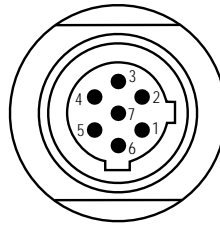


WIRING - ANALOG OUTPUTS

**RG Connector:  
(Voltage or Current Output)**

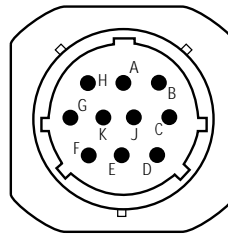
Pin No.	Wire Color	Function
1	Gray	0 to 10 Vdc, 4 to 20 mA, or 0 to 20 mA
2	Pink	Return for Pin 1
3	Yellow	10 to 0 Vdc, 20 to 4 mA, or 20 to 0 mA
4	Green	Return for Pin 3
5	Red or Brown	Customer Supplied Power (+ Vdc)*
6	White	DC Ground
7	-	No Connection



**RG Connector**  
(Molded Mating Extension Cable Required)

**MS Connector:  
(Voltage or Current Output)**

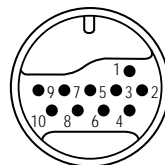
Pin No.	Wire Color	Function
A	White	DC Ground
B	-	No Connection
C	Gray	Return for Pin D
D	Pink	0 to 10 Vdc, 4 to 20 mA, or 0 to 20 mA
E	Red	Customer Supplied Power (+ Vdc)*
F	-	No Connection
G	Yellow	10 to 0 Vdc, 20 to 4 mA, or 20 to 0 mA
H	Green	Return for Pin G
J	-	No Connection
K	-	No Connection



**MS Connector**  
(Mating Connector: P/N 370013; MS3116F-12-10S  
or Extension Cable)

**RB Connector: (Current Output)**

Pin No.	Wire Color	Function
1	White	DC Ground
2	-	No Connection
3	Gray	Return for Pin 4
4	Pink	4 to 20 mA, 0 to 20 mA, 20 to 4 mA, or 20 to 0 mA
5	Red	Customer Supplied Power (+ Vdc)*
6	-	No Connection
7	Black	No Connection
8	Violet	No Connection
9	-	No Connection
10	-	No Connection



**RB Connector**  
(Mating Connector: P/N 400755-3 or Extension Cable)

\* 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.)

**RB Connector: (Voltage Output)**

Pin No.	Wire Color	Function
1	White	DC Ground
2	-	No Connection
3	Gray	Return for Pin 4
4	Pink	0 to 10 Vdc
5	Red	Customer Supplied Power (+ Vdc)*
6	-	No Connection
7	Black	10 to 0 Vdc
8	Violet	Return for Pin 7
9	-	No Connection
10	-	No Connection

**INTEGRAL CABLE:**

**R0 Cable:  
(Voltage or Current Output)**

Wire Color	Function
Gray (Note 1)	0 to 10 Vdc, 4 to 20 mA, or 0 to 20 mA
Pink (Note 1)	Displacement Output Return for Gray Wire
Yellow	10 to 0 Vdc, 20 to 4 mA, or 20 to 0 mA (Note 2)
Green	Displacement Output Return for Yellow Wire
Red or Brown	Customer Supplied Power (+ Vdc)*
White	DC Ground

\* 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.)

**CAUTION!**

When wiring Tempsonics L Series sensors equipped with an RG, MS, or R0 connector, **do not connect DC ground to the cable shield or drain wire.**

When wiring Tempsonics L Series sensors equipped with an RB connector, **we recommend that you do connect the cable shield to DC ground.**

