

S P E C I F I C A T I O N S

PARAMETER	SPECIFICATION
Measured Variable:	Displacement
Resolution:	$1 \div [\text{gradient} \times \text{crystal freq. (MHz)} \times \text{circulations}]$
Non-Linearity**:	$\pm 0.02\%$ or $\pm 0.05 \text{ mm}$ ($\pm 0.002 \text{ in.}$), whichever is greater 0.002 in. is the minimum absolute linearity and varies with sensor model
Repeatability:	Equal to resolution
Hysteresis:	$< 0.02 \text{ mm}$ (0.0008 in.)***
Outputs:	Start/Stop or PWM
Measuring Range:	25 to 7620 mm (1 to 300 in.)
Operating Voltage:	+ 13.5 to 26.4 Vdc ($\pm 0\%$): Strokes $\leq 1525 \text{ mm}$ (60 in.) + 24 Vdc ($\pm 10\%$): Strokes $> 1525 \text{ mm}$ (60 in.)
Power Consumption:	100 mA maximum
Operating Temperature:	Head Electronics: - 40 to 85 °C (- 40 to 185 °F) Sensing Element: - 40 to 105 °C (- 40 to 221 °F)
EMC Test***:	DIN IEC 801-4, Type 4, CE Qualified; DIN EN 50081-1 (Emissions), DIN EN 50082-2 (Immunity)
Shock Rating:	100 g (single hit)/IEC standard 68-2-27 (survivability)
Vibration Rating:	5 g/10-150 Hz/IEC standard 68-2-6

Update Time:	Minimum = $[\text{Stroke (specified in inches)} + 3] \times 9.1 \mu\text{s}$
Housing Style/Enclosure:	Sensor Rod: 304L Stainless steel Electronic Head: Aluminum die-cast, IP67
Operating Pressure:	350 bar static, 690 bar spike (5,000 psi static, 10,000 psi spike)
Mounting:	Flange with M18 x 1.5 or 3/4-16 UNF-3A threads
Typical Mounting Torque:	45 N-m (33 ft.-lbs.)
Magnet Type:	Ring magnet or floating magnet

All specifications are subject to change. Please contact MTS for specifications critical to your needs.

* Non-linearity increases with multiple circulations.

** Power supply dependent.

*** EMC test specification does not include the sensor with the RB connection style. Sensors with the RB connection style meet the following standard: DIN EN 50081-2 (emissions) and DIN EN 50082-1 (immunity).

Go to www.mtssensors.com and refer to Product Specification part number 550658 for additional information.

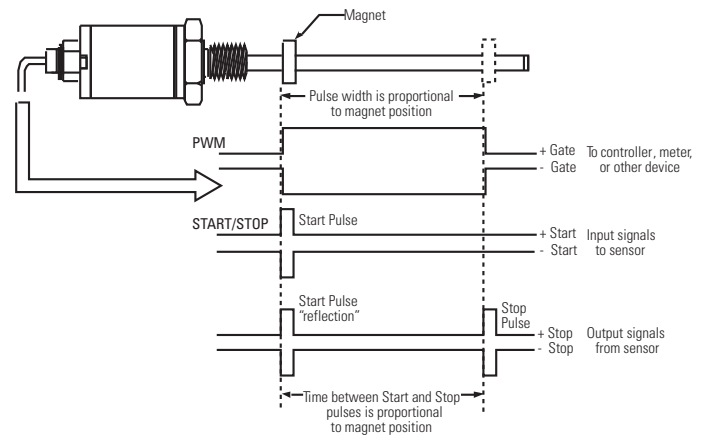
DIGITAL OUTPUTS

Temposonics L-Series position sensors provide direct Start/Stop and PWM outputs. The Start/Stop output consists of two differential pairs of signals, (based on the RS-422 standard), that use TTL voltage levels, (0 to 5 volts). One differential pair is used for Start, and the other for Stop. These differential signals provide for better noise immunity.

