

# SENSORONIX

ADVANCED MAGNETIC SENSOR TECHNOLOGY

*Volume 3*



Sensing Speed, Direction, Position & Proximity  
Standard & Custom Design Magnetic Sensors



**AS9100**  
CERTIFIED  
ISO 9001



# About Us & Company Information

## Company Information

Sensoronix, Inc., is a leading manufacturer of Non-contact Magnetic Sensors. Sensoronix is ISO 9001 and AS9100 certified with all of its products made in the USA. This U.S based company with its headquarters in Irvine, CA, offers a range of standard and customized motion sensor solutions providing precise measurement of Speed, Direction, Position, and Proximity. Sensoronix offers engineering and manufacturing services from prototype to production for low and high volume requirements. Sensoronix has provided quality products for many successful applications and has helped many companies achieve their project objectives with the highest standards of quality and reliability.



Many leading industries have utilized magnetic sensor technology in their applications. These industries include: Automotive, Biotechnology, Aerospace, Aviation, Computer/ Peripheral, Agriculture and many more. Sensoronix is dedicated to the design and production of high quality and advanced magnetic sensor technology customized for various applications.

## Mission Statement

Sensoronix, Inc. is dedicated to provide innovative design capabilities, high quality Magnetic Sensor products, outstanding service, and a proactive market involvement in order to enhance and develop customer/partner initiatives.

## Why Sensoronix?

Sensoronix is proud to have gathered a team of dedicated professionals with decades of success and experience in Magnetic Sensor technology and has created an advanced full service manufacturing organization that:

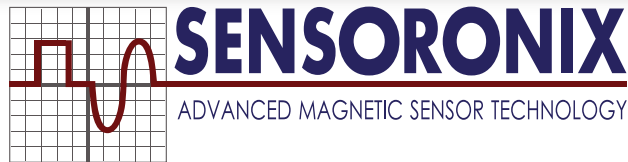
- Possesses innovative design and manufacturing capabilities.
- Specialized in customization per customers' exact requirements.
- Emphasizes on Research and Development for New and innovative designs.
- Has capabilities to produce low and high volume production quantity manufacturing.
- Has very efficient work flow management to ensure quality and efficiency.
- Has maintained its reputation for high quality products and services while staying price competitive in the market.

## Quality & Warranty

Sensoronix believes in 100% quality and 100% customer satisfaction. Therefore, every product manufactured at Sensoronix, goes through an extensive testing and approval process in order to ensure the highest standard of quality before reaching our customers. The quality does not end with the products manufactured at Sensoronix, Inc. We have gathered a professional team of experts in engineering, quality control and sales in order to ensure quality customer service to our valued customers.

All products manufactured by Sensoronix, Inc. will have the company warranty for products utilized under specified conditions for 12 months after the time of shipment to the customer. Any repairs or replacements due to manufacturing defects will be accommodated under the company warranty at no charge. However, defects due to exposure to environments other than specified per products specification criteria which will yield mistreatment will not be covered under the warranty. Our product management and application team will be available to assist customers with detail and step by step instructions on how to choose the right specifications for their specific need.

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# General Specification Capability

## Electrical Specifications Range

### 1. Active Digital Output Sensors: (Hall Effect)

**Input Voltage:** +4.5 to 24 VDC or 5.5 to 36 VDC

**Output Current (I sink):** 20 to 50mA Max

**Output Signal:** Digital (Square Wave) 0 to input voltage or 0 to 5V.

**Target:** Ferrous Material, Single Tooth or Slot Up to 48 Pitch Gear Tooth or Magnet as a Target.

**Airgap:** .005" to .120" (.127mm to 3.046mm)

**Frequency:** 0 to 15KHZ (for Speed Sensor)

**Operating Temperature range:**

-40° F to 302° F (-40°C to 150°C)

### 2. Active Linear Output Displacement Sensors: (Hall Effect)

**Input Voltage:** 4.5 to 6 VDC or 5.5 to 36VDC.

**Output Voltage at 0 Gauss:** 2.5V TYP

**Linearity:** ± 3% Full Scale

**Sensitivity:** 1.30 mV/G

**Bandwidth:** 23KHZ TYP

**Target:** Permanent Magnet.

**Airgap:** .005" to 0.750" (.127mm to 19.036mm)

**Operating Temperature Range:**

-40°F to 255°F (-40°C to 125°C)

### 3. Passive Analog Output Speed Sensors: (VR)

**Resistance:** 40 to 2000 Ohms

**Target:** Ferrous Material, Single Tooth to 32 P/ Gear

**AirGap:** 0.005" to 0.150" (.127mm to 3.808mm)

**Speed Range:** 30 to 1000 Inch/sec

**Output voltage (P-P):** .100 to 200 Vpp

**Operating Temperature Range:**

-40 °F to 302 °F (-40°C to 150°C)

### Optional Modifications:

1. Input Voltage Transient Protection
2. Severe Environment & Automotive Protection
3. EMI / EMC Protection

## Mechanical Specifications Range

### Housing Type:

0. Smooth
1. All Thread
2. Hex Head
3. Knurl Head
4. Connector Head
5. Wrench Flat Head
6. Smooth/Thread
7. With Flange
8. Other (Per Customer's Specification)

### Standard Housing Size:

<i>INCH</i>	<i>METRIC</i>
1/4 - 28, 1/4 - 40	M8 X 1.0
5/16 - 24	M12 X 1.0
3/8 - 24	M12 X 1.25
1/2 - 20, 1/2 - 32	M16 X 1.5
5/8 - 18	M18 X 1.0
3/4 - 16, 3/4-20	M18 X 1.5
	M20 X 1.5
	M22 X 1.5

### Housing Material:

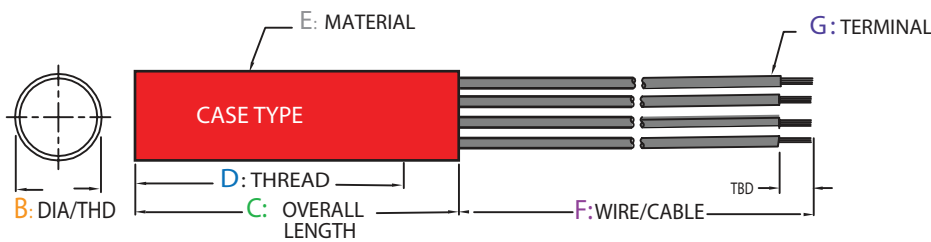
1. 300 Series Stainless Steel
2. Aluminum with or Without Plating
3. Nickel Plated, Brass
4. Rugged, Thermoplastic
5. Other (Per Customer's Specification)

### Terminal:

1. Connector  
**Options:** MS3106 series, Amphenol, Deutsch, M12x1
2. Lead Wire  
**Options:** 16 to 28 AWG with PVC, Teflon Insulations, and Military Types
3. Cable  
**Options:** 16 to 28 AWG with PVC jacket, Teflon Jacket and Insulation, and Military types
4. Lead Wire + Connector  
**Options:** 16 To 26 AWG with AMP, Deutsch, Packard Connector
5. Cable + Connector  
**Options:** 16 To 28 AWG with AMP, Deutsch, Packard Connector

# Part Number Nomenclature

The standard part number includes the sensor type, case type, case diameter, terminal type as well as any special modifications. Please contact Sensoronix if you need more detailed information.



CASE TYPES	DESCRIPTION	A
	SMOOTH	0
	ALL THREAD	1
	HEX HEAD	2
	KNURL HEAD	3
	CONNECTOR HEAD	4
	WRENCH FLAT HEAD	5
	SMOOTH / THREAD	6
	WITH FLANGE	7

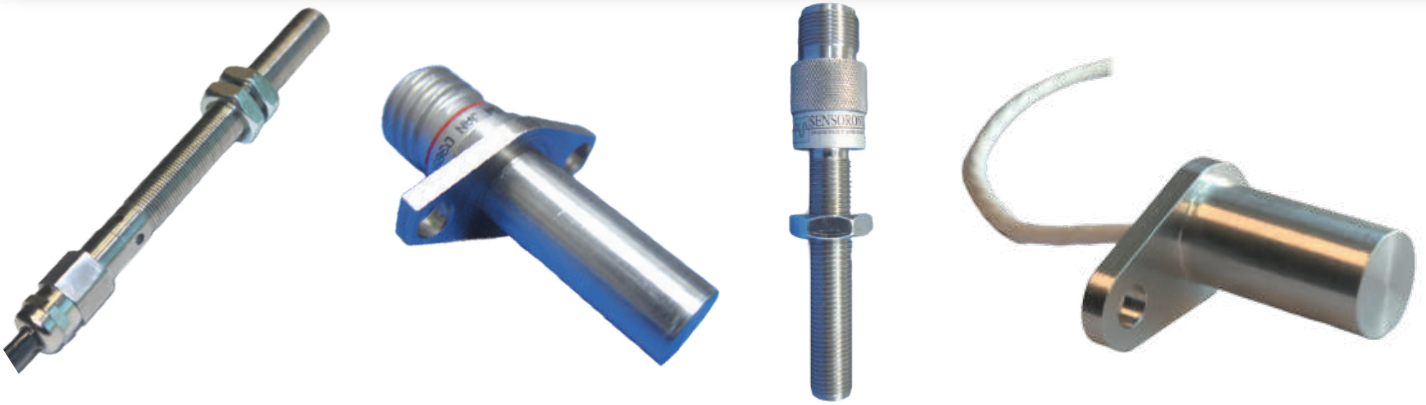
- VR Speed Sensor W/ Digital Output VD
- Dual Output VR Speed Sensor VC
- Variable Reluctance Speed Sensor VR
- Quadrature Speed Sensor HQ
- Linear Speed and Direction Sensor HD
- Linear Speed Sensor HA
- Linear Position Sensor HL
- Proximity Switch Sensor HP
- Zero Speed Sensor HS

Sensor Type	HS	X	X	X	-	X	X	0
Case Type								
Case Diameter "B"								
1/4" (0.250")	2X	<b>METRIC</b>						
3/8" (0.375")	3X	M-8	08					
15/32" (0.468")	4X	M-12	12					
1/2" (0.500")	5X	M-16	16					
5/8" (0.625")	6X	M-18	18					
3/4" (0.750")	7X	M-20	20					
7/8" (0.875")	8X	M-22	22					
Others	9X							

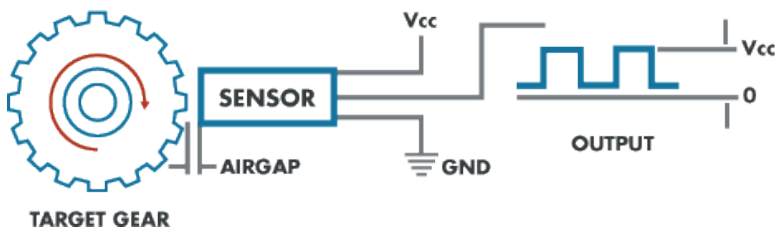
Fixed Number (0)	
Vary With Special Modifications	
Terminal "G"	
Connector	0
Conn. & Wire	1
Conn. & Cable	2
Lead Wires	3
Cables	4



# Hall - Effect Zero Speed Sensor (HS)



Non-contact magnetic sensors that measure the distortion of magnetic field created by a ferrous target. Hall-Effect Zero speed sensors provide very precise measurements of movement even at zero speed which makes the Hall-Effect zero speed sensors ideal for speed measurements. Hall-Effect zero speed sensors provide digital output with constant amplitude signal regardless of variation of the speed.



Target: Ferrous Material Gear Tooth with range of Min 4 to 32 Gear Pitch

Frequency: 15 kHz Max

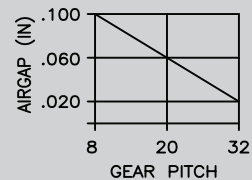
$$P = \frac{N + 2}{OD}$$

P = Gear Pitch  
N = Num. of Teeth  
OD = Outside Diameter

Output Type: Digital (Square Wave) TTL compatible



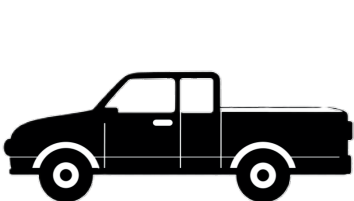
Gear Pitch vs. Airgap Graph



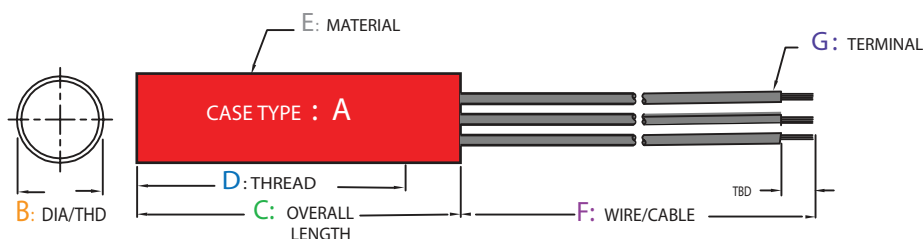
## Example of Common Applications

### Automotive, Aerospace, Off Highway & Marine

**Applications:** Race Car Speed Monitoring, Motorcycle Speed, Boat Propeller Speed, Airplane Cooling System, Helicopter Propeller Speed Measurement, Transmission, Engine Speed RPM, Crank Shaft Speed, Ignition Timing, Off Road Vehicles Speed, Exercise Equipment Speed Monitoring, Traction Control, Wheel Speed, Wood Chopping, Fan Control, Dynamometers, Cement Mixers, Tractors, Harvesting Machines.



