

## Data Sheet

# G-Series V GH5 Digital

## Magnetostrictive Linear Position Sensors

- Digital-pulse output models: PWM or Start/Stop
- LED for visualization of the sensor status
- Field adjustments and diagnostics using the TempoLink® smart assistant



## 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.

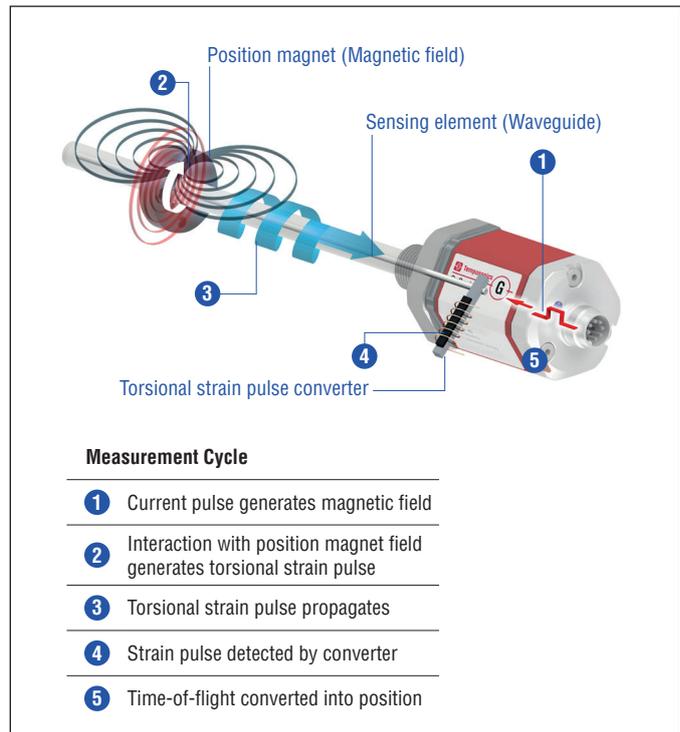


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

## G-SERIES V GH5 Digital

The Temposonics® G-Series V brings balanced sensor performance to meet the many demands of your application. The main advantages of the rod version GH5 with digital output PWM and Start/Stop are:



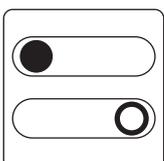
### 9 positions simultaneously

The G-Series V Digital can detect and report the position of up to 9 magnets simultaneously (controller dependent).



### LED for sensor status

The LED in the housing cover visualizes the sensor status. This allows you to see the current status of the sensor at a glance.



### Switching output

You can switch the digital output of the sensor from Start/Stop to Pulse Width Modulation (PWM) and vice versa on site.

## All settings under control with the smart assistant for the G-Series V

The TempoLink® smart assistant supports you in setup and diagnostics of the G-Series V. Among other things, you can adjust the parameters of the sensor to your application on site or read out information about the current status of the sensor.

For more information of this assistant please see the data sheet:

- TempoLink® smart assistant  
(Document part number: [552070](#))



## TECHNICAL DATA

Output						
Digital pulse outputs	Start/Stop and Pulse Width Modulation (PWM)					
Measured output variables	Position or liquid level					
Measurement parameters						
Null/Span adjustment	100 % of electrical stroke					
Resolution	0.1, 0.01 and 0.005 mm (controller dependent)					
Update time	Stroke length	≤ 500 mm	≤ 1100 mm	≤ 3000 mm	≤ 6250 mm	≤ 7620 mm
	Update time	500 µs	1 ms	2 ms	4 ms	5 ms
Linearity deviation <sup>1</sup>	< ±0.02 % F.S. (minimum ±50 µm)					
Repeatability	< ±0.002% % F.S. (minimum ±5 µm)					
Hysteresis	< 4 µm typical					
Temperature coefficient	< 30 ppm/K typical					
Operating conditions						
Operating temperature	-40...+80 °C (-40...+176 °F)					
Humidity	90 % relative humidity, no condensation					
Ingress protection	IP67 (connectors correctly fitted)/IP68 (3 m/3 d) and IP69 for cable outlet					
Shock test	100 g/11 ms, IEC standard 60068-2-27					
Vibration test	30 g/10...2000 Hz, IEC standard 60068-2-6 (excluding resonant frequencies)/ GH5-J: 15 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 GH5 sensors fulfill the requirements of the EMC directives 2014/30/EU, UKSI 2016 No. 1091 and TR CU 020/2011.					
Operating pressure	450 bar (6,527 psi)/700 bar (10,153 psi) peak (at 10 × 1 min) for sensor rod/GH5-J: 800 bar (11,603 psi)					
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 1.4306 (AISI 304L)					
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 with amendments					
Stroke length	25...7620 mm (1...300 in.)/GH5-J: 25...5900 mm (1...232 in.)					
Mechanical mounting						
Mounting position	Any					
Mounting instruction	Please consult the technical drawings on <a href="#">page 4</a>					
Electrical connection						
Connection type	1 × M16 male connector (6 pin) or cable outlet					
Operating voltage	Standard: +24 VDC (-15/+20 %)/option: +9 VDC...+28.8 VDC; The GH5 sensors must be power supplied via an external Class 2 power source in accordance with the UL approval					
Power consumption	2.5 W typical (3.5 W maximum)					
Dielectric strength	500 VDC (DC ground to machine ground)					
Polarity protection	Up to -30 VDC					
Overvoltage protection	Up to 36 VDC					