Each Start/Stop or PWM output style sensor is provided with its actual measured gradient value indicated on the sensor's label. The gradient is the inverse of the rate at which a pulse signal, (generated at the position magnet), propagates through the magnetostrictive waveguide inside the sensor's rod, (about 9 microseconds per inch). As the position magnet is moved further down the sensor rod, more time is required for the pulse signals to travel back to the sensor's electronics at the head. To determine the absolute position of the position magnet it is only necessary to divide the difference in time between the Start signal and the Stop signal by the gradient.

The PWM output provides the same elapsed time information, but rather than separate Start and Stop signals, it is represented on one differential pair of signals as a varying pulse width.

For both Start/Stop and PWM standard resolution is 0.004 inches, (when using a 28 MHz counter). Higher resolutions are possible with increased circulations or with the use of higher resolution counters.

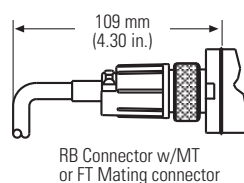
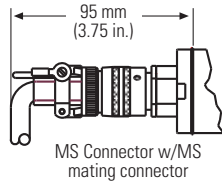
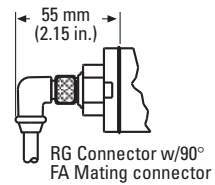
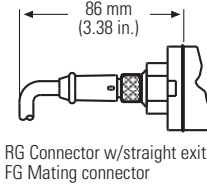
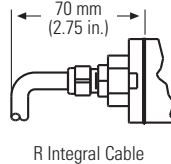
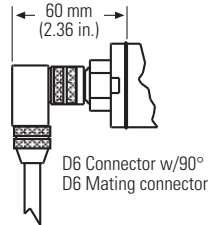
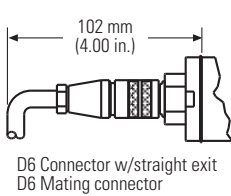
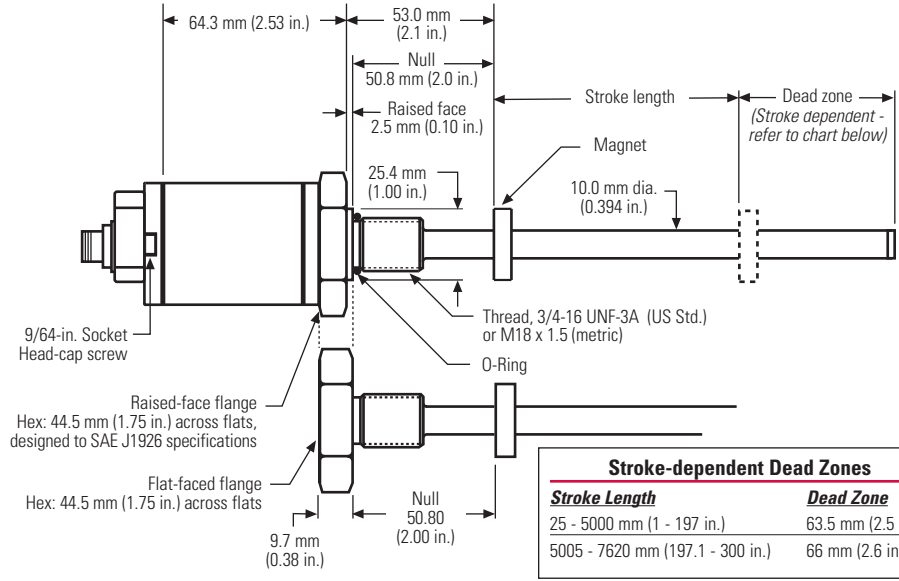


Product specification is part number 550658.

