

# RH/RP Displacement Sensor- Analog Output



## Technical Characteristics

- Rugged and fully enclosed design
- Non-wear, non-contact measurement method
- Easy to use, standard analog signal output
- No need to return to zero, absolute position output
- Easy diagnosis, LED real-time condition monitoring
- Low power consumption design effectively reduces system heating
- Stable and reliable, using digital analog technology
- The start and end position of the measurement can be adjusted in full scale

## C Product Parameters-Analog Output

### • Input

Measurement data	Position magnet ring
Stroke length	25~5500 mm, customized according to customer needs
Number of measurements	1

### • Output

Current	4 ~ 20mA or 20 ~ 4mA(min/max load 0/5002)
Voltage	0 ~ 10Vdc or 0~5Vdc (min load resistance ≥ 10K)
Resolution	16-bit D/A or 0.0015% of full scale (min 1um)
Nonlinearity	<±0.01% of full scale, min±50um
Repetition accuracy	<±0.001% of full scale, min ±1um
Hysteresis	< 10um
Update time	1KHz (range ≤ 1m), 500Hz (1m < range ≤ 2m), 333Hz (2m < range ≤ 3m), customizable
Temperature coefficient	<30ppm/°C

### • Operating conditions

Magnet velocity	Arbitrary
Protection level	IP67 RH Stainless Stell Rod /IP65 RP Aluminum profile
Operating temperature	-40°C ~ +85°C
Humidity/dew point	Humidity 90%, no condensation
Shock index	GB/T2423.5 100g(6ms)
Vibration index	GB/T2423.10 20g/10~2000Hz
EMC test	GB/T17626.2/3/4/6/8, Grade 4/3/4/3/3, Class A, CE Certification

### • Structure and Materials

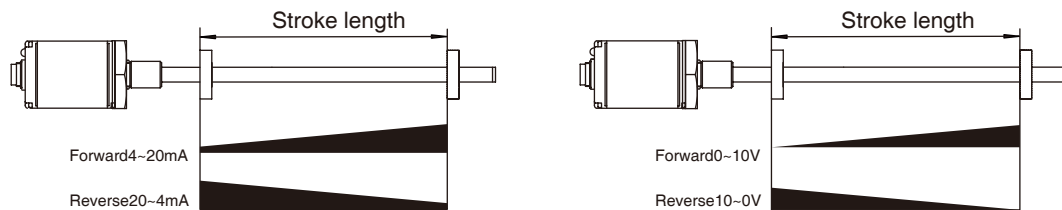
	Failure indication	Displayed by the LEDs on the rear cover of the electronic compartment
RH Series	Electronic bin	Aluminum alloy
	Measuring rod	304 stainless steel
	Outer tube pressure	35MPa (continuous) /70MPa (peak) or 350bar (continuous) / 700bar (peak)
	Position magnet	Standard magnet ring and various ring magnets
RP Series	Electronic bin	Aluminum alloy
	Measuring rod	Aluminum alloy
	Position magnet	Slider magnet, square magnet, sector magnet
	Mounting thread form	M18×1.5、M20×1.5、3/4"-16UNF-3A (customizable)
	Installation direction	Any direction
	Outgoing mode	Cable outlet or Connector

### • Electrical Connections

Input voltage	+24Vdc±20%
Operating current	<80mA (varying with range)
Polarity protection	Max.-30Vdc
Overvoltage protection	Max.36Vdc
Insulation resistance	> 10MΩ
Insulation strength	500V

## S Output Characteristics-Analog Output

- The measurement accuracy of analog output magnetostrictive displacement sensor depends on the number of bits of built-in D/A module. Displacement signals can be directly output to external controllers, such as analog input of PLC.
- The sensor transforms the absolute position of the vernier magnet into a standard analog signal in real time, that is, 0~20A (or reverse), 4~20mA (or reverse) DC current or 0~5V (or reverse), -5~+5V (or reverse), 0~10V (or reverse), -10~+10 (or reverse) DC voltage, etc. The change trend of the output value is linear with the movement direction of the magnet ring, which can be set as forward and reverse output according to needs. As shown in the following figure:



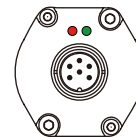
Current output includes: 0~20mA (or reverse) 、 4~20mA (or reverse)

Voltage output includes: 0~5V (or reverse) 、 -5~+5V (or reverse) 、 0~10V (or reverse) 、 -10~+10V (or reverse)

## L LED Real-time State Monitoring and Diagnosis

- Red and green LED indicator built into the sensor head cover provide sensor working condition and diagnostic function.