1/ With position magnet # 251 416-2

## TECHNICAL DRAWING

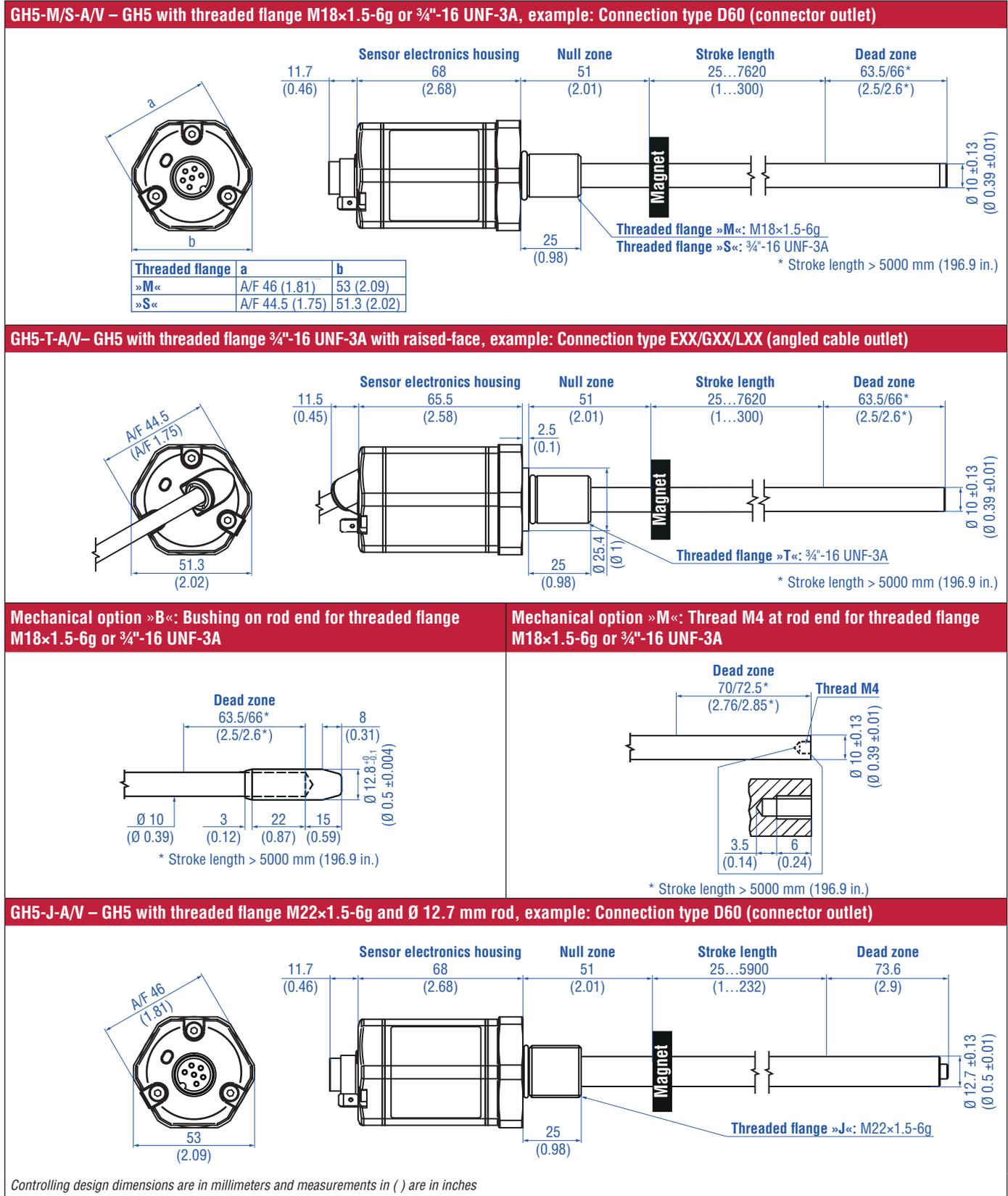


Fig. 2: Temposonics® GH5 with ring magnet

## CONNECTOR WIRING

D60		
Signal + power supply		
M16 male connector	Pin	Function
 <p>View on sensor</p>	1	Gate (-) for PWM Stop (-) for Start/Stop
	2	Gate (+) for PWM Stop (+) for Start/Stop
	3	Interrogation (+) for PWM Start (+) for Start/Stop
	4	Interrogation (-) for PWM Start (-) for Start/Stop
	5	+24 VDC (-15/+20 %)
	6	DC Ground (0 V)

Fig. 3: Connector wiring D60

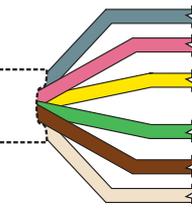
EXX/GXX/LXX		
Signal + power supply		
Cable	Color	Function
	GY	Gate (-) for PWM Stop (-) for Start/Stop
	PK	Gate (+) for PWM Stop (+) for Start/Stop
	YE	Interrogation (+) for PWM Start (+) for Start/Stop
	GN	Interrogation (-) for PWM Start (-) for Start/Stop
	BN	+24 VDC (-15/+20 %)
	WH	DC Ground (0 V)

Fig. 4: Connector wiring cable outlet

**FREQUENTLY ORDERED ACCESSORIES** – Additional options available in our [Accessories Catalog](#) 551444

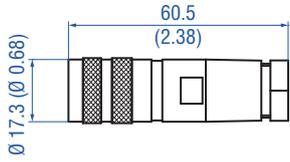
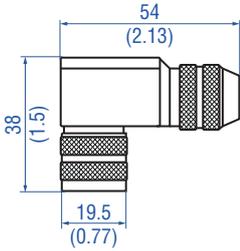
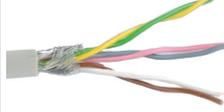
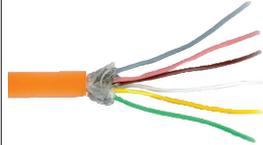
Position magnets			
<p><b>U-magnet OD33</b> Part no. 251 416-2</p>	<p><b>Ring magnet OD33</b> Part no. 201 542-2</p>	<p><b>Ring magnet OD25.4</b> Part no. 400 533</p>	<p><b>Ring magnet</b> Part no. 402 316</p>