**NOTES:**

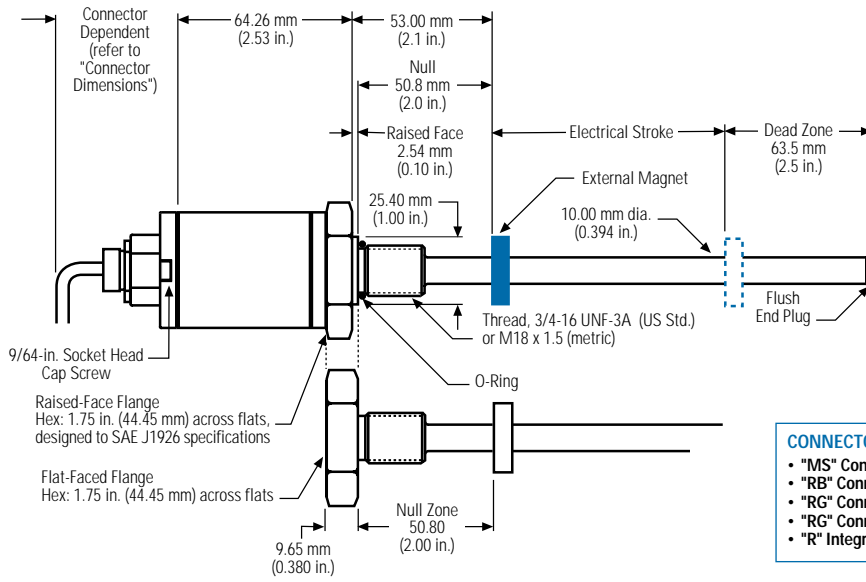
**General:**

1.) When using current (mA) outputs, only one output signal is provided (as selected in the ordering guide). With voltage outputs, both 0 to 10 Vdc and 10 to 0 Vdc output signals are provided.

**Retrofitting:**

1.) When using L Series sensors with 'R0' type integral cables or 'RG' and 'RA' extension cables, the function of the gray and pink wires are reversed compared to the original Tempsonics LH sensors.  
2.) When using L Series sensors with reverse-acting current outputs (i.e., 20 to 4 mA or 20 to 0 mA) and 'R0' type integral cables or 'RG' extension cables, please note that the current output scales are on separate wires. The original Tempsonics LH sensors had the forward and reverse-acting current output scales factory set using the same wire. This change will impact the replacement of original Tempsonics LH sensors with reverse-acting current output.

# DIMENSIONS

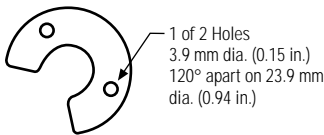


MODEL  
LH

### CONNECTOR DIMENSIONS (cable bend included)

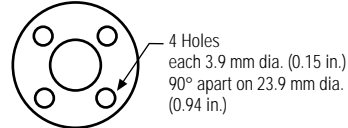
- "MS" Connector w/"MS" Mating Connector: 95.25 mm (3.75 in.)
- "RB" Connector w/"MT" or "FT" Mating Connector: 109.22 mm (4.30 in.)
- "RG" Connector w/straight exit "RG" Mating Connector: 85.85 mm (3.38 in.)
- "RG" Connector w/90° "RA" Mating Connector: 54.61 mm (2.15 in.)
- "R" Integral Cable: 69.85 mm (2.75 in.)

### Part No. 251416



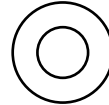
ID: 13.5 mm (0.53 in.)  
OD: 32.8 mm (1.29 in.)  
Thickness: 7.9 mm (0.312 in.)

### Part No. 201542



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

### Part No. 400533

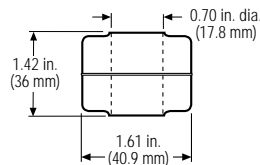


ID: 13.5 mm (0.53 in.)  
OD: 25.4 mm (1.0 in.)  
Thickness: 7.9 mm (0.312 in.)

### Part No. 401032



ID: 13.5 mm (0.532 in.)  
OD: 17.4 mm (0.685 in.)  
Thickness: 7.9 mm (0.312 in.)  
**(For use with strokes up to 1500 mm or 60 in.)**



**Part No. 200938-1**  
Specific Gravity: > 0.74  
Pressure: 125 psi  
(Float for use with rod-style sensors in hydraulic fluid or fresh water applications only)

# MAGNETS

## Z E R O & S P A N

All Temposonics L Series sensors are factory calibrated and should not require calibration. However, if your application requires that the zero and span settings be fine-tuned, use the following procedure.