ROD-STYLE (Model RH)

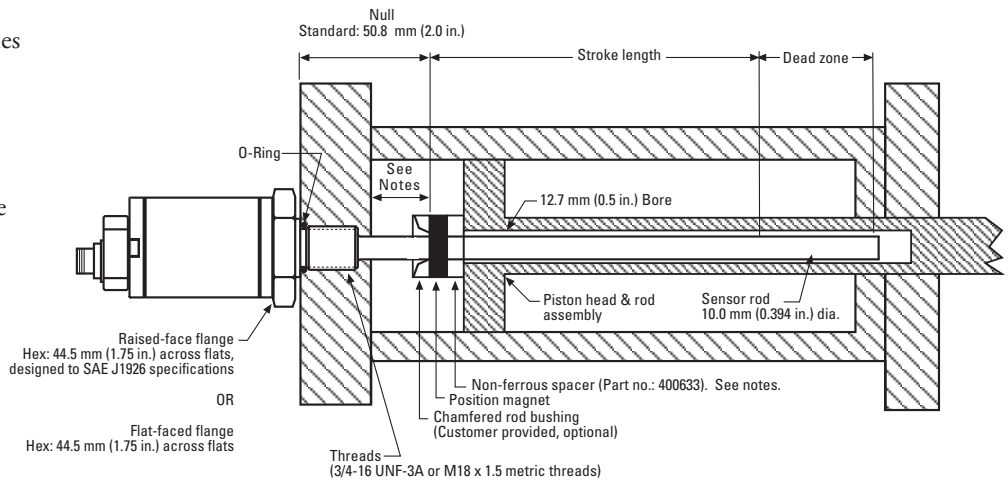
The Temposonics L-Series rod-style application housing (Model RH) offers modular construction, flexible mounting configurations, and easy installation. It is designed for internal mounting in applications where high-pressure conditions exist (5000 psi continuous, 10,000 psi spike) such as hydraulic cylinders. Temposonics RH may also be mounted externally in many applications.

In addition, the RH housing offers the ability to quickly and easily replace the sensor cartridge in the field (up to 72 inches).



CYLINDER INSTALLATION

The rod-style Temposonics L-Series position sensor (Model LH) is designed for installation into hydraulic cylinders. The sensor's high-pressure, stainless steel tube installs into a 1/2 inch bore in the piston head and rod assembly as shown.

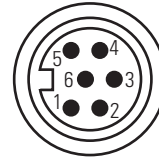


NOTES:

- The position magnet requires minimum distances away from ferrous metals to allow proper sensor output. The minimum distance from the front of the magnet to the cylinder end cap is 15 mm, (0.6 in.). The minimum distance from the back of the magnet to the piston head is provided by the non-ferrous spacer, i.e. 3.2 mm, (0.125 in.).
- The illustration above represents a typical installation. Some installation requirements may be application specific.

Integral Connector D6 Integral Cable with Pigtail Termination

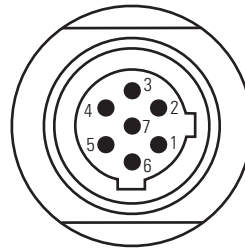
Pin No.	Wire Color	Function
1	Gray	(-) Gate for PWM, (-) Stop for Start/Stop
2	Pink	(+) Gate for PWM, (+) Stop for Start/Stop
3	Yellow	(+) Interrogation for PWM, (+) Start for Start/Stop
4	Green	(-) Interrogation for PWM, (-) Start for Start/Stop
5	Red or Brown	Customer Supplied Power (+ Vdc)*
6	White	DC Ground



Integral Connector (D6 Male)
(As viewed from end of sensor)

RG Connector

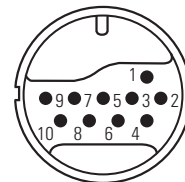
Pin no.	Wire color	Function
1	Gray	(-) Gate
2	Pink	(+) Gate
3	Yellow	(+) Interrogation (see notes 2 & 3 on page 4)
4	Green	(-) Interrogation (see notes 2 & 3 on page 4)
5	Red or Brown	Customer supplied power (+ Vdc)*
6	White	DC ground
7	-	No connection



RG connector
(As viewed from end of sensor)

RB Connector: (LH sensors only)

Pin no.	Wire color	Function
1	White	DC ground
2	-	No connection
3	Gray	(-) Gate
4	Pink	(+) Gate
5	Red	Customer supplied power (+ Vdc)*
6	-	No connection
7	-	No connection
8	-	No connection
9	Yellow	(+) Interrogation (see notes 2 & 3 on page 4)
10	Green	(-) Interrogation (see notes 2 & 3 on page 4)

