

Data Sheet

R-Series V RFV Analog

Magnetostrictive Linear Position Sensors

- Flexible sensor rod
- Stroke length up to 20 m
- Field adjustments and diagnostics using the new TempoLink® smart assistant



V
THE NEW GENERATION

TECHNICAL DATA

Output									
Analog	Voltage: 0...10/10...0/-10...+10/+10...-10 VDC (min. controller load > 5 kΩ) Current: 4(0)...20/20...4(0) mA (min./max. load 0/500 Ω)								
Measured output variables	Position for one or two position magnets Position + speed (without direction) or velocity (with direction) for one position magnet Position for one position magnet + temperature inside the sensor electronics housing								
Measurement parameters									
Position measurement									
Null/Span adjustment	100 % of electrical stroke								
Resolution	16 bit (internal resolution 0.1 μm)								
Update time	Stroke length	≤ 200 mm	≤ 350 mm	≤ 1200 mm	≤ 2400 mm	≤ 4800 mm	≤ 7620 mm	≤ 10,000 mm	≤ 20,000 mm
	Update time	0.25 ms	0.333 ms	0.5 ms	1.0 ms	2.0 ms	5.0 ms	7.5 ms	15.0 ms
Linearity deviation ¹	< ±0.02 % F.S. (minimum ±100 μm)								
Repeatability	< ±0.001 % F.S. (minimum ±2,5 μm) typical								
Hysteresis	< 4 μm typical								
Temperature coefficient	< 30 ppm/K typical								
Velocity measurement									
Range	0.01...10 m/s or 1...400 in./s								
Deviation	≤ 0.05 %								
Resolution	16 bit (minimum 0.01 mm/s)								
Operating conditions									
Operating temperature	-40...+85 °C (-40...+185 °F)								
Humidity	90 % relative humidity, no condensation								
Ingress protection	IP30 (IP65 rating only for professional mounted guide pipe and if mating connectors are correctly fitted)								
Shock test	100 g/6 ms IEC standard 60068-2-27								
Vibration test	5 g/10...2000 Hz, IEC standard 60068-2-6 (excluding resonant frequencies)								
EMC test	Electromagnetic emission according to EN 61000-6-3								
	Electromagnetic immunity according to EN 61000-6-2 The RFV sensors fulfill the requirements of the EMC directives 2014/30/EU, UKSI 2016 No. 1091 and TR CU 020/2011 under the condition of an EMC compliant installation ²								
Magnet movement velocity	Any								
Design/Material									
Sensor electronics housing	Aluminum (painted), zinc die cast								
Sensor flange	Stainless steel 1.4305 (AISI 303)								
Sensor rod	Stainless steel conduit with PTFE coating								
RoHS compliance	The used materials are compliant with the requirements of EU Directive 2011/65/EU and EU Regulation 2015/863 as well as UKSI 2022 No. 622								
Stroke length	150...20,000 mm (6...787 in.)								
Mechanical mounting									
Mounting position	Any								
Mounting instruction	Please consult the technical drawings on page 5 and page 6 and the operation manual (document part number: 552063)								

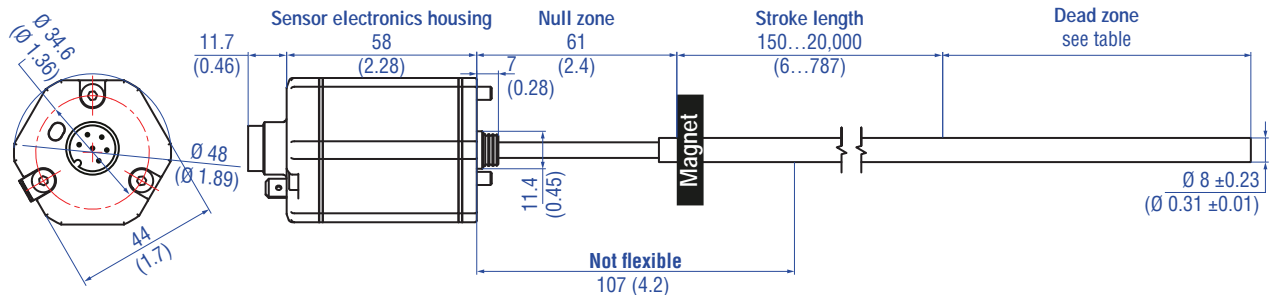
Technical data “Electrical connection” on [page 4](#)