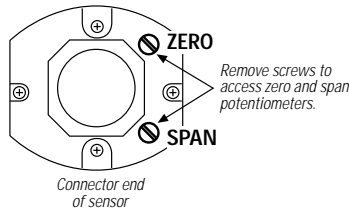


Figure 1

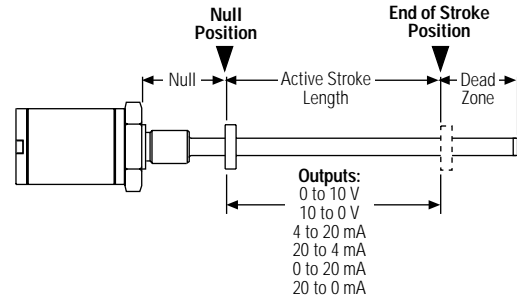


Figure 2

1. With power on, connect the sensor's output leads to a voltmeter/ammeter.
2. Remove the screws that protect the zero and span potentiometer ports (see Fig. 1 above).
3. Move the magnet to the **null** position (see Fig. 2).
4. Use a small, flat-head screwdriver to adjust the zero potentiometer until the output reads:

**For Forward-Acting Outputs:**

- - 0.020 V ( $\pm 0.005$  V) for sensor with 0 to 10 V outputs
- + 3.980 mA ( $\pm 0.005$  mA) for sensors with 4 to 20 mA outputs
- + 0.020 mA ( $\pm 0.005$  mA) for sensor with 0 to 20 mA outputs

**For Reverse-Acting Outputs:**

- + 10.02 V ( $\pm 0.010$  V) for sensor with 0 to 10 V outputs
- + 20.02 mA ( $\pm 0.010$  mA) for sensors with current outputs

(Refer to Figure 2 to determine zero and span set point location)

5. Move the magnet to the **end of stroke** position.
6. Use a small, flat-head screwdriver to adjust the span potentiometer until the output reads:

**For Forward-Acting Outputs:**

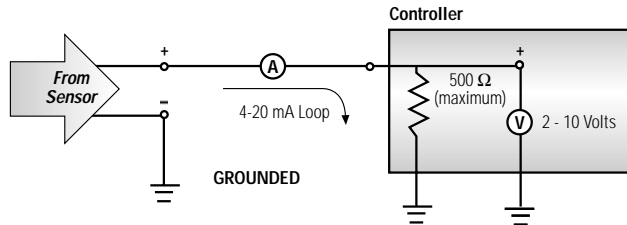
- + 10.02 V ( $\pm 0.010$  V) for sensor with 0 to 10 V outputs
- + 20.02 mA ( $\pm 0.010$  mA) for sensors with current outputs

**For Reverse-Acting Outputs:**

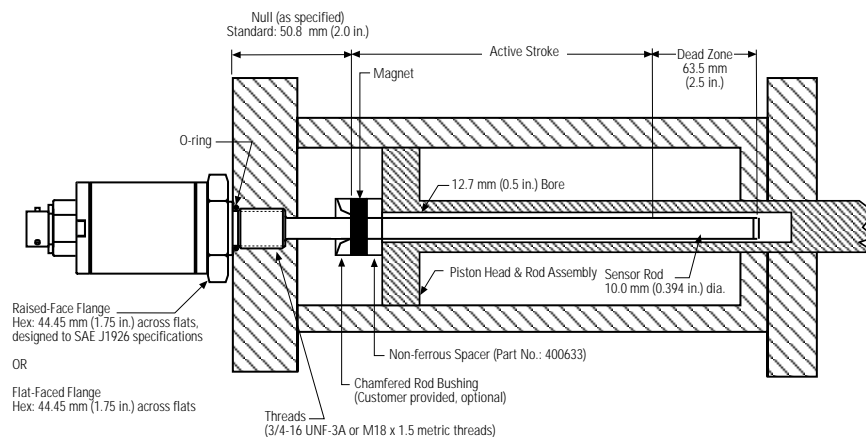
- - 0.020 V ( $\pm 0.005$  V) for sensor with 0 to 10 V outputs
- + 3.980 mA ( $\pm 0.005$  mA) for sensors with 4 to 20 mA outputs
- + 0.020 mA ( $\pm 0.005$  mA) for sensor with 0 to 20 mA outputs