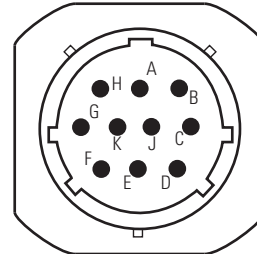


RB connector
(As viewed from end of sensor)

* Power requirements are stroke length dependent.
 +13.5 to 26.4 Vdc ($\pm 0\%$) Stroke lengths ≤ 1525 mm (60 in.)
 +24 Vdc ($\pm 10\%$): Stroke lengths > 1525 mm (60 in.)

MS Connector:

Pin no.	Wire color	Function
A	White	DC ground
B	-	No connection
C	Gray	(-) Gate
D	Pink	(+) Gate
E	Red	Customer supplied power (+ Vdc)*
F	-	No connection
G	-	No connection
H	-	No connection
J	Yellow	(+) Interrogation (see notes 2 & 3)
K	Green	(-) Interrogation (see notes 2 & 3)



MS connector
(As viewed from end of sensor)

R3 Integral Cable with MS Connector:

Pin no.	Integral cable wire color	Function
A	White	DC Ground
B	-	No connection
C	-	No connection
D	Green	(-) Interrogation
E	Yellow	(+) Interrogation
F	-	No connection
G	Pink	(+) Gate
H	Red	Customer supplied power (+ Vdc)*
J	-	Shield
K	Gray	(-) Gate

* Power requirements are stroke length dependent.
 +13.5 to 26.4 Vdc (± 0%) Stroke lengths ≤ 1525 mm (60 in.)
 +24 Vdc (± 10%); Stroke lengths > 1525 mm (60 in.)

NOTES:

- 1) Appropriate grounding of cable shield is required at the controller end.
- 2) For single-ended interrogation, the unused interrogation lead must be connected to DC ground at the controller.
- 3) When using PWM with internal interrogation, both interrogation leads must be connected to DC ground.

EXTENSION CABLE WITH CONNECTOR(S) FOR THE D6 CONNECTION TYPE



SENSOR CONNECTION TYPE

- D6** = Female connector (straight-exit) for sensors with D6 connector
- DA** = Female connector (90° exit) for sensors with D6 connector

CABLE LENGTHS

For standard length cables up to 100 ft.

- 005** = 5 ft.
- 015** = 15 ft.
- 025** = 25 ft.
- 050** = 50 ft.
- 100** = 100 ft.

For custom length cables over 100 ft.

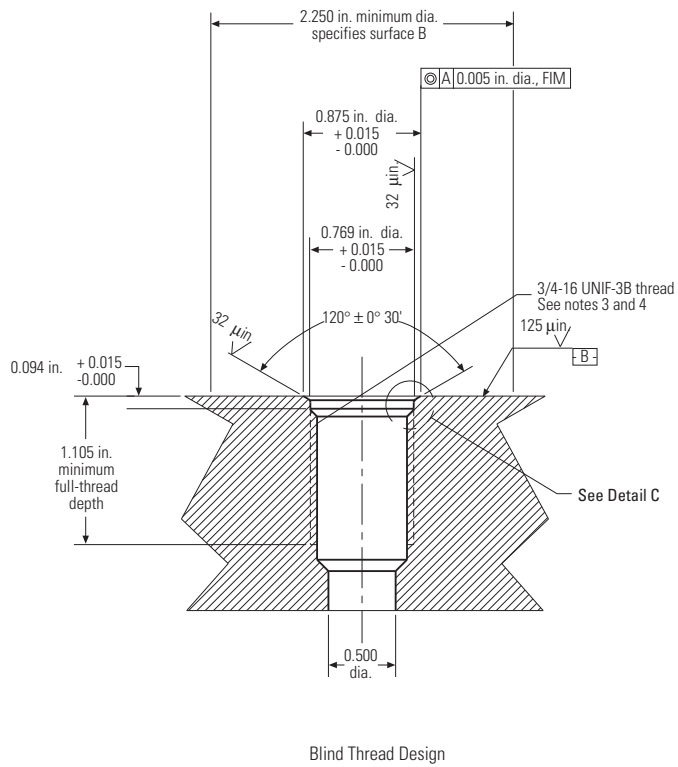
--- = Cable Length (maximum cable length is dependent on the output selected; consult MTS Applications Engineering.)