1/ With position magnet # 251 416-2

2/ The flexible sensor element must be mounted in an appropriately shielded environment

TECHNICAL DRAWING

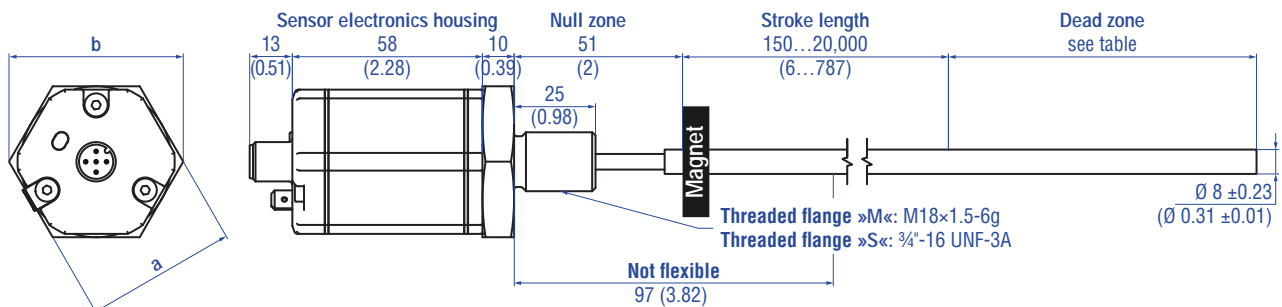
RFV-B – RFV base unit, example: Connection type D60 (connector outlet)



Stroke length	Tolerance of total length	Dead zone
Up to 7620 mm (300.00 in.)	+8 mm (0.31 in.)/-5 mm (0.20 in.)	94 mm (3.70 in.)
Up to 10,000 mm (393.70 in.)	+15 mm (0.59 in.)/-15 mm (0.59 in.)	100 mm (3.94 in.)
Up to 15,000 mm (590.55 in.)	+15 mm (0.59 in.)/-30 mm (1.18 in.)	120 mm (4.72 in.)
Up to 20,000 mm (787.00 in.)	+15 mm (0.59 in.)/-45 mm (1.77 in.)	140 mm (5.51 in.)

Note: Tolerance of total length has no influence on the stroke length.

RFV-M/S – RFV with threaded flange M18×1.5-6g or 3/4"-16 UNF-3A, example: Connection type D34 (connector outlet)



Threaded flange	a	b
»M«	A/F 46 (1.81)	53 (2.09)
»S«	A/F 44.5 (1.75)	51.3 (2.02)


Stroke length	Tolerance of total length	Dead zone
Up to 7620 mm (300.00 in.)	+8 mm (0.31 in.)/-5 mm (0.20 in.)	94 mm (3.70 in.)
Up to 10,000 mm (393.70 in.)	+15 mm (0.59 in.)/-15 mm (0.59 in.)	100 mm (3.94 in.)
Up to 15,000 mm (590.55 in.)	+15 mm (0.59 in.)/-30 mm (1.18 in.)	120 mm (4.72 in.)
Up to 20,000 mm (787.00 in.)	+15 mm (0.59 in.)/-45 mm (1.77 in.)	140 mm (5.51 in.)

Note: Tolerance of total length has no influence on the stroke length.

Controlling design dimensions are in millimeters and measurements in () are in inches


Fig. 2: Temposonics® RFV with ring magnet, part 1

CONNECTOR WIRING

D34				
Signal + power supply				
M12 male connector	Output	Pin	Function	
 <p>View on sensor</p>	1	1	+12...30 VDC (±20 %)	
		2	Position (magnet 1)	
		3	DC Ground (0 V)	
	2*	4	Position (magnet 2) or reverse position (magnet 1) or speed or velocity (magnet 1) or temperature inside the sensor electronics housing	
		5	Signal Ground	

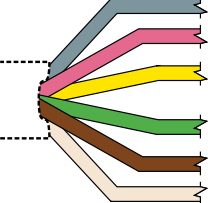
* order dependent

Fig. 4: Connector wiring D34

D60				
Signal + power supply				
M16 male connector	Output	Pin	Function	
 <p>View on sensor</p>	1	1	Position (magnet 1)	
		2	Signal Ground	
	2*	3	Position (magnet 2) or reverse position (magnet 1) or speed or velocity (magnet 1) or temperature inside the sensor electronics housing	
		4	Signal Ground	
		5	+12...30 VDC (±20 %)	
		6	DC Ground (0 V)	

* order dependent

Fig. 5: Connector wiring D60

HXX or LXX / RXX or EXX / TXX or GXX / UXX				
Signal + power supply				
Cable	Output	Color	Function	
	1	GY	Position (magnet 1)	
		PK	Signal Ground	
	2*	YE	Position (magnet 2) or reverse position (magnet 1) or speed or velocity (magnet 1) or temperature inside the sensor electronics housing	
		GN	Signal Ground	
		BN	+12...30 VDC (±20 %)	
		WH	DC Ground (0 V)	

* order dependent

For cable type TXX, the extra red & blue wires are not used.