# Standard (HS) Products Available



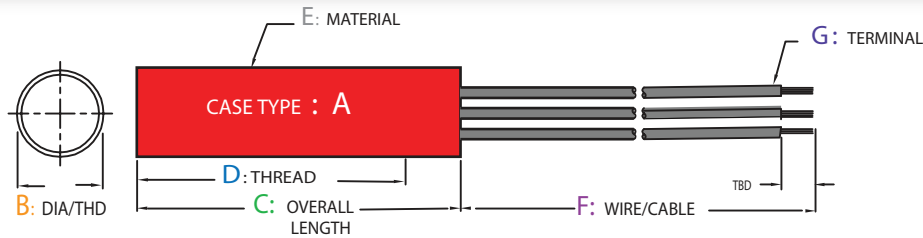
Please contact Sensoronix for more detailed information on the standard sensors listed below.  
All products are custom designed to meet your exact specification requirements.

PART #	MECHANICAL SPECIFICATIONS							ELECTRICAL SPECIFICATIONS						ENVIRONMENT	
	A	B	C	D	E	F	G	INPUT VOLTAGE (VDC)	INPUT CURRENT (mA)	V OUT HIGH (VDC)	V OUT LOW (VDC)	OUTPUT CURRENT (mA)	PULL UP RESISTOR	FRONT SEALED	TEMP RANGE (°C)
<b>1/4" Diameter Series</b>															
HS220-300	2	1/4 - 28	2.00	1.75	303 S.S.	72 ± .5	20 AWG, LEAD WIRES W/ TEFF. INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	303 S.S.	-40 to 150
HS220-400	2	1/4 - 40	1.13	0.88	303 S.S.	12	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	303 S.S.	-20 to 150
* HS220-410	2	1/4 - 40	1.50	0.63	303 S.S.	24 ± .5	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	5.5 to 36	12	5.0	0.4	20 Sink	4.7	303 S.S.	-20 to 85
<b>5/16" Diameter Series</b>															
HS130-300	1	5/16 - 24	1.50	1.50	303 S.S.	12 ± 1	22 AWG LEAD WIRES W/ PVC INS.	4.5 to 24	10	V Input	0.4	20 Sink	4.7	Epoxy	-25 to 90
HS130-400	1	5/16 - 24	1.50	1.50	303 S.S.	12 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.4	20 Sink	4.7	Epoxy	-20 to 150
HS130-410	1	5/16 - 24	1.50	1.50	303 S.S.	36 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.4	25 Sink	Open	Epoxy	-20 to 150
<b>3/8" Diameter Series</b>															
HS030-300	0	3/8	1.40	-	Alum.	6 ± .25	26 AWG LEAD WIRES W/ PVC INS.	4.5 to 24	10	V Input	0.4	15 Sink	2	Epoxy	-25 to 90
HS030-400	0	3/8	2.50	-	Alum.	12 ± .5	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.4	15 Sink	2	Epoxy	-25 to 105
HS230-200	2	3/8 - 24	1.48	1.23	303 S.S.	36 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS. AND CONN. MATES W/: MS3106A	4.5 to 24	10	V Input	0.6	20 Sink	4.7	Epoxy	-20 to 105
HS230-400	2	3/8 - 24	1.48	1.23	303 S.S.	36 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	Epoxy	-20 to 105
HS230-410	2	3/8 - 24	1.48	1.23	303 S.S.	36 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	Epoxy	-20 to 125
HS230-420	2	3/8 - 24	1.50	1.25	303 S.S.	36 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	303 S.S.	-20 to 150
HS230-430	2	3/8 - 24	1.50	1.25	303 S.S.	12	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	303 S.S.	-20 to 150
HS230-440	2	3/8 - 24	2.81	2.56	303 S.S.	24 ± .5	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	303 S.S.	-40 to 150
HS230-450	2	3/8 - 24	1.50	1.25	303 S.S.	36	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.6	25 Sink	Open	303 S.S.	-20 to 100
*** HS230-460	2	3/8 - 24	1.50	1.25	303 S.S.	12 ± .5	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	303 S.S.	-40 to 120
HS530-200	5	3/8 - 24	2.70	2.25	303 S.S.	36 ± .5	22 AWG, 3 CON. CBL. W/ PVC INS. AND CONN. DEUTSCH: DT04-3P	4.5 to 24	10	V Input	0.4	25 Sink	Open	303 S.S.	-25 to 85
HS530-400	5	3/8 - 24	1.25	1.25	303 S.S.	36 ± 3	28 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.4	20 Sink	4.7	303 S.S.	-25 to 85
HS530-410	5	3/8 - 24	2.70	2.25	303 S.S.	72 ± .5	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	303 S.S.	-20 to 125
<b>15/32" Diameter Series</b>															
HS140-300	1	15/32 - 32	1.00	1.00	303 S.S.	12 ± .5	26 AWG, LEAD WIRES W/ PVC INS.	4.5 to 24	10	V Input	0.4	20 Sink	4.7	Epoxy	-25 to 100
HS140-400	1	15/32 - 32	1.00	1.00	303 S.S.	12 ± .5	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.4	20 Sink	4.7	Epoxy	-25 to 100
<b>7/16" Diameter Series</b>															
HS140-410	1	7/16 - 20	1.75	1.75	303 S.S.	24 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.6	25 Sink	Open	303 S.S.	-40 to 105
<b>1/2" Diameter Series</b>															
HS050-300	0	1/2	1.11	-	Alum.	8 ± .25	26 AWG, LEAD WIRES W/ PVC INS.	4.5 to 18	10	V Input	0.4	13 Sink	2	Epoxy	-25 to 100
HS050-400	0	1/2	1.00	-	303 S.S.	36 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.8 to 18	10	V Input	0.4	13 Sink	2	Epoxy	-40 to 105
** HS150-200	1	1/2 - 20	2.56	2.56	303 S.S.	12.5	22 AWG, 3 CON. CBL. W/ TEFF. INS. AND CONN: M12x1, 4 PINS	4.5 to 24	10	V Input	0.6	20 Sink	4.7	303 S.S.	-40 to 150
HS150-400	1	1/2 - 32	1.25	1.25	303 S.S.	9 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.8 to 18	10	V Input	0.4	13 Sink	2	Epoxy	-40 to 105
** HS150-410	1	1/2 - 20	2.56	2.56	303 S.S.	24 ± .5	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	303 S.S.	-40 to 150
HS150-420	1	1/2 - 32	1.25	1.25	303 S.S.	120 ± 2	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.8 to 24	10	V Input	0.6	13 Sink	2	Epoxy	-40 to 105
HS750-200	7	.565	1.33	1.08	303 S.S.	4 ± .5	22 AWG, 3 CON. CBL. W/ TEFF. INS. AND CONN DELPHI: 12129615	4.5 to 24	14	V Input	0.4	25 Sink	Open	303 S.S.	-40 to 125
HS750-400	7	.545	1.18	1.18	Alum.	12 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.4	20 Sink	4.7	303 S.S.	-40 to 125

\*Electrical Protections  
**Supply Voltage** : 40VDC  
**Reverse Polarity** : -50V Reverse Transient  
**Load Dump** : 60V  
 \*\* EMC Protection Included  
 \*\*\* Omnipolar (Magnetoresistive)

**ADDITIONAL PARTS LISTED ON NEXT PAGE**

# Standard (HS) Products Available



Please contact Sensoronix for more detailed information on the standard sensors listed below.  
All products are custom designed to meet your exact specification requirements.

PART #	MECHANICAL SPECIFICATIONS						ELECTRICAL SPECIFICATIONS						ENVIRONMENT		
	A	B	C	D	E	F	G	INPUT VOLTAGE (VDC)	INPUT CURRENT (mA)	VOUT HIGH (VDC)	VOUT LOW (VDC)	OUTPUT CURRENT (mA)	PULL UP RESISTOR	FRONT SEALED	TEMP RANGE (°C)
<b>5/8" Diameter Series</b>															
HS160-120	1	5/8 - 18	6.00	6.00	303 S.S.	4 ± .50	18 AWG, SXL LEAD WIRES AND DEUTSCH CONN: DT04-3P	4.5 to 24	12	V Input	0.6	20 Sink	4.7	303 S.S.	-25 to 125
HS160-400	1	5/8 - 18	6.00	6.00	303 S.S.	120 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS. CBL. W/ CONN BRAD HARISON OR TURCK MICTO CHANGE	4.5 to 24	10	V Input	0.6	20 Sink	4.7	303 S.S.	-25 to 125
HS360-210	3	5/8 - 18	2.50	2.00	303 S.S.	9 ± .5	22 AWG, 3 CON. CBL. W/ PVC INS. AND PACKARD CONN: 1201 0717	4.5 to 24	9	V Input	0.6	20 Sink	4.7	Epoxy	-40 to 100
HS360-220	3	5/8 - 18	2.72	2.14	303 S.S.	72 ± 2	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.4	20 Sink	4.7	Epoxy	-25 to 125
HS360-400	3	5/8 - 18	2.72	2.14	303 S.S.	72 ± 2	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.4	20 Sink	4.7	Epoxy	-25 to 125
HS360-410	3	5/8 - 18	2.50	2.00	303 S.S.	36	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.4	20 Sink	4.7	Epoxy	-25 to 125
HS460-000	4	5/8 - 18	3.27	2.14	303 S.S.	-	3 PINS AMPHENOL CONN: MATE W/ MS3106A	4.5 to 24	10	V Input	0.6	20 Sink	4.7	Epoxy	-25 to 125
HS460-010	4	5/8 - 18	5.13	4.00	303 S.S.	-	3 PINS AMPHENOL CONN: MATE W/ MS3106A	4.5 to 24	15	V Input	0.4	20 Sink	4.7	Epoxy	-25 to 125
HS460-020	4	5/8 - 18	2.33	1.20	303 S.S.	-	3 PINS AMPHENOL CONN: MATE W/ MS3106A	4.5 to 24	10	V Input	0.6	20 Sink	4.7	Epoxy	-25 to 125
HS460-050	4	5/8 - 18	2.96	1.87	303 S.S.	-	3 PINS AMPHENOL CONN: MATE W/ MS3106A	4.5 to 24	10	V Input	0.6	20 Sink	4.7	Epoxy	-25 to 125
*HS460-060	4	5/8 - 18	3.27	2.14	303 S.S.	-	3 PINS AMPHENOL CONN: MATE W/ MS3106A	5.5 to 36	9	5.0	0.6	20 Sink	4.7	Epoxy	-20 to 125
HS560-200	5	5/8 - 18	3.00	2.63	303 S.S.	12.5	22 AWG, 3 CON. CBL. W/ TEFF. INS. AND CONN: M12X1, 4 PINS	4.5 to 24	10	V Input	0.4	20 Sink	4.7	303 S.S.	-25 to 125
HS560-400	5	5/8 - 18	2.50	2.13	303 S.S.	480 ± 2	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.4	20 Sink	4.7	Epoxy	-25 to 125
HS560-410	5	5/8 - 18	3.00	2.63	303 S.S.	72 ± 2	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.4	20 Sink	4.7	303 S.S.	-25 to 125
<b>3/4" Diameter Series</b>															
HS070-400	0	3/4	3.00	-	303 S.S.	300 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS. AND DEUTSCH CONN: DT04-3P	4.8 to 24	10	V Input	0.6	20 Sink	4.7	Epoxy	-40 to 105
*HS270-200	2	3/4 - 16	4.00	3.37	303 S.S.	12 ± 1	18 AWG LEAD WIRES W/PVC INS.	5.5 to 36	12	V Input	0.4	20 Sink	4.7	Epoxy	-40 to 105
HS270-300	2	3/4 - 16	2.34	2.00	Alum.	3.5 ± .5	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	Epoxy	-40 to 105
HS270-400	2	3/4 - 16	2.34	2.00	303 S.S.	120 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.8 to 24	10	V Input	0.6	25 Sink	Open	Epoxy	-40 to 105
HS270-410	2	3/4 - 16	4.00	3.66	Alum.	72 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.8 to 24	10	V Input	0.6	20 Sink	4.7	Epoxy	-40 to 105
HS270-420	2	3/4 - 16	2.34	2.00	Alum.	36 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	Epoxy	-40 to 105
HS270-430	2	3/4 - 16	2.30	1.87	Alum.	8 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	9	V Input	0.4	20 Sink	4.7	Epoxy	-20 to 100
HS270-440	2	3/4 - 16	3.00	2.66	Alum.	36 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	5.5 to 24	10	V Input	0.4	50 Sink	4.7	Epoxy	-40 to 105
HS270-450	2	3/4 - 16	3.00	2.57	Alum.	240 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	5.5 to 24	75	V Input	0.4	150 Sink	4.7	Epoxy	-40 to 105
HS470-020	4	3/4 - 16	3.12	2.00	303 S.S.	-	4 PINS, CONN: M12 X 1, 4 PINS	4.5 to 24	10	V Input	0.6	20 Sink	4.7	303 S.S.	-40 to 105
*HS570-200	5	3/4 - 16	4.50	4.10	303 S.S.	12 ± 1	3 PINS AMPHENOL CONN: MATE W/ MS3106A	5.5 to 36	9	5.0	0.6	20 Sink	4.7	303 S.S.	-40 to 105
*HS570-210	5	3/4 - 16	4.50	4.10	303 S.S.	6 ± .5	22 AWG, 3 CON. CBL. W/ TEFF. INS. AND CONN: M12 X1, 4 PINS	5.5 to 36	15	V Input	0.4	50 Source	4.7	303 S.S.	-40 to 107
*HS570-220	5	3/4 - 16	3.00	2.60	303 S.S.	6 ± .5	22 AWG, 3 CON. CBL. W/ TEFF. INS. AND CONN: M12 X1, 4 PINS	5.5 to 36	15	V Input	0.4	50 Source	4.7	303 S.S.	-40 to 107
<b>M12 Diameter Series</b>															
HS312-300	3	M12 x 1.0	2.56	1.80	303 S.S.	12 ± .25	26 AWG. LEAD WIRE W/ PVC INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	Epoxy	-40 to 100
HS312-400	3	M12 x 1.0	2.56	1.80	303 S.S.	24 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	Epoxy	-40 to 100
HS312-420	3	M12 x 1.0	3.06	2.00	303 S.S.	39.4 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	303 S.S.	-40 to 125
<b>M18 Diameter Series</b>															
*HS218-200	2	M18 x 1.5	2.80	2.05	303 S.S.	39 ± .5	22 AWG, 3 CON. CBL. W/PVC INS. AND CONN: DEUTSCH: DT04-3P	5.5 to 36	15	V Input	0.4	50 Source	4.7	303 S.S.	-40 to 125
HS218-400	2	M18 x 1.5	2.60	0.98	303 S.S.	48 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.6	20 Sink	4.7	303 S.S.	-30 to 140
HS218-410	2	M18 x 1.5	2.36	2.05	303 S.S.	48 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	15	V Input	0.4	50 Source	4.7	303 S.S.	-40 to 140
HS218-420	2	M18 x 1.5	2.80	2.05	303 S.S.	39 ± .5	22 AWG, TEFF. CBL W/ DEUTSCH CONN.	5.5 to 36	15	V Input	0.4	50 Source	4.7	303 S.S.	-40 to 125

\*Electrical Protections  
**Supply Voltage** : 40VDC  
**Reverse Polarity** : -50V Reverse Transient  
**Load Dump** : 60V



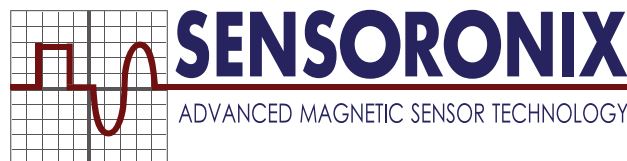
# Options to choose a Sensor for your Application

- 1 Use our standard products listing and find a sensor that meets your application's requirements.