7. Since the null setting can affect the end of stroke setting, return to the null position to verify that the output still reads within the acceptable range. If not, repeat the procedure until the null and end of stroke settings provide a full output range.
8. **IMPORTANT:** Replace the screws which protect the zero and span potentiometers.

## T Y P I C A L 4 - 2 0 m A W I R I N G :



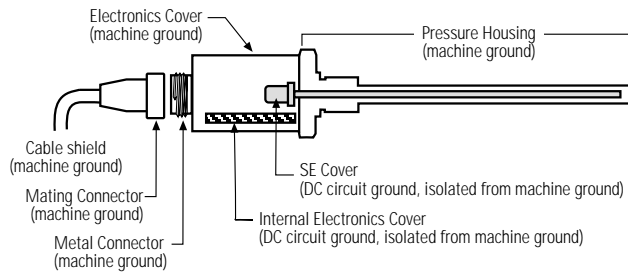
## T Y P I C A L C Y L I N D E R I N S T A L L A T I O N :



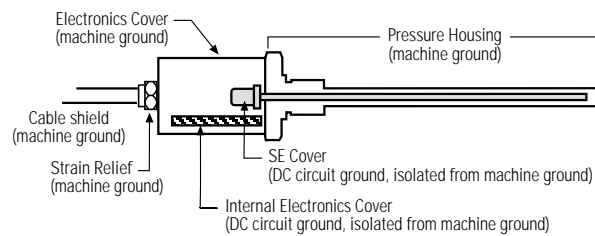
The illustration above represents a **typical** installation. Some installation requirements may be application specific.

## GROUNDING

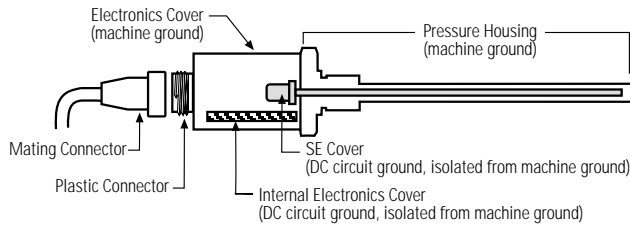
### L Series (SE-based) Sensors with Metal Connectors



### L Series (SE-based) Sensors with Integral Cables



### L Series (SE-based) Sensors with Plastic Connectors



#### Retrofitting Notes:

- 1.) When retrofitting original Temposonics II or LH sensors with L Series sensors, with 'R0' type integral cables, verify that the cable shield and the DC circuit ground are isolated from each other. Connecting the cable shield to DC ground will typically cause a ground loop when using sensors with metal connectors or integral cables.
- 2.) Connecting the cable shield and DC ground together will not typically cause a problem when using a sensor with a plastic connector.