<p>Material: PA ferrite GF20 Weight: Approx. 11 g Surface pressure: Max. 40 N/mm<sup>2</sup> Fastening torque for M4 screws: 1 Nm Operating temperature: -40...+120 °C (-40...+248 °F)</p>	<p>Material: PA ferrite GF20 Weight: Approx. 14 g Surface pressure: Max. 40 N/mm<sup>2</sup> Fastening torque for M4 screws: 1 Nm Operating temperature: -40...+120 °C (-40...+248 °F)</p>	<p>Material: PA ferrite Weight: Approx. 10 g Surface pressure: Max. 40 N/mm<sup>2</sup> Operating temperature: -40...+120 °C (-40...+248 °F)</p>	<p>Material: PA ferrite coated Weight: Approx. 13 g Surface pressure: Max. 20 N/mm<sup>2</sup> Operating temperature: -40...+100 °C (-40...+212 °F)</p>

Position magnet	Magnet spacer	O-rings	
<p><b>Block magnet L</b> Part no. 403 448</p>	<p><b>Magnet spacer</b> Part no. 400 633</p>	<p><b>O-ring for threaded flange</b> M18x1.5-6g Part no. 401 133</p>	<p><b>O-ring for threaded flange</b> ¾"-16 UNF-3A Part no. 560 315</p>
<p>Material: Plastic carrier with neodymium magnet Weight: Approx. 20 g Fastening torque for M4 screws: 1 Nm Operating temperature: -40...+75 °C (-40...+167 °F)</p> <p>This magnet may influence the sensor performance specifications for some applications.</p>	<p>Material: Aluminum Weight: Approx. 5 g Surface pressure: Max. 20 N/mm<sup>2</sup> Fastening torque for M4 screws: 1 Nm</p>	<p>Material: Fluoroelastomer Durometer: 75 ±5 Shore A Operating temperature: -40...+204 °C (-40...+400 °F)</p>	<p>Material: Fluoroelastomer Durometer: 75 ±5 Shore A Operating temperature: -40...+204 °C (-40...+400 °F)</p>