If you don't find a sensor in our standard products listing to meet your exact application requirements, follow below to customize a sensor to meet your application needs.

- 2 Choose a P/N from our standard listing that is close to your requirements and let us know the changes to meet your requirements.
- 3 Provide your detailed technical specifications along with description of your application so we can design a sensor to meet your exact requirements.
- 4 Send your specifications so we can make a high quality replacement to your existing sensor.

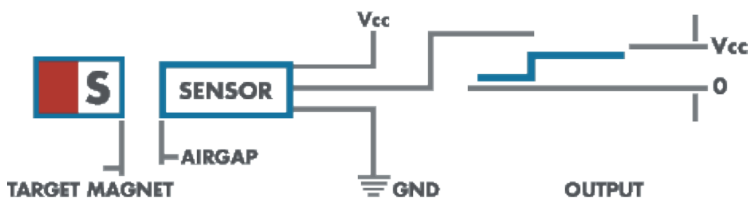
**Sensoronix** offers Engineering and Manufacturing services from prototype to production. A leading manufacturer of Non-Contact Magnetic Sensors for industries in Automotive, Biotechnology, Aerospace, Aviation, Rail, Agriculture and many more. Sensoronix offers a range of standard and customized motion sensor solutions providing precise measurement of Speed, Direction, Position and Proximity.



# Hall Effect Proximity Switch Sensor (HP)



Non-contact magnetic sensor proximity switch produces a digital output. The output produced by Hall-Effect Proximity Switch sensor switches between logic low (operate point) and logic high (release point) with presence and absence of a magnet as a target. The built-in hysteresis circuitry allows clean switching of the output even in the presence of external mechanical vibration and electrical noise.



Target: Magnet

Frequency: 0-100 kHz Max

Output Type: Digital (Square Wave) TTL compatible

## Magnetic Characteristics

Parameters	TYP "Gauss"
Magnetic Operating Point	25 -180
Magnetic Release Point	5 - 140
Magnetic Hysteresis	7 - 40

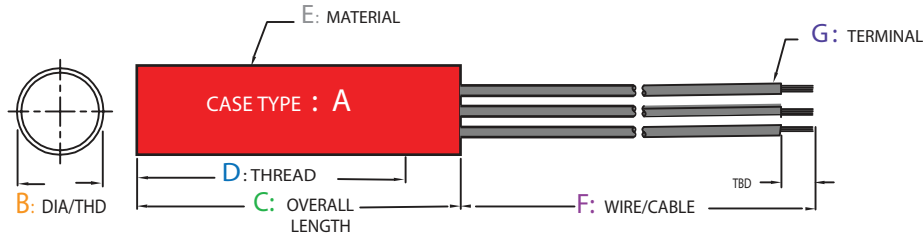
## Example of Common Applications

### Robotics, Automotive, Aerospace, Oil & Gas

**Applications:** Cars Door Limit Switch, Boats, Airplanes Door Lock, Helicopter Propeller Speed Measurement, Wheel Speed, Robotic Position, Exercise Equipment Limit Switch, Off Highway Vehicle, Presses Limit Switch, Printers, Steering Mirror, Tilt Switch, Traction Control, Valve Actuator Limit Switch, Valve Position Switch, Turbine Meters, Motion Control Systems.



# Standard (HP) Products Available



Please contact Sensoronix for more detailed information on the standard sensors listed below.  
All products are custom designed to meet your exact specification requirements.

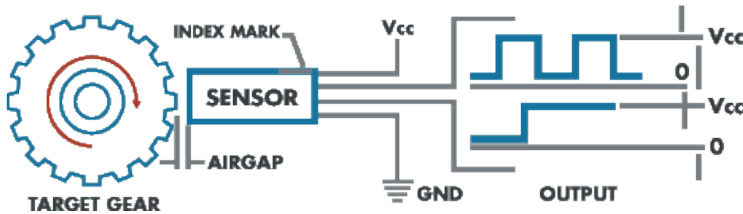
PART #	MECHANICAL SPECIFICATIONS							ELECTRICAL SPECIFICATIONS						ENVIRONMENT	
	A	B	C	D	E	F	G	INPUT VOLTAGE (VDC)	INPUT CURRENT (mA)	V OUT HIGH (VDC)	V OUT LOW (VDC)	OUTPUT CURRENT (mA)	PULL UP RESISTOR	FRONT SEALED	TEMP RANGE (°C)
<b>1/4" Diameter Series</b>															
HP620-300	6	1/4 - 28	1.00	0.85	303 S.S.	48 ± .5	20 AWG, LEAD WIRES W/ TEFF. INS.	4.5 to 24	5	V Input	0.4	25 Sink	Open	303 S.S.	-40 to 150
HP620-400	6	1/4 - 28	1.00	0.85	303 S.S.	120 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	5	V Input	0.4	25 Sink	Open	303 S.S.	-40 to 150
<b>5/16" Diameter Series</b>															
HP130-400	1	5/16 - 24	1.50	1.50	303 S.S.	12 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.4	20 Sink	4.7	Epoxy	-20 to 105
*** HP130-420	1	5/16 - 24	1.50	1.50	303 S.S.	12 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	6 to 24	13	V Input	0.4	20 Sink	4.7	Epoxy	-20 to 85
<b>3/8" Diameter Series</b>															
HP230-300	2	3/8 - 24	1.00	0.75	303 S.S.	36 ± 1	24 AWG, WIRE W/ TEFF. INS.	4.5 to 24	14	V Input	0.4	20 Sink	4.7	303 S.S.	20 to 150
HP230-400	2	3/8 - 24	1.50	1.25	303 S.S.	48 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	14	V Input	0.4	20 Sink	4.7	303 S.S.	-40 to 125
HP230-410	2	3/8 - 24	1.50	1.25	303 S.S.	12 ± .5	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	14	V Input	0.4	20 Sink	4.7	303 S.S.	-20 to 100
HP230-420	2	3/8 - 24	1.50	1.25	303 S.S.	36	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	14	V Input	0.4	20 Sink	4.7	303 S.S.	-40 to 150
<b>15/32" Diameter Series</b>															
* HP140-400	1	15/32 - 32	1.00	1.00	303 S.S.	6 ± .25	22 AWG, 3 CON. CBL W/ PVC INS.	5.5 to 36	9	5.0	0.4	20 Sink	4.7	Epoxy	-40 to 125
HP142-400	1	15/32 - 32	1.00	1.00	303 S.S.	39.5 ± .25	22 AWG, 3 CON. CBL W/ PVC INS.	4.5 to 24	9	V Input	0.4	25 Sink	Open	Epoxy	-40 to 125
<b>7/16" Diameter Series</b>															
HP140-410	1	7/16 - 20	1.75	1.75	303 S.S.	24 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	14	V Input	0.4	20 Sink	4.7	303 S.S.	-40 to 150
<b>1/2" Diameter Series</b>															
*(**)(***) HP050-400	0	1/2	1.10	-	303 S.S.	12 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	6 to 30	13	V Input	0.4	20 Sink	4.7	Epoxy	-55 to 85
** HP150-100	1	1/2 - 20	1.00	1.00	303 S.S.	12 ± .5	18 AWG, 3 SXL LEAD. WIRE. W/ CONN. DEUTCH DT04-3P	4.5 to 25	9	V Input	0.4	30 Source	4.7	Epoxy	-20 to 100
HP150-110	1	1/2 - 20	8.00	8.00	303 S.S.	12 ± .5	18 AWG, 3 SXL LEAD. WIRE. W/ CONN. DEUTCH DT04-3P	4.5 to 25	9	V Input	0.4	30 Source	4.7	Epoxy	-20 to 100
HP150-200	1	1/2 - 20	1.00	1.00	303 S.S.	40 ± 2	22 AWG, 3 CON. CBL. W/ CONN. DEUTCH DT04-3P	4.5 to 24	9	V Input	0.4	25 Sink	Open	Epoxy	-20 to 100
HP150-400	1	1/2 - 20	1.00	1.00	303 S.S.	40 ± 2	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	9	V Input	0.4	25 Sink	Open	Epoxy	-40 to 125
<b>5/8" Diameter Series</b>															
* HP260-400	2	5/8 - 18	3.31	3.00	303 S.S.	25 ± 1	22 AWG, 3 CON. CBL. W/ SHLD PVC INS.	6 to 36	13	V Input	0.4	20 Sink	4.7	Epoxy	-20 to 85
HP360-200	3	5/8 - 18	2.50	2.00	303 S.S.	3 ± .25	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS. AND DEUTCH CONN. P/N: DT04-3P	4.5 to 24	10	V Input	0.4	13 Sink	2	Epoxy	-25 to 125
HP360-400	3	5/8 - 18	2.72	2.14	303 S.S.	72 ± 2	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.4	13 Sink	2	Epoxy	-25 to 125
HP360-410	3	5/8 - 18	2.50	2.00	303 S.S.	36 ± 2	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.4	20 Sink	4.7	Epoxy	-25 to 125
* HP460-000	4	5/8 - 18	5.70	4.50	303 S.S.	-	3 PINS AMPHENOL CONN: MATE W/ MS3106A	5 to 30	10	V Input	0.4	20 Sink	4.7	Epoxy	-40 to 125
* HP460-010	4	5/8 - 18	4.17	2.50	303 S.S.	-	3 PINS AMPHENOL CONN: MATE W/ MS3106A	5 to 30	10	V Input	0.4	20 Sink	4.7	Epoxy	-40 to 125
* HP460-020	4	5/8 - 18	3.40	1.70	303 S.S.	-	3 PINS AMPHENOL CONN: MATE W/ MS3106A	5 to 30	10	V Input	0.4	20 Sink	4.7	Epoxy	-40 to 125
*(**) HP460-030	4	5/8 - 18	3.00	2.14	303 S.S.	-	CONN. M12X1, 4 PINS	5.5 to 36	10	V Input	0.4	20 Sink	4.7	303 S.S.	-40 to 100
* HP460-040	4	5/8 - 18	3.00	2.14	303 S.S.	-	CONN. M12X1, 4 PINS	4 to 30	13	V Input	0.4	50 Source	4.7	303 S.S.	-40 to 100
**** HP460-050	4	5/8 - 18	4.05	2.50	303 S.S.	-	3 PINS AMPHENOL CONN: MATE W/ MS3106A	5 to 30	10	V Input	0.4	20 Sink	4.7	Epoxy	-40 to 125
HP460-060	4	5/8 - 18	3.00	2.14	303 S.S.	-	CONN. M12X1, 4 PINS	5.5 to 36	10	5.0	0.4	20 Sink	4.7	303 S.S.	-40 to 100
<b>3/4" Diameter Series</b>															
HP270-400	2	3/4 - 16	2.30	1.87	Alum.	72 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	10	V Input	0.4	25 Sink	Open	Epoxy	-40 to 125
* HP270-410	2	3/4 - 16	2.30	1.87	Alum.	40 ± 2	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	5.5 to 36	10	5.0	0.4	20 Sink	4.7	Epoxy	-40 to 125
**** HP270-420	2	3/4 - 16	2.30	1.87	Alum.	8 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	9	V Input	0.4	20 Sink	4.7	Epoxy	-20 to 100
HP270-430	2	3/4 - 16	2.34	2.00	Alum.	10 ± .5	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.8 to 24	10	V Input	0.4	20 Sink	4.7	Epoxy	-40 to 105
<b>M12 Diameter Series</b>															
HP112-400	1	M12 x .75	0.95	0.95	Alum.	98 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 24	10	V Input	0.4	25 Sink	Open	Epoxy	-40 to 125
HP312-400	3	M12 x 1.0	3.06	2.56	303 S.S.	120 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 25	10	V Input	0.4	20 Sink	4.7	303 S.S.	-20 to 125

\*Electrical Protections  
**Supply Voltage** : 40VDC  
**Reverse Polarity** : -50V Reverse Transient  
**Load Dump** : 60V  
 \*\* EMC Protection Included  
 \*\*\* Omnipolar (Magnetoresistive)  
 \*\*\*\*Northpole Sensing

# Hall Effect Speed & Direction Sensor (HD)



Non-contact magnetic sensors that measure the distortion of magnetic fields and thus provide precise measurements of speed and direction. Output #1 is digital square wave and measures the speed of target wheel or gear. Output #2 is a DC level that when the target wheel rotates clockwise, the output signal # 2 produces logic High, and when the target wheel rotates counter clockwise, the output signal # 2 produces logic low. Output signal #1 will be 50% duty cycle with proper alignment of sensor and target gear.