## SPECIFICATIONS

PARAMETER	SPECIFICATION
Measured Variable:	Displacement
Resolution:	Infinite
Non-Linearity:	$\pm 0.02\%$ or $\pm 0.05$ mm ( $\pm 0.002$ in.), whichever is greater 0.002 in. is the minimum absolute linearity and varies with sensor model
Repeatability:	Equal to resolution
Hysteresis:	< 0.02 mm (0.0008 in.)
Outputs:	Voltage: 0 to +10 Vdc or +10 to 0 Vdc Current: 4 to 20 mA, 20 to 4 mA, 0 to 20 mA, or 20 to 0 mA
Measuring Range:	25 to 2000 mm (1 to 78 in.)
Operating Voltage:	+ 13.5 to 26.4 Vdc ( $\pm 0\%$ ): Strokes $\leq 1525$ mm (60 in.) + 24 Vdc ( $\pm 10\%$ ): Strokes > 1525 mm (60 in.)
Power Consumption:	120 mA
Operating Temperature:	Head Electronics: - 40 to 70°C (- 40 to 158°F) Sensing Element: - 40 to 105°C (- 40 to 221°F)
EMC Test*:	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
Adjustability:	Field adjustable zero and span to 5% of active stroke
Update Time:	$\leq 1$ ms
Operating Pressure:	5000 psi static; (applies to Model LH only) 10,000 psi spike
Minimum Load:	Voltage Output: 5,000 $\Omega$
Housing Style/Enclosure:	Aluminum die-cast head, IP 67 stainless steel rod & flange (LH flange: M18 x 1.5 or 3/4-16 UNF-3A)
Magnet Type:	Ring magnet

\* EMC test specification does not include sensor with the RB connection style.

The above specifications are assuming that output ripple is averaged by the measuring device as with any typical analog device.

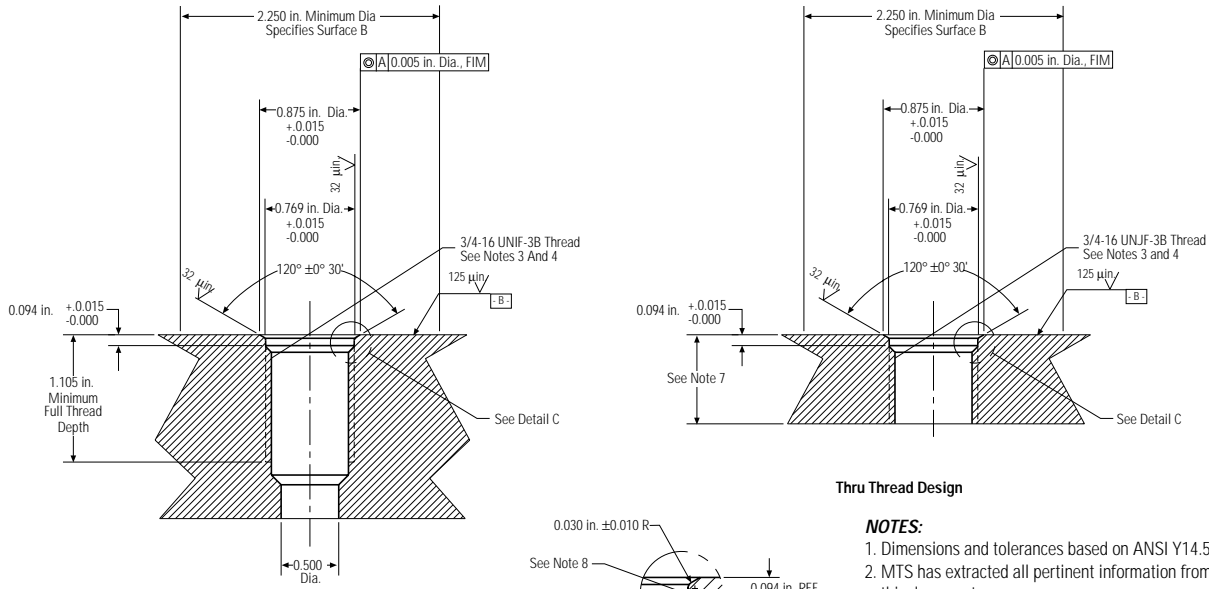
Specifications are subject to change without notice. Contact MTS to confirm specifications that are critical to your application.

