

Data Sheet

R-Series RT4 SSI

Magnetostrictive Linear Position Sensors

- Redundant SSI output
- High temperature rod
- IP68 ingress protection



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.

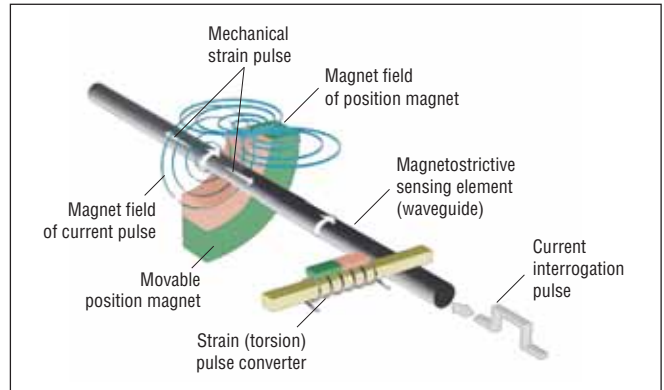


Fig. 1: Time-based magnetostrictive position sensing principle

RT4 SENSOR

Robust, non-contact and wear-free, the Temposonics® linear position sensors provide best durability and accurate position measurement solutions in harsh industrial environments. Designed for demanding applications that require redundancy and detached electronics due to high temperature or high reliability requirements. The position measurement accuracy is tightly controlled by the quality of the waveguide which is manufactured by Temposonics. The position magnet is mounted on the moving machine part and travels contactlessly over the sensor rod with the built-in waveguide.

- Redundant R-series detached electronics for enhanced safety applications

RT4 sensor specifications (up to +100 °C)

- Detached electronics up to 600 mm from sensor rod
- IP68 ingress protection
- Linear, absolute measurement
- Non-contact sensing technology
- Linearity deviation less than 0.02 %
- Direct 24/25/26 bit SSI output, gray/binary formats
- LEDs for sensor status and diagnostics

Applications:

- Steel, wood, power generation, fluid power



Fig. 2: Typical application: metal processing

TECHNICAL DATA

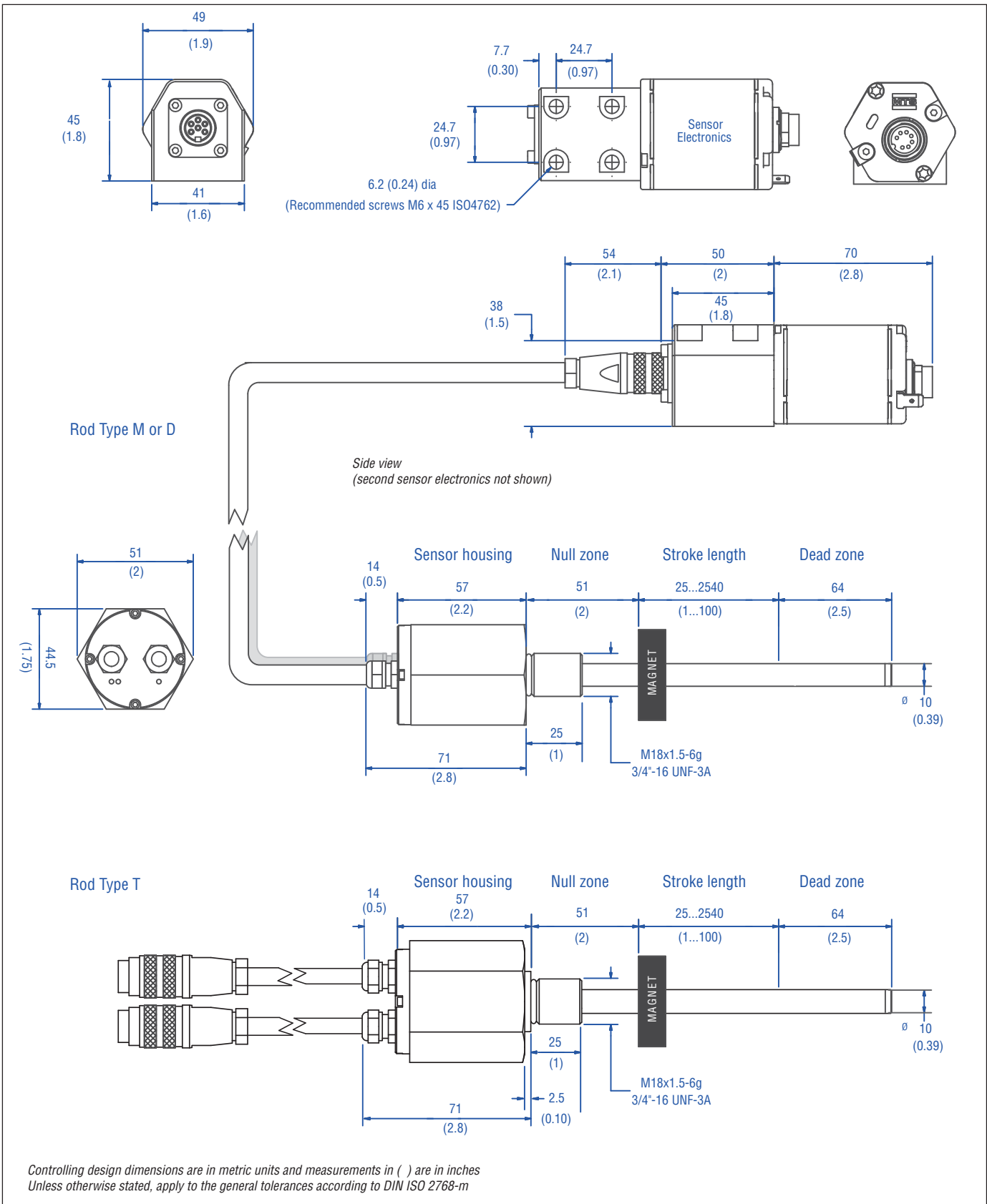
Output					
Interface	SSI (Synchronous Serial Interface) - differential signal in SSI standard (RS 422)				
Data protocol	Binary or Gray, optional: parity and error bit				
Data length	24, 25, or 26 bit				
Data transmission rate	70 kBaud* ...1 MBaud, depending on cable length:				
	Length	< 3	< 50	< 100	< 200
		< 400 m			
	Baud rate	1 MBd	< 400 kBd	< 300 kBd	< 200 kBd
		< 100 kBd			
Measured value	Position				
Measurement parameters					
Resolution	1 µm, 2 µm, 5 µm, 10 µm, 20 µm, 50 µm, 100 µm				
Cycle times	Stroke length	300	750	1000	2000 mm
	Measurement rate	3.7	3.0	2.3	1.2 kHz
Linearity ¹	< ±0.02 % F.S. (minimum ±50 µm)				
Repeatability	0.001 % F.S. (minimum ±2.5 µm)				
Operating conditions					
Operating temperature	Sensor electronics: -40 °C (-40 °F) to +75 °C (+167 °F) Sensor rod with interconnection cable: -40 °C (-40 °F) to +100 °C (+212 °F)				
Humidity	90% humidity, no condensation				
Ingress protection	Sensor electronics: IP67 (with professionally mounted housing and connectors) Sensor housing with interconnection cable: IP68				
Shock test	100 g (single hit) / IEC standard 60068-2-27				
Vibration test	10 g / 10 to 2000 Hz, IEC standard 60068-2-6 (resonance frequencies excluded)				
EMC test ²	Electromagnetic emission: IEC/EN 50081-1				
	Electromagnetic susceptibility: IEC/EN 50082-2				
	IEC/EN 61000-4-2/3/4/6, level 3/4 criterium A				
Magnet movement velocity ¹	Any				
Design/Material					
Sensor electronics	Aluminum housing with diagnostic LED display. (LEDs located beside connector/cable exit)				
Sensor housing	Stainless steel 1.4305, AISI 304L				
Stroke length	25...2540 mm (1...100 in.)				
Operating pressure	350 bar static, 690 bar peak (5000 psi, 10,000 psi peak)				
Mechanical mounting					
Mounting position	Any orientation				
Mounting instruction	Please consult the technical drawings				
Electrical connection					
Connection type	7 pin connector M16 or integral cable				
Operating voltage	+24 VDC (-15% / +20 %)				
Ripple	≤ 0.28 Vpp				
Current consumption	100 mA per sensor electronics				
Dielectric strength	500 VDC (DC ground to machine ground)				
Polarity protection	up to -30 VDC				
Overvoltage protection	up to 36 VDC				

* / with standard monoflop of 16 µs

1/ With position magnet # 201 542-2

2/ Sensor rod and interconnection cable are mounted in a metal housing (e.g. in a cylinder).

TECHNICAL DRAWINGS (Detached electronics with side cable entry)



CONNECTOR WIRING

M16 connector

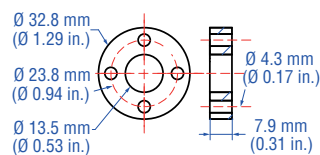
D70	Pin	Function
	1	Data (-)
	2	Data (+)
	3	Clock (+)
	4	Clock (-)
	5	+24 VDC (-15 / +20 %)
	6	DC Ground (0 V)
	7	n.c.