Target: Ferrous Material Gear Tooth with range of Min. 4 to 32 Gear Pitch

Frequency: 15 kHz Max

Output Type: Digital (Square Wave) TTL compatible

$$P = \frac{N + 2}{OD}$$

P = Gear Pitch  
N = Num. of Teeth  
OD = Outside Diameter

Gear Pitch	Airgap (IN)
8	0.085
12	0.065
20	0.055

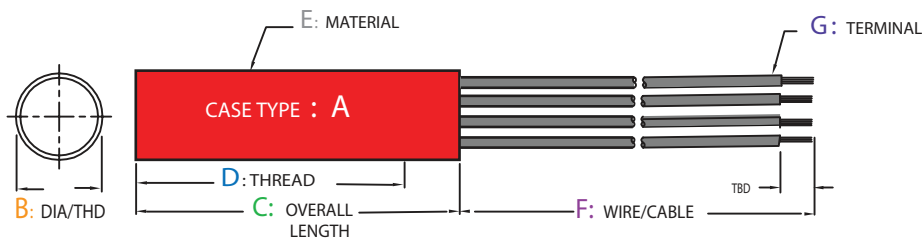
## Example of Common Applications

### Automotive, Aerospace, Off Highway & Military

**Applications:** Car, Motorcycle, Boat Speed and Direction Measurement, Airplane, Helicopter, Tank, Military Equipment, Dynamometer, Transmission, Traction Control, Armored Vehicles, Missiles, Mining Equipment, Hydraulics.



# Standard (HD) Products Available



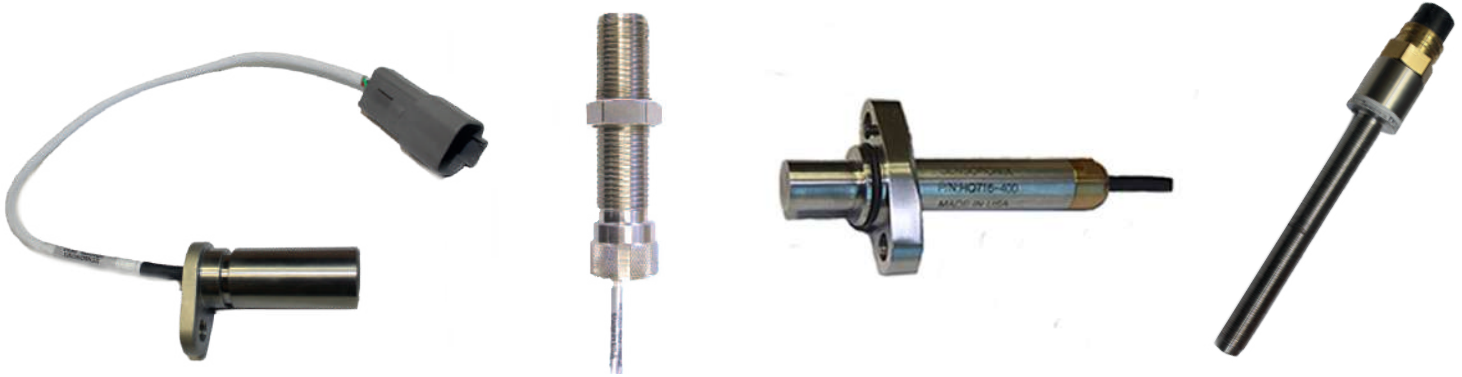
Please contact Sensoronix for more detailed information on the standard sensors listed below.  
All products are custom designed to meet your exact specification requirements.

PART #	MECHANICAL SPECIFICATIONS						ELECTRICAL SPECIFICATIONS						ENVIRONMENT		
	A	B	C	D	E	F	G	INPUT VOLTAGE (VDC)	INPUT CURRENT (mA)	V OUT HIGH (VDC)	V OUT LOW (VDC)	OUTPUT CURRENT (mA)	PULL UP RESISTOR	FRONT SEALED	TEMP RANGE (°C)
<b>5/8" Diameter Series</b>															
HD160-400	1	5/8 - 18	2.50	2.50	303 S.S.	12 ± 1	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS.	5 to 18	15	V Input	0.4	20 Sink	4.7	Epoxy	-40 to 125
* HD360-400	3	5/8 - 18	2.72	2.14	303 S.S.	72 ± 3	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS.	5.5 to 36	15	5.0	0.6	50 Sink	4.7	Epoxy	-40 to 125
* HD460-000	4	5/8 - 18	3.00	2.14	303 S.S.	-	CONN. M12X1, 4 PINS	5.5 to 36	20	V Input	0.6	50 Sink	4.7	303 S.S.	-40 to 85
<b>3/4" Diameter Series</b>															
* HD270-400	2	3/4 - 16	2.30	1.87	Alum.	72 ± 3	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS.	5.5 to 36	15	5.0	0.6	50 Sink	4.7	Epoxy	-40 to 125
<b>M18 Diameter Series</b>															
* HD218-400	2	M18 x 1.5	2.80	2.05	303 S.S.	31.5 ± .5	20 AWG, 4 CON. CBL. W/ SHLD	10 to 40	15	5.0	0.6	50 Sink	4.7	303 S.S.	-40 to 125
* HD218-410	2	M18 x 1.5	2.36	2.05	303 S.S.	31.5 ± .5	20 AWG, 4 CON. CBL. W/ SHLD	10 to 40	15	5.0	0.6	50 Sink	4.7	303 S.S.	-40 to 125
* HD518-400	5	M18 x 1.5	2.14	1.89	303 S.S.	120 ± 3	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS.	5.5 to 36	15	5.0	0.6	50 Sink	4.7	Epoxy	-40 to 125
HD518-410	5	M18 x 1.5	2.14	1.89	303 S.S.	24 ± 1	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 18	15	V Input	0.6	20 Sink	4.7	Epoxy	-40 to 125
* HD518-420	5	M18 x 1.0	2.05	1.78	303 S.S.	12 ± .5	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS.	5.5 to 36	20	5.0	0.6	50 Sink	4.7	303 S.S.	-40 to 125
<b>M20 Diameter Series</b>															
* HD120-400	1	M20 x 1.5	2.05	2.05	303 S.S.	39 ± .5	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS.	6 to 36	10	5.0	0.6	50 Sink	4.7	303 S.S.	-20 to 100

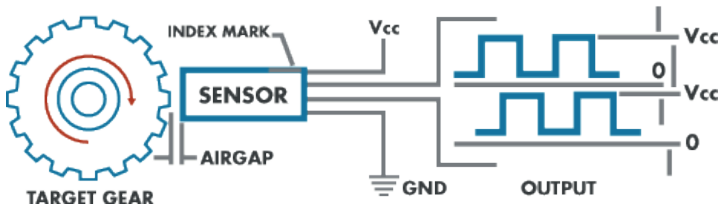
\*Electrical Protections  
**Supply Voltage** : 40VDC  
**Reverse Polarity** : -50V Reverse Transient  
**Load Dump** : 60V



# Hall Effect Quadrature Sensor (HQ)



Non-contact magnetic sensors that measure the distortion of magnetic field created by a ferrous target. Quadrature sensors provide two 90° out of phase digital outputs to record speed and direction. When the target wheel or gear is rotating clockwise, the output signal # 1 leads output signal # 2, and when the target is rotating counter clockwise, the output signal # 2 leads output signal # 1. Both output signals will be 50% duty cycle with proper alignment of sensor and target gear.



Target: Ferrous Material Gear Tooth with range of Min 4 to 32 Gear Pitch

Frequency: 15 kHz Max

Output Type: Digital (Square Wave) TTL compatible

Quadrature Phasing: 90° +/- 20%

$$P = \frac{N + 2}{OD}$$

P = Gear Pitch  
N = Num. of Teeth  
OD = Outside Diameter

Gear Pitch vs. Airgap Graph

Gear Pitch	Airgap (IN)
8	0.085
12	0.065
20	0.055

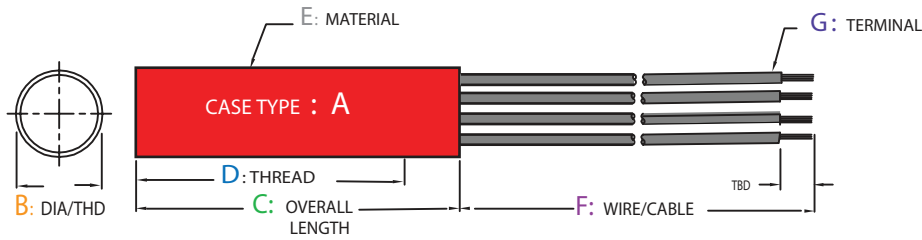
## Example of Common Applications

### Aviation, Aerospace, Off Highway, Agriculture & Construction

**Applications:** Tractor, Train Speed and Direction, Crane, Dynamometer, Boat Speed and Direction Measurement, Transmission, Traction Control, Fan Control, Engine Control, Switches, Crank Shaft, Cement Mixers, Lifters, Tractors, Harvesting Machines, Trucks.



# Standard (HQ) Products Available



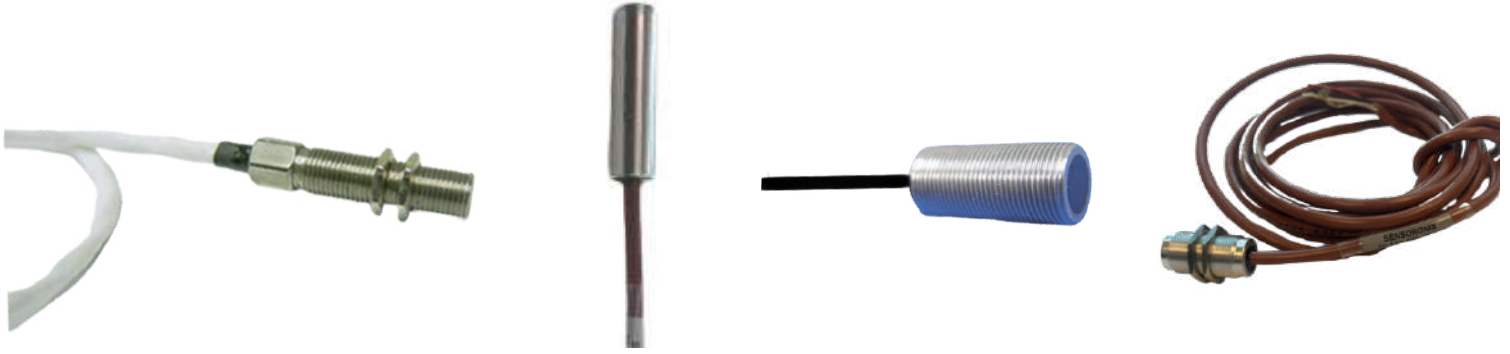
Please contact Sensoronix for more detailed information on the standard sensors listed below.  
All products are custom designed to meet your exact specification requirements.