Mounting accessories		
<p><b>Hex jam nut M18x1.5-6g</b> Part no. 500 018</p>	<p><b>Hex jam nut ¾"-16 UNF-3A</b> Part no. 500 015</p>	<p><b>Fixing clip</b> Part no. 561 481</p>
<p>Material: Steel, zinc plated</p>	<p>Material: Steel, zinc plated</p>	<p>Application: Used to secure sensor rods (Ø 10 mm (Ø 0.39 in.)) when using an U-magnet or block magnet Material: Brass, non-magnetic</p>

**Cable connectors\***

**Cables**

			
<p><b>M16 female connector (6 pin), straight</b> <b>Part no. 370 423</b></p>	<p><b>M16 female connector (6 pin), angled</b> <b>Part no. 370 460</b></p>	<p><b>PVC cable</b> <b>Part no. 530 032</b></p>	<p><b>PUR cable</b> <b>Part no. 530 052</b></p>
<p>Material: Zinc nickel plated Termination: Solder Cable Ø: 6...8 mm (0.24...0.31 in.) Operating temperature: -40...+100 °C (-40...+212 °F) Ingress protection: IP65/IP67 (correctly fitted) Fastening torque: 0.6 Nm</p>	<p>Material: Zinc nickel plated Termination: Solder Cable Ø: 6...8 mm (0.24...0.31 in.) Wire: 0.75 mm<sup>2</sup> (20 AWG) Operating temperature: -40...+95 °C (-40...+203 °F) Ingress protection: IP67 (correctly fitted) Fastening torque: 0.6 Nm</p>	<p>Material: PVC jacket; gray Features: Twisted pair, shielded, flexible Cable Ø: 6 mm (0.23 in.) Cross section: 3 × 2 × 0.14 mm<sup>2</sup> Bending radius: 10 × D (fixed installation) Operating temperature: -40...+105 °C (-40...+221 °F)</p>	<p>Material: PUR jacket; orange Features: Twisted pair, shielded, highly flexible, halogen free, suitable for drag chains, mostly oil &amp; flame resistant Cable Ø: 6.4 mm (0.25 in.) Cross section: 3 × 2 × 0.19 mm<sup>2</sup> Bending radius: 5 × D (fixed installation) Operating temperature: -20...+80 °C (-4...+176 °F)</p>

**Cable**



**FEP cable**  
**Part no. 530 157**

Material: FEP jacket; black  
Features: Twisted pair, shielded  
Cable Ø: 6.7 mm (0.26 in.)  
Cross section: 3 × 2 × 0.14 mm<sup>2</sup>  
Operating temperature: -40...+180 °C (-40...+356 °F)

\*/ Follow the manufacturer's mounting instructions  
Color of connectors and cable jacket may change. Color codes for the individual wires and technical properties remain unchanged.  
Controlling design dimensions are in millimeters and measurements in ( ) are in inches

**Extension cables M16**

**Notice for extension cables M16**



**PVC cable with M16 female connector (6 pin), straight – pigtail**

PVC cable (part no. 530 032) with M16 female connector, straight (part no. 370 423)

Order code:  
**K2-A-370423-xxxxyy-530032-0**  
(where xxxx = cable length and yy = unit in centimeters “CM” or feet “FT”)

**PUR cable with M16 female connector (6 pin), straight – pigtail**

PUR cable (part no. 530 052) with M16 female connector, straight (part no. 370 423)

Order code:  
**K2-A-370423-xxxxyy-530052-0**  
(where xxxx = cable length and yy = unit in centimeters “CM” or feet “FT”)

**FEP cable with M16 female connector (6 pin), straight – pigtail**

FEP cable (part no. 530 112) with M16 female connector, straight (part no. 370 423)

Order code:  
**K2-A-370423-xxxxyy-530112-0**  
(where xxxx = cable length and yy = unit in centimeters “CM” or feet “FT”)

Standard cable lengths		
Meters	Feet	Code
1.5	5.0	0150
2.0	6.6	0200
4.6	15.0	0460
5.0	16.4	0500
7.6	25.0	0760
10.0	32.8	1000
15.2	50.0	1520

For additional extension cables reference the accessories catalog for industrial sensors (document part no.: [551444](#)).