Cable outlet

Cable	Function
GY	Data (-)
PK	Data (+)
YE	Clock (+)
GN	Clock (-)
BN	+24 VDC (-15 / +20 %)
WH	DC Ground (0 V)

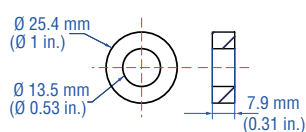
FREQUENTLY ORDERED ACCESSORIES – Additional options available in our [Accessories Catalog](#) 550929

Position magnets



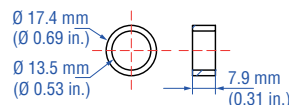
Standard ring magnet 0032.8
Part no. 201 542-2

Material: PA ferrite GF20
Weight: ca. 14 g
Operating temperature:
-40...+105 °C (-40...+221 °F)
Surface pressure: max. 40 N/mm²
Fastening torque for M4 screws:
max. 1 Nm



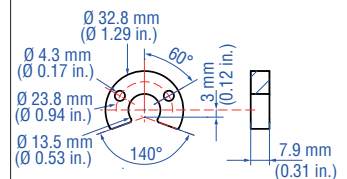
Ring magnet OD25.4
Part no. 400 533

Material: PA ferrite
Weight: ca. 10 g
Operating temperature:
-40...+105 °C (-40...+221 °F)
Surface pressure: max. 40 N/mm²



Ring magnet OD17.4
Part no. 401 032

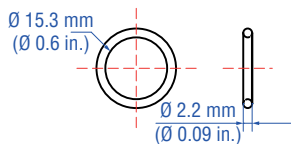
Material: PA neobind
Weight: ca. 5 g
Operating temperature:
-40...+105 °C (-40...+221 °F)
Surface pressure: max. 20 N/mm²



U-magnet OD33
Part no. 251 416-2

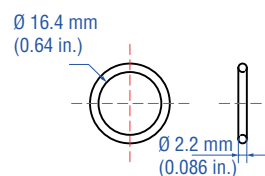
Material: PA ferrite GF20
Weight: ca. 11 g
Operating temperature:
-40...+105 °C (-40...+221 °F)
Surface pressure: max. 40 N/mm²
Fastening torque for M4 screws:
max. 1 Nm

Optional installation hardware



O-ring
Part no. 401 133

Material: Fluoroelastomer
75 ± 5 durometer
Application: M-style housings



O-ring
Part no. 560 315

Material: Fluoroelastomer
75 ± 5 durometer
Application: T and D -style housings

Controlling design dimensions are always in metric units

ORDER CODE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
R	T	4				E									S									
a			b		c		d		e			f			g									

23, 24, 25 optional

a	Sensor model																							
R	T	4	Rod version																					

b	Sensor rod style																							
M	Flat faced Metric threaded flange, M18x1.5																							
D	Flat faced US customary threaded flange, 3/4"-16																							
T	Raised face US customary threaded flange, 3/4"-16																							

c	Sensor rod interconnection cable																							
B	1	250 mm (9.8 in.) Santoprene cable, hanging connector																						
B	2	400 mm (15.7 in.) Santoprene cable, hanging connector																						
B	3	600 mm (23.6 in.) Santoprene cable, hanging connector																						

d	Electronics housing style																							
E	Side cable electronics connection																							

e	Stroke length																							
X	X	X	X	M	for mm (0025...2540 mm in 5 mm increments)																			
X	X	X	X	U	for inches (001.0...100.0 in. in 0.1 in. increments)																			

f	Connection type																							
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Integral connector																								
D	7	0	7pin M16 connector																					

Integral Cables (box No. 13, 14, 15)																								
P			Integral high-performance cable, orange jacket with pigtail termination																					
R			Integral cable, PVC jacket, pigtail termination, standard																					
F			Integral cable, black polyurethane jacket with pigtail termination																					

Cable length

Encode in feet if using US customary stroke length
Encode in meters if using metric stroke length

3 (03) to 98 (98) ft. or 1 (01) to 30 (30) meters.

Operating voltage																								
Without selection input voltage, 24 VDC																								

g	Output																							
S(17)(18)(19)(20)(21)(22)(23)(24)(25) = Synchronous Serial Interface																								

Data length (box no. 17)																								
1	25 bits																							
2	24 bits																							
3	26 bits																							

g	Output (continued)																							
S(17)(18)(19)(20)(21)(22)(23)(24)(25) = Synchronous Serial Interface																								

Format (box no. 18)																								
B	Binary																							
G	Gray																							

Resolution (box no. 19)																								
1	0.005 mm																							
2	0.01 mm																							
3	0.05 mm																							
4	0.1 mm																							
5	0.02 mm																							
6	0.002 mm																							
8	0.001 mm																							

Filtering performance (box no. 20)																								
8	Noise reduction filter (8 values)																							
G	Noise reduction filter (8 values) + error delay 10 cycles																							

Signal options (box no. 21 and 22)																								
0	0	Measuring direction forward																						
0	1	Measuring direction reverse																						
0	2	Measuring direction forward, synchronized measurement																						
0	5	Measuring direction forward, Bit 25 = Alarm, Bit 26 = Parity even																						
9	9	Advanced Signal Options (Use next fields 23, 24, 25)																						

Measurement contents (box no. 23)																								
1	Position																							

Direction and Sync mode (box no. 24)																								
1	Forward async																							
2	Forward sync1																							
5	Reverse async																							
6	Reverse sync1																							

Communication Diagnostics (box no. 25)																								
0	No further option																							
2	Additional alarm bit + parity even bit																							

DELIVERY



Sensor, O-ring

Accessories have to be ordered separately.

Operation manuals & software are available at:

www.temposonics.com



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