PART #	MECHANICAL SPECIFICATIONS							ELECTRICAL SPECIFICATIONS						ENVIROMENT	
	A	B	C	D	E	F	G	INPUT VOLTAGE (VDC)	INPUT CURRENT (mA)	V OUT HIGH (VDC)	V OUT LOW (VDC)	OUTPUT CURRENT (mA)	PULL UP RESISTOR	FRONT SEALED	TEMP RANGE (°C)
<b>3/8" Diameter Series</b>															
* HQ130-200	1	3/8 - 24	1.50	1.50	303 S.S.	18 ± .5	22 AWG, 4 COND. CBL. W/ TEFF. INS. AND CONN: M12X1, 4 PINS	5.5 to 36	12	V Input	0.6	25 Sink	Open	Epoxy	-25 to 125
HQ130-400	1	3/8 - 24	1.70	1.70	303 S.S.	12 ± 1	22 AWG, 4 CON. CBL. W/ SHLD TEFF. INS.	4.5 to 24	12	V Input	0.6	20 Sink	4.7	Epoxy	-25 to 100
HQ230-400	2	3/8 - 24	1.50	1.25	303 S.S.	12 ± 1	22 AWG, 4 CON. CBL. W/ SHLD TEFF. INS.	4.5 to 24	12	V Input	0.6	20 Sink	4.7	Epoxy	-25 to 125
HQ230-410	2	3/8 - 24	1.50	1.25	303 S.S.	12 ± 1	22 AWG, 4 CON. CBL. W/ SHLD TEFF. INS.	4.5 to 24	12	V Input	0.6	20 Sink	4.7	303 S.S.	-25 to 125
HQ230-420	2	3/8 - 24	1.50	1.25	303 S.S.	36 ± 1	22 AWG, 4 CON. CBL. W/ SHLD TEFF. INS.	4.5 to 24	12	V Input	0.6	25 Sink	Open	303 S.S.	-25 to 150
<b>5/8" Diameter Series</b>															
HQ160-400	1	5/8 - 18	1.00	1.00	303 S.S.	72 ± 3	22 AWG, 4 CON. CBL. W/ SHLD TEFF. INS.	4.5 to 24	12	V Input	0.6	20 Sink	4.7	Epoxy	-25 to 100
HQ360-400	3	5/8 - 18	2.72	2.14	303 S.S.	120 ± 3	22 AWG, 4 CON. CBL. W/ SHLD TEFF. INS.	4.5 to 24	12	V Input	0.6	20 Sink	4.7	Epoxy	-25 to 100
HQ460-000	4	5/8 - 18	3.00	2.14	303 S.S.	-	CONN. M12 X 1, 4 PINS	4.5 to 24	12	V Input	0.6	20 Sink	4.7	303 S.S.	-25 to 125
HQ560-400	5	5/8 - 18	2.37	2.00	Alum.	12 ± .25	22 AWG, 4 CON. CBL. W/ SHLD TEFF. INS.	4.5 to 24	12	V Input	0.6	20 Sink	4.7	Epoxy	-25 to 125
HQ560-410	5	5/8 - 18	2.37	2.00	303 S.S.	180 ± .25	22 AWG, 4 CON. CBL. W/ SHLD TEFF. INS.	4.5 to 24	12	V Input	0.6	20 Sink	4.7	Epoxy	-25 to 125
<b>3/4" Diameter Series</b>															
HQ070-300	0	3/4	2.00	-	303 S.S.	12 ± .25	24 AWG, (X4) LEAD WIRES W/ PVC INS.	4.5 to 24	12	V Input	0.6	20 Sink	4.7	Epoxy	-25 to 100
HQ270-400	2	3/4 - 16	2.30	1.87	Alum.	72 ± 3	22 AWG, 4 CON. CBL. W/ SHLD TEFF. INS.	4.5 to 24	12	V Input	0.6	20 Sink	4.7	Epoxy	-25 to 100
HQ770-200	7	.745	2.05	1.86	303 S.S.	12 ± 1	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS. AND DEUTSCH CONN: DT-04-4P.	4.5 to 24	12	V Input	0.6	25 Sink	Open	303 S.S.	-40 to 125
HQ570-400	5	3/4 - 20	3.00	2.75	303 S.S.	12 ± .25	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	15	V Input	0.4	30 Source	Open	303 S.S.	-40 to 125
<b>M10 Diameter Series</b>															
HQ110-400	1	M10 x 1.0	2.81	2.81	303 S.S.	24 ± .5	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	12	V Input	0.6	20 Sink	4.7	303 S.S.	-40 to 150
<b>M12 Diameter Series</b>															
HQ412-000	4	M12 x 1.0	5.06	4.00	303 S.S.	-	CONN. M12 X 1, 4 PINS	4.5 to 24	12	V Input	0.6	20 Sink	4.7	303 S.S.	-25 to 85
<b>M16 Diameter Series</b>															
HQ516-400	5	M16 x 1.0	2.14	1.77	303 S.S.	36 ± 3	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	12	V Input	0.6	20 Sink	4.7	Epoxy	-25 to 100
<b>M18 Diameter Series</b>															
HQ218-400	2	M18 x 1.5	4.25	3.50	303 S.S.	36 ± 1	20 AWG, 4 CON. CBL. W/ SHLD 22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS. CONN. P/N: DT-04-4P	4.5 to 24	12	V Input	0.6	25 Sink	Open	303 S.S.	-40 to 125
* HQ518-200	5	M18 x 1.0	2.00	1.75	303 S.S.	6 ± 1	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS. CONN. P/N: DT-04-4P	5 to 36	12	V Input	0.6	25 Sink	Open	303 S.S.	-25 to 100
HQ518-400	5	M18 x 1.5	2.14	1.89	303 S.S.	36 ± 3	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 24	12	V Input	0.6	20 Sink	4.7	Epoxy	-25 to 100
* HQ518-410	5	M18 x 1.5	2.14	1.77	303 S.S.	12 ± .25	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS.	5 to 36	12	5.0	0.6	30 Source	4.7	Epoxy	-25 to 125
* HQ518-420	5	M18 x 1.0	2.00	1.75	303 S.S.	6 ± 1	22 AWG, 4 CON. CBL. W/ SHLD, TEFF. INS.	8 to 36	12	V Input	0.6	25 Sink	Open	303 S.S.	-25 to 125
<b>M24 Diameter Series</b>															
* HQ524-400	5	M24 x 1.5	3.00	2.60	303 S.S.	24 ± 1	22 AWG, CBL. W/ SHLD, TEFF. INS.	5 to 36	12	5.0	0.4	20 Sink	4.7	303 S.S.	-40 to 125

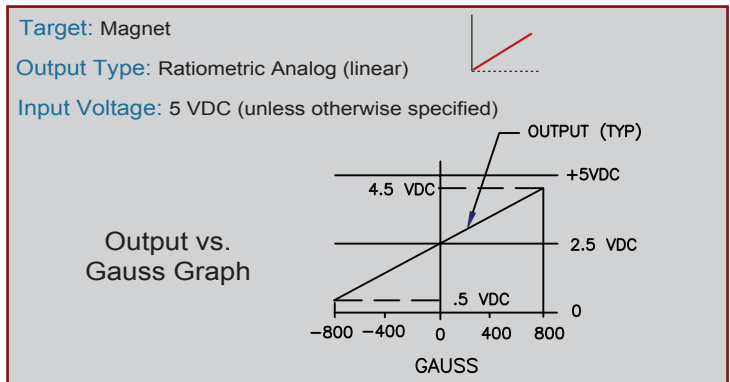
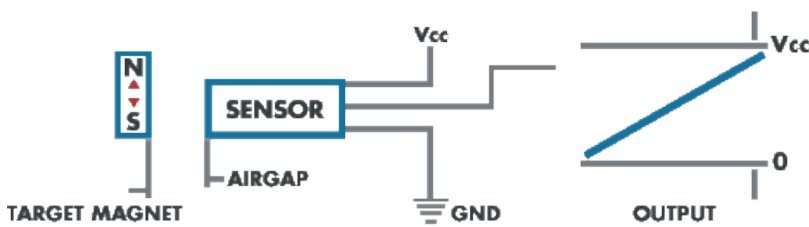
\*Electrical Protections  
**Supply Voltage** : 40VDC  
**Reverse Polarity** : -50V Reverse Transient  
**Load Dump** : 60V



# Hall-Effect Displacement Sensor W/ Linear Output (HL)



Non-contact magnetic sensors that are designed to respond to a wide range of positive or negative magnetic fields and can sense relatively small changes in a magnetic field. By having magnet as a target, this unit produces a Ratio-metric Rail-To-Rail linear output. It also has an internal amplifier to boost the output to a higher level. These sensors are ideal for applications such as magnetic flux measurement, displacement, and linear output rotary measurement.



## Example of Common Applications

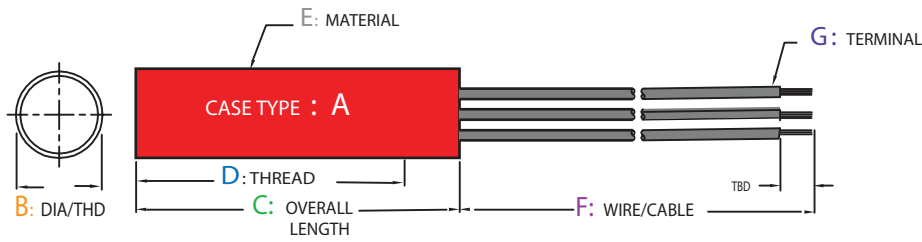
### Aerospace, Biotech & Robotic

**Applications:** Centrifuge, Medical Equipment, ABS Brakes System Position, Antenna Position, Angle Position Sensing, Fan Control, Test Equipment, Chemical Dispensing Equipment.





# Standard (HL) Products Available

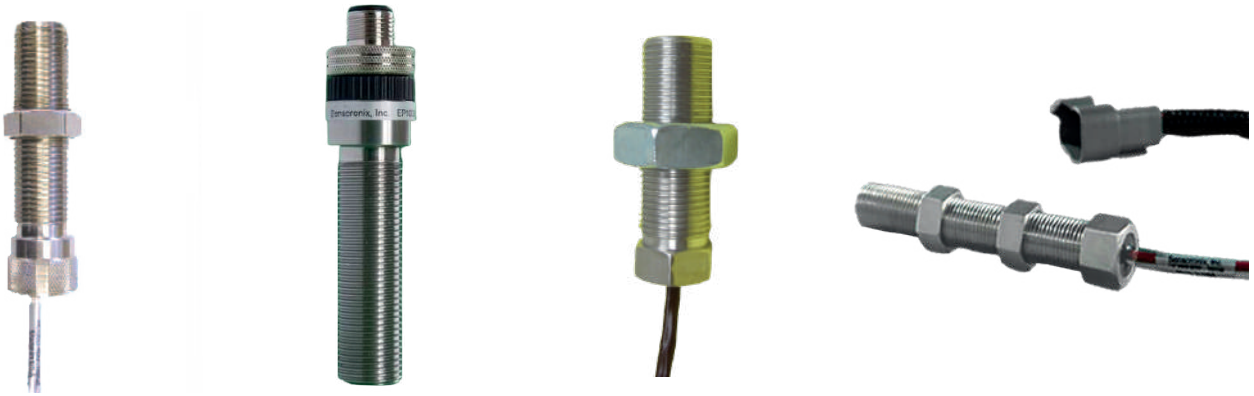


Please contact Sensoronix for more detailed information on the standard sensors listed below.  
All products are custom designed to meet your exact specification requirements.

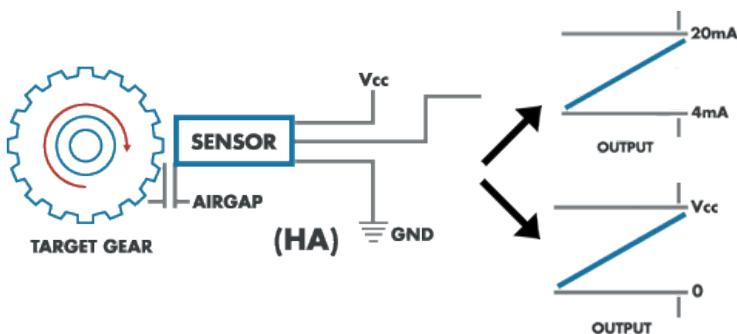
PART #	MECHANICAL SPECIFICATIONS							ELECTRICAL SPECIFICATIONS					ENVIRONMENT		
	A	B	C	D	E	F	G	INPUT VOLTAGE (VDC)	INPUT CURRENT (mA)	V Out @ 0 g 5 V INPUT	SENSITIVITY (mV/G)	OUTPUT CURRENT (mA)	Linearity % of Span MAX	FRONT SEALED	TEMP RANGE (°C)
<b>1/4" Diameter Series</b>															
HL120-400	1	1/4 - 28	1.00	1.00	303 S.S.	2 ± .3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 10.5	9	2.5 ± .175	2.5 ± .100	1.5	-1.5	Epoxy	-40 to 100
<b>5/16" Diameter Series</b>															
HL130-400	1	5/16 - 24	1.50	1.50	303 S.S.	12 ± 1	22 AWG, 3 CON. CBL. W/ TEFF. INS.	4.5 to 10.5	9	2.5 ± .175	2.5 ± .100	1.5	-1.5	Epoxy	-40 to 125
<b>3/8" Diameter Series</b>															
HL030-400	0	3/8	1.40	-	Alum.	24 ± .5	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 10.5	9	2.5 ± .175	2.5 ± .100	1.5	-1.5	Epoxy	-40 to 100
HL230-400	2	3/8 - 24	1.50	1.25	303 S.S.	120 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, TEFF. INS.	4.5 to 10.5	9	2.5 ± .175	2.5 ± .100	1.5	-1.5	303 S.S.	-55 to 100
<b>1/2" Diameter Series</b>															
HL050-400	0	1/2	1.00	-	303 S.S.	36 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 10.5	9	2.5 ± .175	2.5 ± .100	1.5	-1.5	Epoxy	-40 to 100
<b>M8 Diameter Series</b>															
HL108-200	1	M8 x 1.0	1.50	1.50	303 S.S.	31.5 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS. AND MOLEX CONN: 35507-0300	4.5 to 10.5	9	2.5 ± .175	2.5 ± .100	1.5	-1.5	Epoxy	-40 to 100
<b>M12 Diameter Series</b>															
HL112-400	1	M12 x .75	0.95	0.95	Alum.	98 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	4.5 to 10.5	9	2.5 ± .175	2.5 ± .100	1.5	-1.5	Epoxy	-40 to 100



# Hall-Effect Speed Sensor W/ Linear Output (HA)



Non-contact linear speed magnetic sensors that uses Hall effect technology to measure the velocity of a rotating object. This sensor is a complex device with signal conditioning that is powered and provides a 4 - 20 mA or a 0 - 10 VDC linear output for velocity measurement.



Target: Ferrous Material Gear Tooth with range of Min. 4 to 32 Gear Pitch

$$P = \frac{N + 2}{OD}$$

P = Gear Pitch  
N = Num. of Teeth  
OD = Outside Diameter

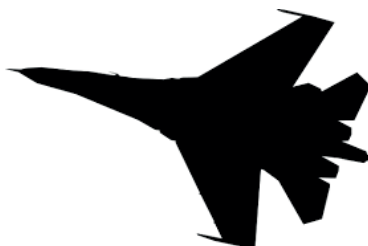
Frequency: 15 kHz Max

Output Type: Analog (Linear) Output Speed Sensor

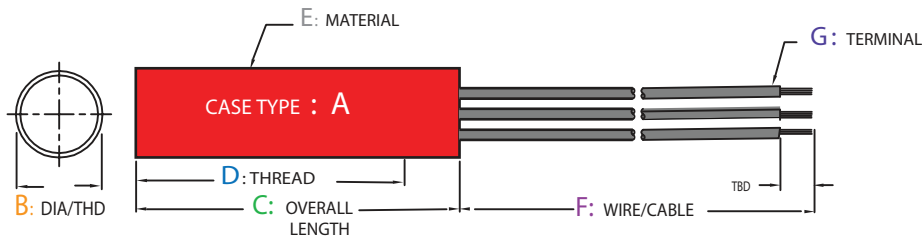
## Example of Common Applications

### Automotive, Aerospace & Off Highway

**Applications:** Satellite, Airplane Speed, Truck, Car, Motorcycle, Boat, Helicopter Speed Monitoring, Crankshaft, Transmission, Dynamometer, Engine Speed, Tractors, Hydraulics, Automation Control, Military Vehicles, Turbines, Railway.