CABLE TERMINATION

- PO** = Pigtail connection
- D6M** = 6-pin D6 Male connector (straight exit)

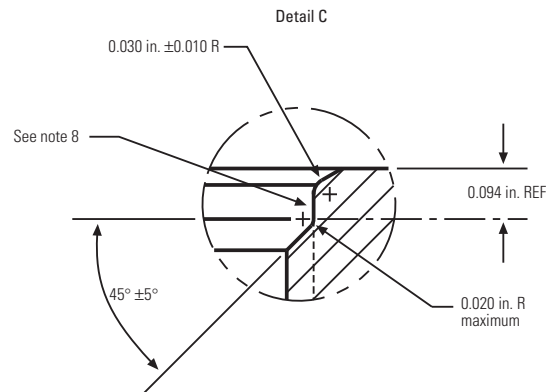
CYLINDER PORT DETAILS

PORT DETAIL (PD) FOR TEMPOSONICS Model RH SENSORS WITH HOUSING STYLE S:

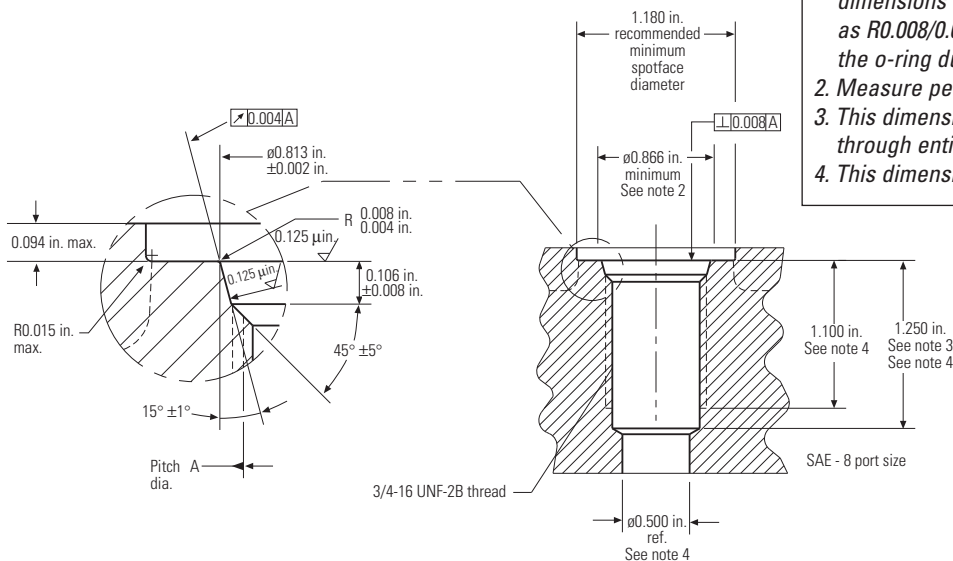


NOTES:

1. Dimensions and tolerances based on ANSI Y14.5-1982.
2. MTS has extracted all pertinent information from MS33649 to generate this document.
3. PD must be square with surface B within 0.005 FIM across 2.250 dia. minimum.
4. PD must be concentric with 2.250 dia. within 0.030 FIM and with 0.769 dia. within 0.005 FIM.
5. Surface texture ANSI B46.1-1978
6. Use o-ring, MTS part number 560315 for correct sealing.
7. The thread design shall have sufficient threads to meet strength requirements of material used.
8. Finish counter-bore shall be free from longitudinal and spiral tool marks. Annular tool marks up to 32 microinches maximum will be permissible.



