature:
-40...+100 °C (-40...+212 °F)



Ring magnet OD20
Part no. 254 012

Material: Composite neobond
Weight: Approx. 8.5 g
Surface pressure: Max. 20 N/mm²
Operating temperature:
-40...+75 °C (-40...+167 °F)

Cable



C-Series Sensor to M12 connector
Part no. 201 989-1 (50 mm)
Part no. 201 989-2 (75 mm)
Part no. 201 989-3 (100 mm)
Part no. 201 989-4 (150 mm)

M12 flange ordered separately

Wiring

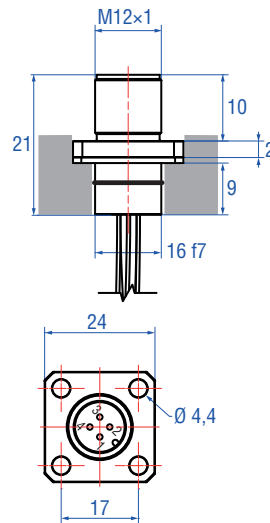
M12 Connector
(Pinout G)

Pin M12 male connector (4 pin)



- | | |
|---|---------------|
| 1 | VDC |
| 2 | not connected |
| 3 | DC Ground |
| 4 | Signal |

Flange



M12 Flange
Part no. 253 769

Material flange: Brass nickel-plated
Material O-ring: 13x1.6 NBR70

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Document Part Number:
552057 RevisionCB (EN) 01/2025

ISO 9001
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