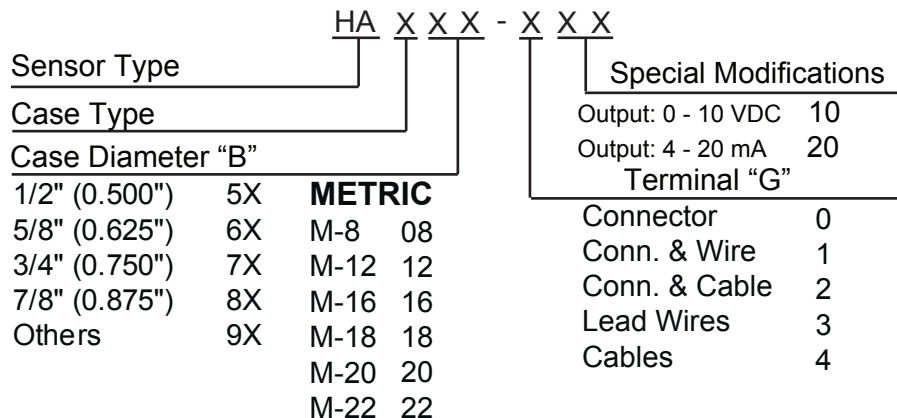
# Standard (HA) Products Available



Please contact Sensoronix for more detailed information on the standard sensors listed below.  
All products are custom designed to meet your exact specification requirements.

PART #	MECHANICAL SPECIFICATIONS							ELECTRICAL SPECIFICATIONS						ENVIROMENT	
	A	B	C	D	E	F	G	INPUT VOLTAGE (VDC)	INPUT CURRENT (mA)	OUTPUT RANGE	OUTPUT CURRENT (mA)	FREQUENCY RANGE (Hz)	SENSITIVITY (mV/Hz)	FRONT SEALED	TEMP RANGE (°C)
<b>5/8" Diameter Series</b>															
HA260-410	2	5/8 - 18	3.31	3.00	303 S.S.	120 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	24	35	0 - 10 VDC	10	0 to 2500	50	Epoxy	0 to 85
HA260-420	2	5/8 - 18	3.30	3.00	303 S.S.	120 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	24	35	4 - 20 mA	10	0 to 83	0.8	Epoxy	0 to 85
HA360-410	3	5/8 - 18	2.72	2.14	303 S.S.	72 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	24	35	0 - 10 VDC	10	0 to 500	50	Epoxy	0 to 85
HA360-420	3	5/8 - 18	2.72	2.14	303 S.S.	72 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	24	26	4 - 20 mA	10	0 to 500	0.8	Epoxy	0 to 85
HA460-010	4	5/8 - 18	2.62	1.48	303 S.S.	-	3 PINS AMPHENOL CONN: MATE W/ MS3106A	24	35	0 - 10 VDC	10	0 to 500	0.8	Epoxy	0 to 85
HA560-420	5	5/8 - 18	3.00	2.63	303 S.S.	120 ± 1	22 AWG, 3 CON. CBL. W/ SHLD PVC INS.	24	35	4 - 20 mA	10	0 to 110	0.8	303 S.S.	-20 to 95
<b>3/4" Diameter Series</b>															
HA270-410	2	3/4 - 16	2.34	2.00	Alum.	72 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	24	26	0 - 10 VDC	10	0 to 200	50	Epoxy	0 to 70
HA270-420	2	3/4 - 16	2.34	2.00	Alum.	72 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	24	26	4 - 20 mA	10	0 to 1000	0.8	Epoxy	0 to 70
HA271-420	2	3/4 - 16	2.34	2.00	Alum.	120 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	24	26	4 - 20 mA	10	0 to 50	0.8	Epoxy	0 to 70
<b>M18 Diameter Series</b>															
HA118-420	1	M18 x 1.5	3.13	3.13	303 S.S.	80 ± 3	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	24	26	4 - 20 mA	10	0 to 50	0.8	303 S.S.	0 to 70
<b>M22 Diameter Series</b>															
HA222-220	2	M22 x 1.5	3.31	3.00	303 S.S.	118 ± .5	22 AWG, 3 CON. CBL. W/ TEFF. INS. DEUTCH CONN. P/N: DT04-3P	24	35	4 - 20 mA	10	0 to 200	0.8	303 S.S.	-20 to 95

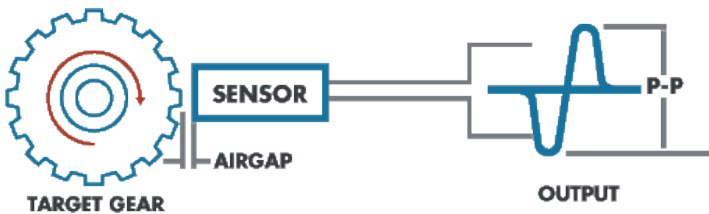
## Part Number Nomenclature



# Variable Reluctance Speed Sensor (VR)



The collapse of magnetic field due to the interruption by a ferrous gear tooth provides an analog signal output (sine wave) that does not require an outside power source. Variable reluctance sensor or Mag-pickup is suitable for speed sensing with a range from 30 to 1000 inches per second with a target gear from one tooth per revolution to 32 pitch gear.



Target: Ferrous Material Gear Tooth w/ range of Min. 1 tooth or slot to 32 Gear Pitch


$$P = \frac{N + 2}{OD}$$

P = Gear Pitch  
N = Num. of Teeth  
OD = Outside Diameter

Surface Speed (IPS) =  $\frac{RPM \cdot \pi \cdot D}{60}$

0 to Peak Voltage = Peak to Peak X 0.5

RMS = Peak to Peak X 0.35

Output Type: Analog (Sine Wave) 

## Example of Common Applications

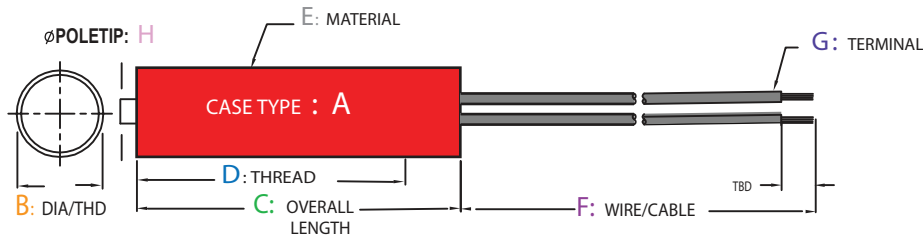
### Power Generation, Automotive, Aerospace, Railroad & Mining

**Applications:** Wind Turbine Speed, Flow Meter, Race Car, Airplane, Truck Transmission, Motorcycle Speed, Helicopter, Crankshaft, Transmission, Generator, Engine Speed, Tractors, Hydraulics, Windmills, Power Turbines, Locomotive, Golf Carts, Off Road Equipment.





# Standard (VR) Products Available



Please contact Sensoronix for more detailed information on the standard sensors listed below.  
All products are custom designed to meet your exact specification requirements.

PART #	MECHANICAL SPECIFICATIONS							ELEC. SPEC.		ENVIROMENT		
	A	B	C	D	E	F	G	H	COIL RESISTANCE (Ohm)	TEMP RANGE (°C)	PROTE -CTIONS	FRONT SEALED
<b>3/4" Diameter Series</b>												
VR270-100	2	3/4 - 16	3.00	2.57	Alum.	3.5 ± .5	16 AWG, PACKARD CONN: 1201 0973	.187	565 ± 20%	-54 to 121	IP66	Epoxy
VR270-300	2	3/4 - 16	2.30	1.87	Alum.	12	18 AWG, SXL INS WIRES	.187	450 ± 20%	-54 to 105	IP66	Epoxy
VR270-320	2	3/4 - 16	4.06	3.63	Alum.	10 ± .5	18 AWG, LEAD WIRES W/ TEFF. INS.	.187	1055 ± 14%	-40 to 105	IP66	Epoxy
VR570-300	5	3/4 - 16	1.47	1.17	303 S.S.	6	18 AWG, SXL INS WIRES	.187	1000 ± 20%	-40 to 105	IP66	Epoxy
<b>M12 Diameter Series</b>												
VR112-300	1	M12 x 1.0	3.00	3.00	303 S.S.	6 ± 1	18 GAUGE LEAD WIRES W/ TEFF. INS.	.125	650 ± 13%	-40 to 125	IP66	Epoxy
VR312-300	3	M12 x 1.0	4.06	3.00	303 S.S.	6 ± 1	18 GAUGE LEAD WIRES W/ TEFF. INS.	.125	650 ± 20%	-40 to 125	IP66	Epoxy
VR312-310	3	M12 x 1.0	3.06	2.00	303 S.S.	59 ± 1	18 GAUGE LEAD WIRES W/ TEFF. INS.	.125	850 ± 13%	-40 to 150	IP67	303 S.S.
VR312-320	3	M12 x 1.0	4.06	3.00	303 S.S.	59 ± 1	18 GAUGE LEAD WIRES W/ TEFF. INS.	.125	850 ± 13%	-40 to 150	IP67	303 S.S.
VR312-330	3	M12 X 1.0	5.06	4.00	303 S.S.	59 ± 1	18 GAUGE LEAD WIRES W/ TEFF. INS.	.125	850 ± 13%	-40 to 150	IP67	303 S.S.
VR312-400	3	M12 X 1.0	2.56	1.80	303 S.S.	18	22 AWG, SHLD CBL. W/ PVC INS.	.125	650 ± 20%	-40 to 105	IP67	Epoxy
VR412-000	4	M12 x 1.25	3.88	2.50	303 S.S.	-	2 PINS AMPHENOL CONN: MATE W/ MS3106A	.093	1600 ± 20%	-28 to 121	IP66	Epoxy
<b>M16 Diameter Series</b>												
VR116-100	1	M16 x 1.5	2.00	2.00	303 S.S.	2 ± .25	18 AWG SXL LEAD WIRES, W/ METRI PACK CONN: 150 SERIES	.187	180 ± 20%	-40 to 125	IP66	Epoxy
VR116-300	1	M16 x 1.5	4.00	4.00	303 S.S.	8 ± .25	18 AWG SXL LEAD WIRES	.106	250 ± 20%	-54 to 107	IP66	Epoxy
VR116-320	1	M16 x 1.5	1.75	1.75	303 S.S.	8 ± .25	18 AWG LEAD WIRES W/ PVC INS.	.187	180 ± 20%	-40 to 125	IP66	Epoxy
VR216-400	2	M16 x 1.5	3.00	2.69	Alum.	6 ± .25	22 AWG CBL. W/ SHLD PVC INS.	.093	1600 ± 20%	-28 to 121	IP66	Epoxy
VR416-000	4	M16 x 1.5	4.25	3.12	303 S.S.	-	2 PINS AMPHENOL CONN: MATE W/ MS3106A	.187	180 ± 20%	-40 to 105	IP66	Epoxy
VR416-010	4	M16 x 1.5	4.25	3.12	303 S.S.	-	2 PINS AMPHENOL CONN: MATE W/ MS3106A	.106	52 ± 20%	-40 to 105	IP66	Epoxy
<b>M18 Diameter Series</b>												
VR118-100	1	M18 x 1.5	2.00	2.00	303 S.S.	2 ± .25	18 AWG SXL LEAD WIRES, W/ METRI PACK CONN: 150 SERIES	.187	180 ± 20%	-40 to 125	IP66	Epoxy
VR118-300	1	M18 x 1.5	3.12	3.12	303 S.S.	8 ± .25	18 AWG LEAD WIRES W/ PVC INS.	.187	180 ± 20%	-40 to 125	IP66	Epoxy
<b>M 20 Diameter Series</b>												
VR120-100	1	M20 x 1.5	2.00	2.00	303 S.S.	2 ± .25	18 AWG, SXL LEAD WIRES, W/ METRI PACK CONN: 150 SERIES	.187	180 ± 20%	-40 to 125	IP66	Epoxy
<b>M22 Diameter Series</b>												
VR122-100	1	M22 x 1.5	3.125	3.125	303 S.S.	12 ± .25	18 AWG, SXL LEAD WIRES, W/ METRI PACK CONN: 150 SERIES	.187	180 ± 20%	-65 to 107	IP66	Epoxy

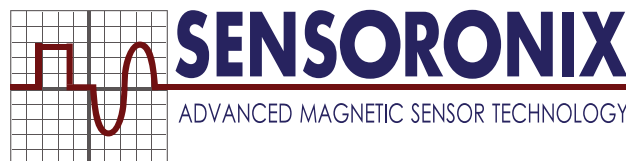
# Options to choose a Sensor for your Application

- 1 Use our standard products listing and find a sensor that meets your requirements.

If you don't find a sensor in our standard products listing to meet your exact requirements, follow below to customize a sensor to meet your application needs.

- 2 Choose a P/N from our standard listing that is close to your requirements and let us know the changes to meet your requirements.
- 3 Provide your detailed technical specifications along with description of your application so we can design a sensor to meet your exact requirements.
- 4 Send your specifications so we can make a high quality replacement to your existing sensor.