Fig. 6: Connector wiring cable outlet

Straight cable outlet			Cable type	Angled cable outlet
H	X	X	Part no. 530 052 PUR	→ L X X Part no. 530 052
R	X	X	Part no. 530 032 PVC	→ E X X Part no. 530 032
T	X	X	Part no. 530 112 FEP	→ G X X Part no. 530 157

Fig. 7: Cable types assignment

Mounting accessories



Pressure rod with threaded flange with flat-face (M18x1.5-6g) and O-ring
HD [length mm: XXXX] M
HD [length in.: XXX.X] U

Pressure rod Ø: 12.7 mm (0.5 in.)
Length: 100...7500 mm (4...295 in.)
Operating pressure: 350 bar (5076 psi)
Material flange:
Stainless steel 1.4305 (AISI 303)
Material rod:
Stainless steel 1.4301 (AISI 304)



Pressure rod with threaded flange with flat-face (3/4"-16 UNF-3A) and O-ring
HL [length mm: XXXX] M
HL [length in.: XXX.X] U

Pressure rod Ø: 12.7 mm (0.5 in.)
Length: 100...7500 mm (4...295 in.)
Operating pressure: 350 bar (5076 psi)
Material flange:
Stainless steel 1.4305 (AISI 303)
Material rod:
Stainless steel 1.4301 (AISI 304)

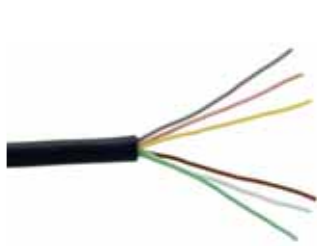


Profile with flange
HFP [length mm: XXXXX] M
HFP [length in.: XXXX.X] U

Length: Max. 20 000 mm (max. 787 in.)
Ingress protection: IP30
Material: Aluminum

Cables

Cable sets



Silicone cable
Part no. 530 176

Material: Silicone jacket; black
Features: Twisted pair, shielded
Cable Ø: 6.3 mm (0.25 in.)
Cross section: 3 × 2 × 0.14 mm²
Bending radius: 7 × D
(fixed installation)
Operating temperature: -50...+150 °C
(-58...+302 °F)



Cable with M12 A-coded female
connector (5 pin), straight – pigtail
Part no. 370 673

Material: PUR jacket; black
Features: Shielded
Cable length: 5 m (16.4 ft)
Ingress protection: IP67 (correctly fitted)
Operating temperature:
-25...+80 °C (-13...+176 °F)



Cable with M12 A-coded female
connector (5 pin), angled – pigtail
Part no. 370 675

Material: PUR jacket; black
Features: Shielded
Cable length: 5 m (16.4 ft)
Ingress protection: IP67 (correctly fitted)
Operating temperature:
-25...+80 °C (-13...+176 °F)

Programming tools



Hand programmer for analog output
Part no. 253 124

Easy teach-in-setups of stroke length
and direction on desired zero / span
positions. For sensors with 1 magnet.



Cabinet programmer for analog output
Part no. 253 408

Features snap-in mounting on
standard DIN rail (35 mm). This
programmer can be permanently
mounted in a control cabinet and
includes a program/run switch.
For sensors with 1 magnet.



TempoLink® kit for Temposonics®
R-Series V
Part no. TL-1-0-AD60 (for D60)
Part no. TL-1-0-AS00 (for cable outlet)
Part no. TL-1-0-AD34 (for D34)

- Connect wirelessly via Wi-Fi enabled device or via USB with the diagnostic tool
- Simple connectivity to the sensor via 24 VDC power line (permissible cable length: 30 m)
- User friendly interface for mobile devices and desktop computers
- See data sheet “TempoLink® smart assistant” (document part no.: [552070](#)) for further information

Controlling design dimensions are in millimeters and measurements in () are in inches
Color of connectors and cable jacket may change. Colors of the cores and technical properties remain unchanged.