Green light	ON	ON	ON	Flash
Red light	OFF	Flash	ON	ON
Function	Normal work	Magnet leaves Stroke length range	Magnet not detected	Programming status



## B Programming

- TEC sensors are field programmable using a USB converter. No need to open the electronic bin, USB port power supply, standard cable connection, fully meet customer needs. The following parameters of the sensor can be modified through the configuration software on the PC side: set the measurement direction of the sensor; set the zero point and full scale point of the sensor; graphically display the magnet ring position value; diagnose the sensor online through the error code.



USB converter  
(Order No. TEC612811)



Sensor programming window

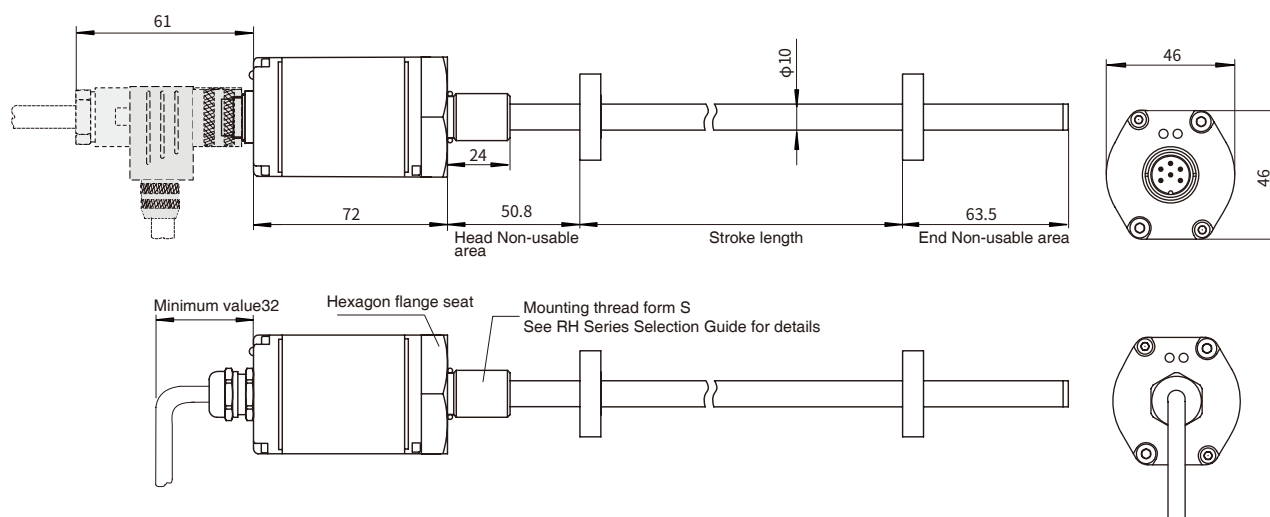
## A a Installation Instructions-Analog Output

Analog output magnetostrictive displacement sensor, suitable for real-time and precise measurement of moving parts stroke, it can measure the absolute displacement or stroke of vernier magnet, expressed in the form of standard analog quantity, including: 0~20MA (or reverse), 420MA (or reverse) DC current or 0~5V (or reverse), -5~+5V (or reverse), 0~10V (or reverse), -10~+10V (or reverse) DC voltage, etc. Sensors have built-in and external two different installation methods, built-in type is suitable for the built-in installation of hydraulic cylinders, compact structure; the external type adopts aluminum profile, which is installed outside the moving parts and convenient to use.