PORT DETAIL (SAE J1926/1) FOR TEMPOSONICS Model RH SENSORS WITH HOUSING STYLE T:



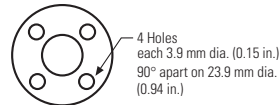
NOTES:

1. If face of port is on a machined surface, dimensions 1.180 and 0.094 need not apply as long as R0.008/0.004 is maintained to avoid damage to the o-ring during installation.
2. Measure perpendicularity to A at this diameter.
3. This dimension applies when tap drill cannot pass through entire boss.
4. This dimension does not conform to SAE J1926/1.

MAGNETS/FLOAT:

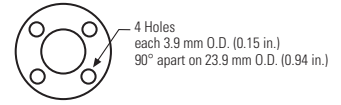
Magnets and floats must be ordered separately with Temposonics LH sensors. A variety of magnet styles (right) are available to meet your particular application needs. The standard ring magnet (Part No. 201542) is suitable for most applications.

**Standard Ring Magnet
Part No. 201542**



ID: 13.5 mm (0.53 in.)
OD: 32.8 mm (1.29 in.)
Thickness: 7.9 mm (0.312 in.)

**Magnet Spacer
(Non-Ferrous spacer for use with
standard ring magnet)
Part No. 400633**



ID: 14.3 mm (0.563 in.)
O.D.: 31.75 mm (1.25 in.)
Thickness: 3.175 mm (0.125 in.)

**Ring Magnet
Part No. 400533**



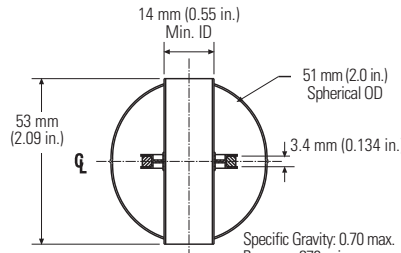
ID: 13.5 mm (0.53 in.)
O.D.: 25.4 mm (1.0 in.)
Thickness: 7.9 mm (0.312 in.)
**(For use with strokes
≤ 3050 mm or 120 in.)**

**Ring Magnet
Part No. 401032**



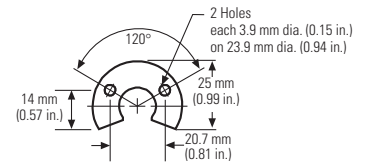
ID: 13.5 mm (0.532 in.)
O.D.: 17.4 mm (0.685 in.)
Thickness: 7.9 mm (0.312 in.)
**(For use with strokes
≤ 1525 mm or 60 in.)**

**Magnet Float
(Level Sensing Application)
Part No. 251447**



Specific Gravity: 0.70 max.
Pressure: 870 psi max.
(Float for use with rod-style sensors in hydraulic fluid or fresh water applications only)

**Floating Magnet
Part No. 251416**



ID: 13.5 mm (0.53 in.)
OD: 32.8 mm (1.29 in.)
Thickness: 7.9 mm (0.312 in.)

HOW TO ORDER

POSITION SENSORS

When placing an order, build the desired model number using the model number guide (right). A wide range of L-Series sensor configurations are available to meet the demands of your particular application.

If you have any questions about how to apply MTS Temposonics position sensors, please contact one of our Application Engineers or your local MTS distributor—they are available to help you design an effective position sensing system to fit your application.