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	
R	F	V													1								
a			b	d						e	f			g	h	i	j	k	l				
optional																							

a	Sensor model		
R	F	V	Flexible rod

b	Design
B	Base unit
M	Threaded flange M18×1.5-6g (standard)
S	Threaded flange ¾"-16 UNF-3A (standard)

Section **c** is intentionally omitted.

d	Stroke length					
X	X	X	X	X	M	00150...20000 mm
Stroke length (mm)		Ordering steps				
150... 1000 mm		50 mm				
1000... 5000 mm		100 mm				
5000...10000 mm		250 mm				
10000...15000 mm		500 mm				
15000...20000 mm		1000 mm				
X	X	X	X	X	U	0006.0...0787.0 in.
Stroke length (in.)		Ordering steps				
6... 40 in.		2 in.				
40...197 in.		4 in.				
197...394 in.		10 in.				
394...591 in.		20 in.				
591...787 in.		40 in.				
Non standard stroke lengths are available; must be encoded in 5 mm/0.1 in. increments						

e	Number of magnets	
0	X	01...02 Position(s) (1...2 magnet(s))

f	Connection type
Connector	

D	3	4	M12 male connector (5 pin)
D	6	0	M16 male connector (6 pin)

Angled cable outlet	
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E	X	X	XX m/ft. PVC cable (part no. 530 032) E01...E30 (1...30 m/3...99 ft.) See "Frequently ordered accessories" for cable specifications
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G	X	X	XX m/ft. FEP cable (part no. 530 157) G01...G30 (1...30 m/3...99 ft.) See "Frequently ordered accessories" for cable specifications
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L	X	X	XX m/ft. PUR cable (part no. 530 052) L01...L30 (1...30 m/3...99 ft.) (Note the temperature range of the cable!) See "Frequently ordered accessories" for cable specifications
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U	X	X	XX m/ft. Silicone cable (part no. 530 176) U01...U30 (1...30 m/3...99 ft.) See "Frequently ordered accessories" for cable specifications
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Straight cable outlet	
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H	X	X	XX m/ft. PUR cable (part no. 530 052) H01...H30 (1...30 m/3...99 ft.) (Note the temperature range of the cable!) See "Frequently ordered accessories" for cable specifications
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R	X	X	XX m/ft. PVC cable (part no. 530 032) R01...R30 (1...30 m/3...99 ft.) See "Frequently ordered accessories" for cable specifications
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T	X	X	XX m/ft. FEP cable (part no. 530 112) T01...T30 (1...30 m/3...99 ft.) See "Frequently ordered accessories" for cable specifications
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Encode in meters if using metric stroke length.
Encode in feet if using US customary stroke length.

g	System
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1	Standard
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h	Output
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A	Current
---	---------

V	Voltage
---	---------



GLOSSARY

A

Analog output

For a sensor with analog output, the measured value is output as an analog voltage signal or current signal.

D

Differential

For differential measurement, the distance between the two position magnets is output as a value.
(→ Multi-position measurement)

M

Max speed or velocity value

For speed or velocity, the output value generated is scaled based on the maximum speed or velocity value indicated in the order code.

Measuring direction

- Forward: Values increasing from sensor electronics housing to rod end/profile end
- Reverse: Values decreasing from sensor electronics housing to rod end/profile end

Multi-position measurement

During the measurement cycle, the positions of every magnet on the sensor are simultaneously reported. The velocity or speed are continuously calculated based on these changing position values as the magnets are moved.

O

Over range output mode

When enabled this mode allows the position output values to continue to increase or decrease when the magnet travels beyond the active stroke range.

R

Resolution

The sensor precisely measures time to provide the position measurement. For the analog output the measured time value is converted into an analog voltage signal or current signal using a high-performance Digital to Analog Converter (DAC) having 16 bits of resolution.

S

Speed

The output value for speed indicates how fast the position magnet is being moved, independent of the measuring direction. (→ Velocity)

T

Temperature inside the sensor electronics housing

The temperature inside the sensor electronics housing is reported as an analog voltage signal or current signal. For each output range, the 0 % output value has the factory default setpoint at -40 °C, and the 100 % output value has the default setpoint at +100 °C.

Note: a dedicated temperature chip is used for the output signal and its values may vary from those reported on the TempoLink® application screen.

V

Velocity

The output value for velocity indicates how fast the position magnet is being moved, and in which direction. (→ Speed)