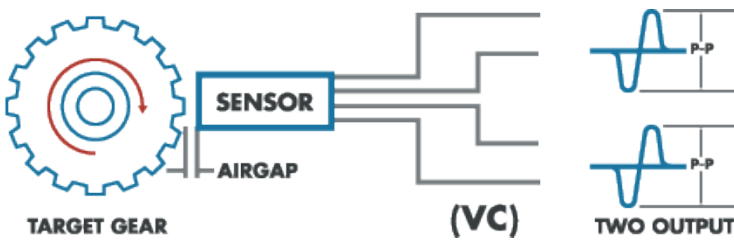
**Sensoronix** offers Engineering and Manufacturing services from prototype to production. A leading manufacturer of Non-Contact Magnetic Sensors for industries in Automotive, Biotechnology, Aerospace, Aviation, Rail, Agriculture and many more. Sensoronix offers a range of standard and customized motion sensor solutions providing precise measurement of Speed, Direction, Position and Proximity.



# VR Speed Sensor W/ Complementary Outputs (VC)



Non-contact magnetic sensors that measure the collapse of magnetic field due to the interruption by a ferrous gear tooth. These sensors provide two analog signal outputs (sine wave) that does not require an outside power source. This sensor is suitable for speed sensing with a range from 30 to 1000 inches per second with a target gear from one tooth per revolution to 32 pitch gear.



Target: Ferrous Material Gear Tooth w/ range of Min. 1 tooth or slot to 32 Gear Pitch

$$P = \frac{N + 2}{OD}$$

P = Gear Pitch  
N = Num. of Teeth  
OD = Outside Diameter

Surface Speed (IPS) =  $\frac{RPM \cdot \pi \cdot D}{60}$

0 to Peak Voltage = Peak to Peak X 0.5

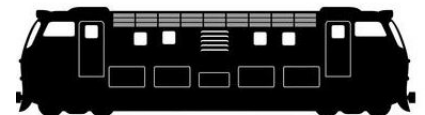
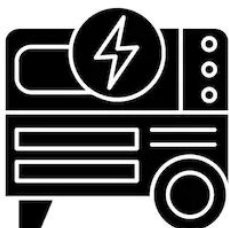
RMS = Peak to Peak X 0.35

Output Type: Dual Outputs Analog (Sine Wave)

## Example of Common Applications

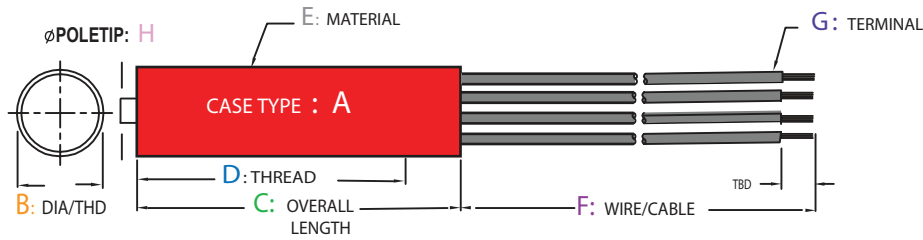
### Power Generation, Automotive, Aerospace, Railroad & Mining

**Applications:** Wind Mill, Golf Cart, Airplane, Flow Meter, Race Car, Truck, Motorcycle, Boat, Helicopter, Crankshaft, Transmission, Generator, Engine, Tractors, Hydraulics, Windmills, Wind Turbines, Locomotive, Golf Carts, Off Road Equipment.





# Standard (VC) Products Available

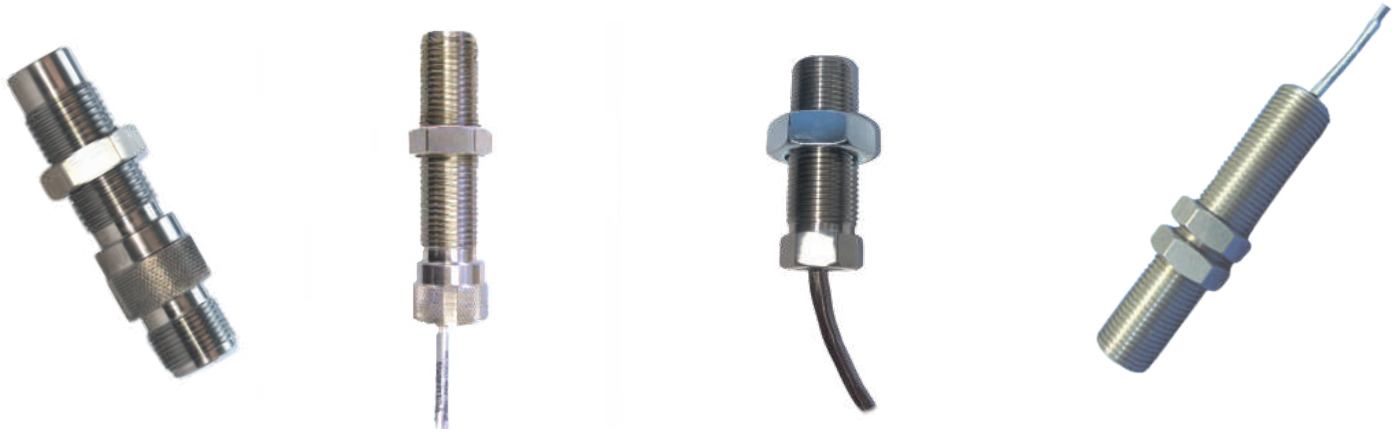


Please contact Sensoronix for more detailed information on the standard sensors listed below.  
All products are custom designed to meet your exact specification requirements.

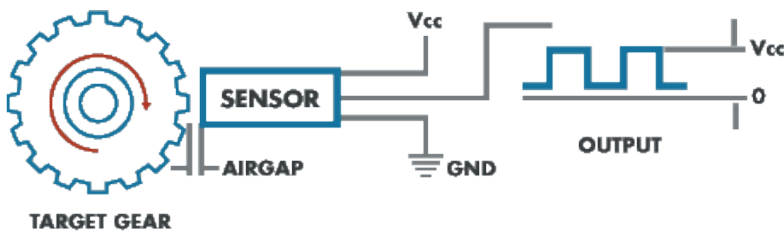
PART #	MECHANICAL SPECIFICATIONS							H	ELEC. SPEC.		ENVIROMENT	
	A	B	C	D	E	F	G		COIL RESISTANCE (Ohm)	TEMP RANGE (°C)	FRONT SEALED	
<b>5/8" Diameter Series</b>												
VC160-100	1	5/8 - 18	3.06	3.06	303 S.S.	3.25 ± .25	20 AWG, LEAD WIRES W/ TEFF. INS. PACKARD CONN: 1205 2641 (2x)	.187	(2x) 180 ± 20%	-40 to 105	Epoxy	
VC260-100	2	5/8 - 18	3.31	3.00	303 S.S.	16 ± 1	16 AWG, SXL LEAD WIRES PACKARD CONN: 1201 10973 (2x)	.187	(2x) 500	-65 to 105	Epoxy	
<b>3/4" Diameter Series</b>												
VC370-100	3	3/4 - 16	3.00	2.44	303 S.S.	30 ± 1.5	18 AWG, SXL LEAD WIRES W/ PACKARD CONN: 120 10973 (2x)	.187	830 - 1220	-40 to 105	Epoxy	
VC570-300	5	3/4 - 16	2.64	2.14	303 S.S.	12	18 AWG, SXL LEAD WIRES	.187	(2x) 180 ± 20%	-40 to 105	Epoxy	
<b>M12 Diameter Series</b>												
VC312-300	3	M12 x 1.0	2.56	2.06	303 S.S.	6	20 AWG, LEAD WIRE W/ TEFF. INS.	.125	(2x) 400 ± 10%	-40 to 105	303 S.S.	
<b>M18 Diameter Series</b>												
VC218-100	2	M18 x 1.0	3.70	3.40	303 S.S.	16 ± 1	16 AWG SXL LEAD WIRES DEUTCH CONN. P/N:DT04-2P (2x)	.187	(2x) 500	-65 to 105	Epoxy	
VC218-400	2	M18 x 1.5	2.25	1.30	303 S.S.	78.8 ± 1	26 AWG, 2 CON. CBL. W/ SHLD, TEFF. INS. (2X), RING TERMINAL (5x)	.187	(2x) 800 ± 15%	-55 to 75	303 S.S.	



# VR Speed Sensor W/ Digital Output (VD)



Due to the active solid state signal conditioning integral with this variable reluctance speed sensor, it converts a sine wave signal output to produce a digital square wave signal with constant amplitude regardless of variations in speed.



Target: Ferrous Material Gear Tooth with range of Min. 4 to 32 Gear Pitch

Frequency: 15 kHz Max

Output Type: Digital (Square Wave), TTL Compatible

$$P = \frac{N + 2}{OD}$$

P = Gear Pitch  
N = Num. of Teeth  
OD = Outside Diameter

Gear Pitch vs. Airgap Graph

Gear Pitch	Airgap (in)
8	0.100
20	0.060
32	0.020

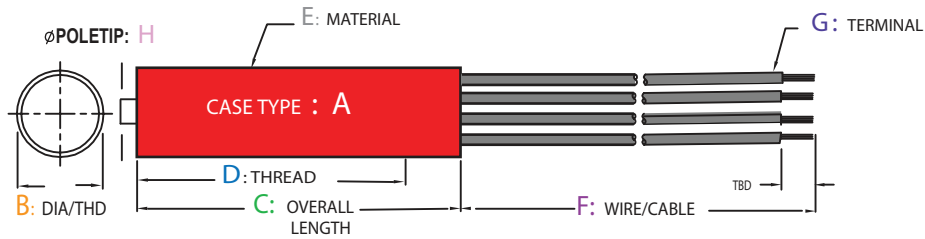
## Example of Common Applications

### Power Generation, Automotive, Aerospace, Railroad & Mining

**Applications:** Wind Turbines, Generator, Engine, Golf Cart, Airplane, Flow Meter, Race Car, Truck, Motorcycle, Boat, Helicopter, Crankshaft, Transmission, Engine, Tractors, Hydraulics, Locomotive, Golf Carts, Off Road Equipment, Construction Equipment.



# Standard (VD) Products Available



Please contact Sensoronix for more detailed information on the standard sensors listed below.  
All products are custom designed to meet your exact specification requirements.

PART #	MECHANICAL SPECIFICATIONS							ELECTRICAL SPECIFICATIONS					ENVIROMENT		
	A	B	C	D	E	F	G	INPUT VOLTAGE (VDC)	INPUT CURRENT (mA)	VOUT HIGH (VDC)	VOUT LOW (VDC)	OUTPUT CURRENT (mA)	PULL UP RESISTOR	FRONT SEALED	TEMP RANGE (°C)
<b>5/8" Diameter Series</b>															
VD360-400	3	5/8 - 18	2.72	2.14	303 S.S.	72 ± 2	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	5 to 25	10	V Input	0.4	7 Sink	2	Epoxy	-40 to 125
VD460-000	4	5/8 - 18	3.00	1.88	303 S.S.	-	3 PINS BENDIX CONN: MATE W/ MS3106A	5 to 25	10	V Input	0.4	7 Sink	2	Epoxy	-40 to 125
<b>3/4" Diameter Series</b>															
VD270-400	2	3/4 - 16	2.34	2.00	303 S.S.	120 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, PVC INS.	5 to 25	10	V Input	0.4	7 Sink	2	Epoxy	-40 to 125
<b>M12 Diameter Series</b>															
* VD312-400	3	M12 x 1.0	4.06	3.00	303 S.S.	72 ± 1	22 AWG, 3 CON. CBL. W/ SHLD, TEFF INS.	5.5 to 36	12	V Input	0.6	20 Sink	4.7	303 S.S.	-40 to 125

\*Electrical Protections  
**Supply Voltage** : 40VDC  
**Reverse Polarity** : -50V Reverse Transient  
**Load Dump** : 60V



# Special Design Product

## Digital Speed (RPM) and Cycle Count Indicators

**Product Category:** Speed & Cycle Count Indicators Including Hall Effect Zero Speed Sensor.

**Model Number:** DSM23-000

**Description:** Dual 8-Digits Speed (RPM) and Cycle Count Indicators

**DSM23-000:** This unit including a single output Hall Effect Speed Sensor can be used to measure and monitor the speed of a rotating motor's shaft. The top display is factory programmed to monitor the speed (RPM) with red backlighting, while the bottom display is cycle counting in green backlighting.