- SENSOR MODEL**
- LH** = Hydraulic Rod-style
- HOUSING STYLE**
- T** = US customary threads, raised-faced hex, and pressure tube
 - S** = US customary threads, flat-faced hex, and pressure tube
 - M** = Metric threads, flat-faced hex, and pressure tube
 - N** = Metric threads, raised-faced hex, and pressure tube
 - B** = Sensor cartridge only, no pressure housing, stroke lengths ≤ 72 in.
- CONNECTION TYPE**
- D6** = 6-pin DIN, Integral connector
 - R0** = Integral cable with pigtail termination
 - RG** = 7-pin micro connector
 - RB** = 10-pin threaded connector*
 - MS** = 10-pin bayonet-style MS connector
 - R3** = Integral cable with 10-pin male connector (part number 370160)
Connection type R3 is for use with L-Series sensors with a pulse-width modulated (PWM) output when retrofitting existing Temposonics digital sensor systems.
- INTEGRAL CABLE LENGTH**
- 00** = No integral cable
 - 02** = 2 meter integral cable; standard with metric stroke lengths (i.e., millimeters)
 - 05** = 5 ft. integral cable; standard with US customary stroke lengths (i.e., inches and tenths)
 - 01 - 99** = Custom cable length 1 to 99 ft. (or 1 to 30 meters)
(Encode length in feet if using US customary stroke length, in meters if using metric stroke length)

CABLE LENGTH NOTES:
MTS recommends the maximum integral cable length to be 10 meters or 33 feet. Cables greater than 10 meters in length are available, however proper care must be taken during handling and installation.

- STROKE LENGTH**
- U** _ _ . _ = Inches and tenths (Encode in 0.1 in. increments)
 - or
 - M** _ _ _ _ = Millimeters (Encode in 5 mm increments)
- INPUT VOLTAGE**
- 1** = +13.5 to 26.4 Vdc, (For stroke lengths ≤ 60 inches)
 - 2** = +24 Vdc, ±10% (For stroke lengths > 60 inches)

STROKE LENGTH NOTES:
LH sensors with Analog outputs have a stroke range = 1-100 in. (25-2540 mm).
LH sensors with Start/Stop or PWM outputs have a stroke range = 1-300 in. (25-7620 mm).

- OUTPUT**
- R0** = Start/Stop
 - D** _ _ _ = Pulse-Width Modulated (PWM) (Fill in the three blanks with the following codes.)
a b c

- a) Interrogation** **b, c) Circulations**
- E** = External _ = Desired number of circulations
 - I** = Internal (Range = 1 to 15; encode as **01** to **15**. Refer to Tables A and B.)

NOTE:
Mating connectors, extension cables and magnets are sold separately.

Resolution	Circulation Count *
0.00026 in. (0.0066 mm)	15
0.0005 in. (0.0127 mm)	8
0.001 in. (0.025 mm)	4
0.002 in. (0.051 mm)	2
0.004 in. (0.102 mm)	1

Stroke	Maximum Circulation Count
≤ 84 in. (2134 mm)	15
> 84 in. (2136 mm)	1

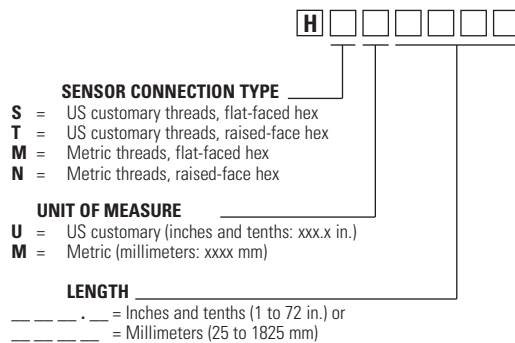
* Limited by stroke length for sensors configured for *internal* interrogation. (Refer to Table B)

ACCESSORIES

ACCESSORIES

Description	Part No.	Notes
Magnet spacer	400633	For use with standard ring magnet 201542.
Magnet mounting Screws	560357	Used to mount standard ring magnet Part No. 201542 (4 screws required).
Power supply (24/28 Vdc, 0.5 A)	380009	Open frame style.
LH o-ring (spare)	560315	For sealing LH pressure tube in the cylinder.
Hex-jam nut (w/ 3/4-16 UNF threads)	500015	For US customary stroke lengths.
Hex-jam nut (w/ M18 x 1.5 threads)	500018	For metric stroke lengths.
Collar	560777	For Temposonics LH sensors with float magnet.
Cable	530026	Specify length in feet at time of order.
D6 straight-exit connector	560700	See drawing on page 2.
D6 90° connector	560778	See drawing on page 2.

PRESSURE HOUSING



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