**Programming tools**



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

- 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

*Color of connectors and cable jacket may change. Color codes for the individual wires and technical properties remain unchanged. Controlling design dimensions are in millimeters and measurements in ( ) are in inches*

## ORDER CODE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
G	H	5																
a			b	c	d					e	f			g	h			

19 optional

### a Sensor model

G	H	5	Rod
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### b Design

B	Base unit (only for replacement)
J	Threaded flange M22×1.5-6g (rod Ø 12.7 mm, 800 bar), max. stroke length 5900 mm
M	Threaded flange M18×1.5-6g (standard)
S	Threaded flange ¾"-16 UNF-3A (standard)
T	Threaded flange ¾"-16 UNF-3A (with raised-face)

### c Mechanical options

A	Standard
B	Bushing on rod end (only for design »M«, »S« & »T«)
M	Thread M4 at rod end (only for design »M«, »S« & »T«)
V	Fluorelastomer seals for the sensor electronics housing

### d Stroke length

X	X	X	X	M	0025...7620 mm
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Standard stroke length (mm)	Ordering steps
25... 500 mm	5 mm
500... 750 mm	10 mm
750...1000 mm	25 mm
1000...2500 mm	50 mm
2500...5000 mm	100 mm
5000...7620 mm	250 mm

X	X	X	X	U	001.0...300.0 in.
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Standard stroke length (in.)	Ordering steps
1... 20 in.	0.2 in.
20... 30 in.	0.4 in.
30... 40 in.	1.0 in.
40...100 in.	2.0 in.
100...200 in.	4.0 in.
200...300 in.	10.0 in.

Non-standard stroke lengths are available; must be encoded in 5 mm/0.1 in. increments.

### e Number of magnets

X	X	01...09 positions (1...9 magnets) (multi-position measurement* only for outputs »RO« & »RF«)
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\*Number of magnets ≥ 2 magnets

### f Connection type

#### Connector

D	6	0	M16 male connector (6 pin)
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#### Angled cable outlet

E	X	X	XX m/ft. PVC cable (part no. 530 032) E01...E30 (1...30 m)/E03...E99 (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)/G03...G99 (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)/L03...L99 (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

1	Standard
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2	Wide operating voltage: +9...+28.8 VDC
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h See next page

h	Output
R O	Start/Stop
R F	Start/Stop with closed error signal utility
D I X	PWM, internal interrogation X denotes the number of circulations (see table 1)
F I X	PWM, internal interrogation with closed error signal utility X denotes the number of circulations (see table 1)
D E X	PWM, external interrogation X denotes the number of circulations (see table 1)
F E X	PWM, external interrogation and closed error signal utility X denotes the number of circulations (see table 1)

»X« for output »DIX«, »FIX«, »DEX« and »FEX«										
Number of circulations	1	2	3	4	5	6	7	8	9	10
»X« in order code	1	2	3	4	5	6	7	8	9	A
Number of circulations	11	12	13	14	15	16	17	18	19	20
»X« in order code	B	C	D	E	F	G	H	I	J	K

Table 1: Number of circulations

#### NOTICE

- Specify the number of magnets for your application and order magnets separately.
- The number of magnets is limited by the stroke length. The minimum allowed distance between magnets (i.e. front face of one to the front face of the next one) is 75 mm (3 in.)
- Use magnets of the same type for multi-position measurement.

## DELIVERY



#### GH5-B:

- Base unit (without flange & rod assembly)
- 3 × socket screws M4×59

#### GH5-J/M/S/T:

- Sensor
- O-ring

Accessories have to be ordered separately.

Manuals, Software & 3D Models available at:  
[www.temposonics.com](http://www.temposonics.com)

## GLOSSARY

### C

#### **Closed Error Signal Utility**

At very high shock or vibration events, the magnet may no longer be detected properly. For these error events the Closed Error Signal Utility will produce an output signal waveform that corresponds to a value of just over the 100 % full stroke position. Therefore, the Closed Error Signal Utility should only be used with certain Allen Bradley and Digitron Electronics interface cards that are designed to process this sensor output appropriately. Contact Applications Engineering for more information.

### E

#### **External Interrogation**

For a sensor that is configured for external interrogation, a signal is required from the controller or interface module to initiate every measurement cycle.

### I

#### **Internal Interrogation**

For a sensor that is configured for internal interrogation, no signal is needed from the controller as the sensor itself initiates the next measurement cycle upon the completion of the current cycle.

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