**Speed Sensor P/N:** HS530-200.

**Description:** Digital Hall Effect Zero Speed Sensor.

**Applications:** Laboratory Used Equipment for Product's Life Test (Rate and Cycle Count Monitoring).

### PRODUCT SPECIFICATIONS

**Input Power Range:** 85-250 VAC/50/60 Hz, 14VA

**Displays:** Two 8 Digits, Digital 0.46" (11.7mm) High

**Indicators:** LCD, Reflective or Green/Red LED Backlight

Programmable Scaling for Count and Rate

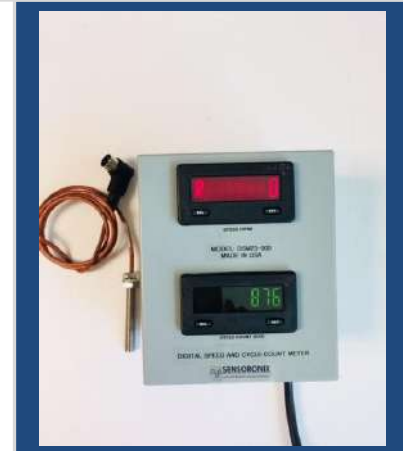
**Sensor:** 3/8-24, 2.7"L, S.S case, 36" Cable & Connector

**Airgap:** .040" -.100" for 32 – 8 Pitch Gear

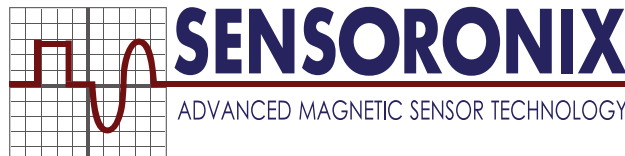
**Sensor's Frequency Range:** 0-15 KHZ

**Operating Temp. Range:** -20 to 75 °C

### Model No.: DSM23-000



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# Special Design Product

## Combined Digital Speed, Direction, and Linear 4-20 mA Outputs Sensor

**Product Category:** Hall Effect Digital Zero Speed, Direction and Linear 4-20mA Output.

**Part Number:** HDL47-420

**Description:** 3/4-16, 2.00" Thread Length with M12x1 Connector Attached to the 303 Stainless Steel Sensor Housing

**HDL Series:** This Hall Effect Speed Sensor provides three separate outputs. Signal #1 is a digital square wave for measuring speed, Signal#2 is a digital DC voltage level to indicate the direction of a rotating shaft (High: When the target gear is rotating Clockwise, and Low: when the gear is rotating counter clockwise), and Signal #3 is a Linear Output to measure the speed of a rotating shaft with standard 4-20mA Output.

**Other Categories Available:** Hall Effect Digital Zero Speed, Direction and Linear 0-10 VDC Output.

**Common Applications:** Dynamometers, Traction Control, Transfer Case, and Machinery Equipments.

### PRODUCT SPECIFICATIONS

**Supply Voltage:** 4.5 to 24 VDC

**Supply Current:** 15 mA Max

**Output Signal:** Two Digital NPN and One Linear 4-20mA.

**Output Current:** 20 mA Sink/ Each Output

**Target Wheel:** 8- 32 Pitch Gear

**Airgap:** .040" -.100" for 32 - 8 Pitch Gear

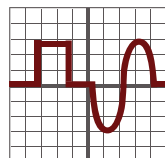
**Operating Temp. Range:** -20 to 90 °C

**Frequency Range:** 0-15 KHZ

P/N: HDL47-420



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# Special Design Product

## Combined Quadrature and Linear 4-20 mA Outputs Speed Sensor

**Product Category:** Hall Effect Quadrature Sensor with Additional Linear 4-20mA Output.

**Part Number:** HQL47-420

**Description:** 3/4-16, 2.00" Thread Length with M12x1 Connector attached to the 303 Stainless Steel Sensor Housing.

**HQL Series:** Hall Effect Quadrature Sensor provides two 90° out of phase digital square wave signals to measure speed and direction of a rotating shaft (When the target gear is rotating clockwise, Signal # 1 leads Signal #2 and when the gear is rotating counter clockwise, Signal #2 leads Signal # 1), and additional linear output to precisely measure speed of the rotating shaft with standard 4-20mA Output.

**Other Categories Available:** Hall Effect Quadrature Sensor with Linear 0-10VDC Output.

**Common Applications:** Dynamometers, Traction Control, Transfer Case, and Machinery Equipments.

### PRODUCT SPECIFICATIONS

**Supply Voltage:** 4.5 to 24 VDC

**Supply Current:** 15 mA Max

**Output Signal:** Two Digital NPN and One Linear 4-20mA.

**Output Current:** 20 mA Sink/ each Output

**Target Wheel:** 8- 32 Pitch Gear

**Airgap:** .040" -.100" for 32 - 8 Pitch Gear

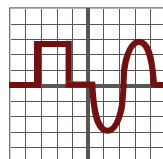
**Operating Temp. Range:** -20 to 90 °C

**Frequency Range:** 0-15 KHZ

P/N: HQL47-420



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**SENSORONIX**  
ADVANCED MAGNETIC SENSOR TECHNOLOGY

# Special Design Product

## Hall Effect Speed Sensor with Digital and Linear 4-20 mA Outputs

**Product Category:** Hall Effect Speed Sensor with Two Outputs of a Digital Square Wave and a Linear 4-20mA Outputs.

**Part Number:** HSA47-420

**Description:** 3/4-16, 2.00" Thread Length with M12x1 Connector attached to the 303 Stainless Steel Sensor Housing.

**HSA Series:** This Hall Effect Speed Sensor provides two signal outputs. Signal #1 is a Digital Square Wave for measuring Speed (RPM) and signal # 2 is a Linear Output to precisely measure the speed of the rotating shaft with standard 4-20mA Output.

**Other Categories Available:** Hall Effect Digital Speed Sensor with additional linear 0-10VDC Output.

**Common Applications:** Dynamometers, Traction Control, Transfer Case, and Machinery Equipments.

### PRODUCT SPECIFICATIONS

**Supply Voltage:** 4.5 to 24 VDC

**Supply Current:** 15 mA Max

**Output Signal:** Digital NPN and Linear 4-20mA.

**Output Current:** 20 mA Sink/ each Output

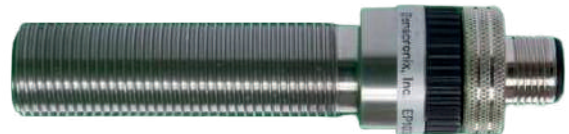
**Target Wheel:** 8- 32 Pitch Gear

**Airgap:** .040" -.100" for 32 - 8 Pitch Gear

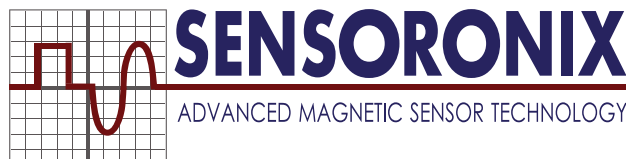
**Operating Temp. Range:** -20 to 90 °C

**Frequency Range:** 0-15 KHZ

P/N: HSA47-420



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# Special Design Product

## Variable Reluctance (VR) Sensor for Railroad Application

**Product Category:** Variable Reluctance (VR) Speed Sensor for Harsh Environment.

**Part Number:** VR770-200

**Description:**  $\phi$ .870", 3.625 Length, Smooth Case with Flange, 303 Stainless Steel Material with Cable/Connector Harness

**Output signal:** Analog, Sine Wave for Measuring Speed (RPM) for AC Traction Motor Application.

**Other Categories Available:** Digital Speed and Direction Sensor.

**Common Applications:** AC Traction Control, Dynamometers, and Transfer Case.

### PRODUCT SPECIFICATIONS

**Coil Resistance:** 2500 $\pm$ 10% Ohms.

**Output Signal:** Analog, Sine Wave, Peak to Peak Voltage

**Target Wheel:** Ferrous Material Gear Tooth, 8- 32 Pitch

**Airgap:** .040" -.100" for 32 - 8 Pitch Gear

**Operating Temp. Range:** -67°C to +107°C

**Frequency Range:** 0-30 KHZ

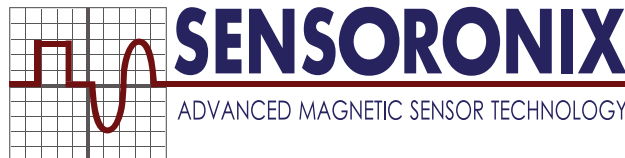
**Protection:** IP67

**Output Signal:** Analog, Sine Wave, Peak to Peak Voltage.

P/N: VR770-200



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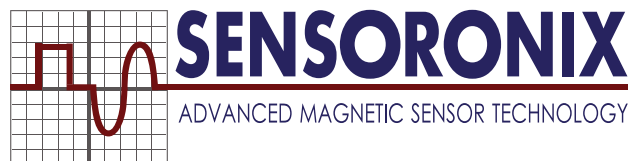
# Options to choose a Sensor for your Application

- 1 Use our standard products listing and find a sensor that meets your requirements.

If you don't find a sensor in our standard products listing to meet your exact requirements, follow below to customize a sensor to meet your application needs.

- 2 Choose a P/N from our standard listing that is close to your requirements and let us know the changes to meet your requirements.
- 3 Provide your detailed technical specifications along with description of your application so we can design a sensor to meet your exact requirements.
- 4 Send your specifications so we can make a high quality replacement to your existing sensor.

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# Technical Reference

**ACCURACY** - The measure of precision with which a device performs over its entire range of related operating parameters such as temperature, power supply voltage and load.

**ACTIVE** – Sensors that integrally contain amplification or conditioning circuitry, and require DC power to operate

**AIRGAP** – The spacing between the sensing face of a speed sensor and the gear teeth, or the actuator. For VRS sensors, is also referred to as pole piece clearance.

**ANALOG OUTPUT** – An output whose magnitude is proportional to the position of the target in the sensing zone. The most common are the 4-20mA, 0-5VDC and 0-10VDC.

**CALIBRATION** - Adjustments of offsets, gains or switch points of a device. Units are shipped factory calibrated to a specific set of conditions, and usually require recalibration in the actual application.

**DUTY CYCLE** – The positive going portion of an AC or DC waveform as a percentage of one complete cycle.

**DWELL TIME** – The length of time the target must be present to enable detection by the sensor or system. It is equal to the target length divided by its velocity

**EMDT** – Electro Mike Displacement Transducer. A non-contact measuring/gauging device utilizing eddy-current losses for target position sensing.

**HYSTERESIS** – The principle in switching position sensors that the operate point is nearer the sensor than the release point. This is necessary to prevent erratic operation, or “jitter” when a target is very near the operate point.

**NEAR FIELD** – The segment of a sensing field immediately in front of the sensor that is rendered unusable by standing waves, ringout or non-linearity.

**NON-LINEARITY** – As applied to analog output sensing, the amount of deviation from a perfect linear output over the sensing range. Usually expressed as a percentage of full scale output voltage or current.

**PASSIVE** – Sensors that do not contain their own amplification and do not require power to operate. The output voltage is dependent on the distance to and speed of the target.

**PEAK TO PEAK VOLTAGE** – The nominally accepted method of rating the output of a VRS sensor under a specific set of test conditions. Abbreviated P-P V is 2.82 times RMS voltage.

**POLE PIECE** – The sensing portion of a VRS sensor which serves to conduct the magnetic flux from the magnet to the target.

**POLE PIECE CLEARANCE** – Also referred to as “airgap” it is the spacing between a VRS Sensor’s pole piece and the gear teeth, or actuator.

**PROXIMITY SENSING** – The ability to direct the presence or position of a target without physical contact.

**REPEATABILITY** – The measure of a device’s ability to reproduce the same output condition with the same input conditions in the same environment. Good repeatability is necessary for good accuracy.

**RESOLUTION** – The ability of an output to indicate small differences in magnitude at the input. High resolution is necessary for good accuracy.

**RESPONSE TIME** – The time that elapses between the appearance of a target in the sensing field and the transition of the output circuit.

**SENSE HEAD** – A 2-wire inductive coil used with specified presence or position sensing modules. Not a standalone device.

**SENSOR** – A stand alone device used to detect target speed, presence or position using magnetic, inductive or ultrasonic technologies.

**SINKING OUTPUT** – An output that conducts current from its output lead to the common lead. Sinking outputs can be either analog or switched. The term “NPN OUTPUT” is often used to designate sinking outputs.

**SOURCING OUTPUT** – An output that conducts current from its positive supply lead. Sourcing outputs can be either analog or switched. The term “PNP OUTPUT” is often used to designate sourcing outputs.

**SURFACE SPEED** – The peripheral speed of the gear, or actuator, calculated in inches or meters per second.

**SWITCHED OUTPUT** – An output that switches “ON” or “OFF” in response to target presence or absence. The output may be either normally open or normally closed. The “NORMAL” condition is defined as no target present.

**ULTRASONIC** – Designating sound waves having a frequency above the limits of human audibility, or in excess of about 20 Kilohertz. Most ultrasonic sensors are designed for use in air operate between 40 Kilohertz and 400 Kilohertz.

**ULTRASONIC POLLUTION** – Ultrasonic noise in the operating environment that impedes sensor performance.

# Speed Sensor Terminology & Formulas

## SPEED CALCULATIONS

$$IPS = \frac{RPM \times D \times \pi}{60}$$

$$DP = \frac{N + 2}{D \text{ in inches}}$$

$$GM = \frac{D \text{ in mm}}{N}$$

$$F = \frac{RPM \times N}{60}$$

$$RPM = \frac{IPS \times 60}{D \times \pi}$$

$$D = \frac{N+2}{P}$$

$$P = \frac{N+2}{D}$$

## ABBREVIATIONS

RPM	= Round Per Min
IPS	= Inch Per Sec
M/S	= Meters Per Sec
N	= Total # of Teeth
P	= Gear Pitch
F	= Frequency
$\pi$	= 3.14
D	= Gear Diameter
DP	= Diametral Pitch
GM	= Gear Module

## CONVERSION FORMULAS

DP	= 2.54/GM
GM	= 1/DP x 25.4
IPS	= M/S x 39.37
M/S	= IPS x .0254

## RECOMMENDED MAX. MOUNTING TORQUE FOR STAINLESS STEEL UNITS

Thread Size	Max. Ft. Lbs.	Max. N/m
3/4	27	36
5/8, M16	15	20
3/8, M10	3	4
1/4, M8	1	1.4
10/32	.3	.4

1Ft./Lb. = 12 in./Lbs. = .74 N/m

## WIRE CROSS REFERENCE

AWG	mm2
30	.05
28	.08
26	.14
24	.25
22	.34
20	.50
18	.75
16	1.50
14	2.50
12	4.00



Our Customer Service Department is ready to assist you with your questions and inquiries.

**Phone:** (949) 528-0906

**Fax:** (949) 385-4958

**Email:** [Sales@Sensoronix.com](mailto:Sales@Sensoronix.com)