# ORDERING GUIDE

		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>SENSOR MODEL</b>	_____															
LH =	Hydraulic Rod Style															
<b>HOUSING STYLE</b>	_____															
T =	LH Model: US customary threads, raised-faced hex, and pressure tube															
S =	LH Model: US customary threads, flat-faced hex, and pressure tube															
M =	LH Model: Metric threads, flat-faced hex, and pressure tube															
N =	LH Model: Metric threads, raised-faced hex, and pressure tube															
B =	For LH Models: Sensor cartridge only, no pressure housing, stroke lengths ≤ 72 in.															
<b>CONNECTION TYPE</b>	_____															
RG =	7-pin micro connector															
RB =	10-pin threaded connector (Not CE certified)															
MS =	10-pin bayonet style MS connector															
R0 =	Integral cable, straight out exit, pigtail connection															
<b>NOTE:</b>	<i>Integral cable length = 5 ft. or 2 m depending on 'Unit of Measure' selected below.</i>															
<b>INTEGRAL CABLE LENGTH</b>	_____															
00 =	No integral cable (i.e., sensors with integral connectors)															
02 =	2 meter integral cable; standard with metric stroke lengths (i.e., millimeters)															
05 =	5 ft. integral cable; standard with US stroke lengths (i.e., inches and tenths)															
01 - 99 =	Custom cable length 1 to 99 ft. (or 1 to 30 meters) <i>See note, right</i>															
<b>UNIT OF MEASURE</b>	_____															
U =	US customary (inches and tenths: xxx.x in.)															
M =	Metric (millimeters: xxxx mm)															
<b>LENGTH</b>	_____															
___ . ___ =	Inches and tenths or _____ millimeters															
	1 to 78 in. stroke lengths only (25 to 2000 mm)															
<b>INPUT VOLTAGE</b>	_____															
1 =	+13.5 to 26.4 Vdc, ±0% (For stroke lengths ≤ 60 inches)															
2 =	+24 Vdc, ±10% (For stroke lengths > 60 inches)															
<b>OUTPUT</b>	_____															
V0 =	0 to 10 Vdc and 10 to 0 Vdc															
A0 =	4 to 20 mA															
A1 =	20 to 4 mA															
A2 =	0 to 20 mA															
A3 =	20 to 0 mA															

**NOTE**  
*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.*

## O-RING BOSS DETAIL FOR TEMPOSONICS LH SENSORS WITH HOUSING STYLE "S"



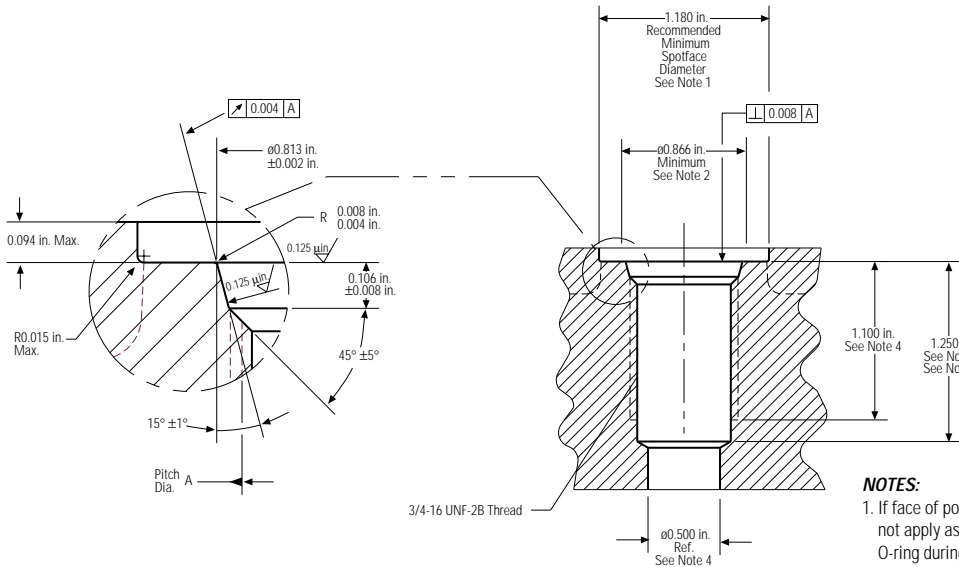
Blind Thread Design

Thru Thread Design

### 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 LH 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.



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