### • Dimensions and installation guidance of RH pressure-resistant rod sensor

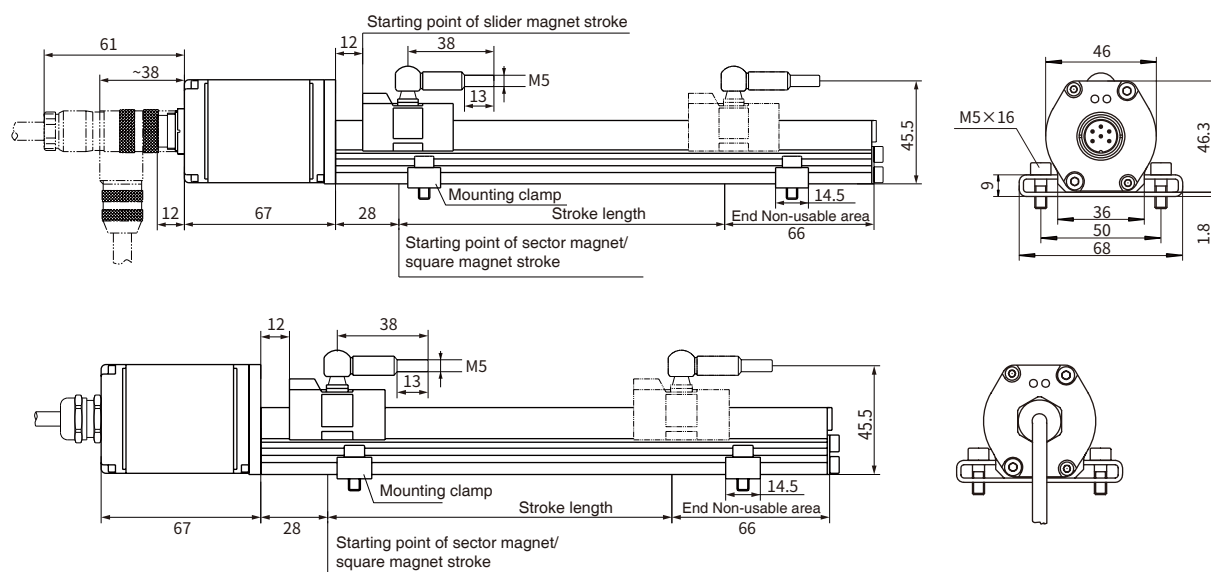
RH series pressure-resistant rodshell, built-in installation design for hydraulic system, pressure-resistant 35MPa continuous, flexible and simple installation mode. Mounting thread form M18×1.5 or M20×1.5 or 3/4"-16UNF-3A.

Note: The measurement Non-usable area shown in the figure indicates that the output value of the sensor in this area is zero or unreliable. The default values of the first and last measurement Non-usable areas of this product are 50.8mm and 63.5mm respectively. The value of the measurement Non-usable area can be appropriately modified according to the needs of customers, please pointed out when ordering.



### • Dimensions and installation guidance of RP aluminum profile sensor

RP Series aluminum profile provides flexible and simple external installation mode, which is suitable for stroke or position detection of linear motion mechanism, and can also be used for external position detection of hydraulic cylinder.



## C Common Accessories - Analog Output

Accessory name/ model	Dimensions	Accessory name/ model	Dimensions	Accessory name/ model	Dimensions
Standard magnet ring Order No.: 211501		Magnetic isolation gasket		6-pin Female Connector Order No.: 312701	
Sector magnet Order No.: 211502		Sector magnetic isolation gasket		6-pin 90 Female Connector Order No.: 312702	
Slider magnet Order No.: 211503		Square magnet Order No.: 211508			

**Note:** Please refer to "Magnet ring Selection" for details of magnet ring kit and other models.

### • Wiring mode

When the sensor is a connector output, refer to the pin definition in the following table for wiring mode; when the sensor is cable outlet output, refer to the wire color definition in the following table for connection mode



• 6-pin male connector arrangement (facing the sensor head)				• 8-pin male connector arrangement (facing the sensor head)		
Pin	Wire color 1*	Wire color 2*	Pin/wire function definition	Pin	Wire color 3*	Pin/wire function definition
1	Blue	Grey	No. 1 magnet ring position signal(+)	1	Yellow	Current output
2	Green	Pink	No. 1 magnet ring position signal(-)	2	Grey	0Vdc(Current/Voltage Loop)
3	Yellow	Yellow	Reservation	3	Pink	Reservation
4	White	Green	Reservation	4	-	Reservation
5	Red	Brown	+24Vdc power supply (-20%~+20%)	5	Green	0...10V
6	Black	White	0 Vdc (power supply circuit)	6	Blue	0 Vdc (power supply circuit)
				7	Brown	+24Vdc power supply (-20%~+20%)
				8	White	Reservation

**Note:** \* Wire color 1: cable PUR sheath, orange, -20~90 °C  
\* Wire color 2/3: cable PVC sheath orange, -20~105 °C

## X Selection Guide - Analog Output

R  - M     -   -     -     -   -

01 02      03 04 05 06 07      08 09      10 11 12 13      14 15 16 17      18 19      20 21

01 - 02		Sensor shell form
R	H	Pressure-resistant rod (internal or external)
R	P	Aluminum profile (external only)

03 - 07		Measuring range
		Four digits, less than four digits are preceded by zero, M means metric system, unitmm

08 - 09		Magnet ring type / mounting thread form
Only for RH series	S 1	M18×1.5, measuring rod diameter 10mm, 304 material
	S 2	M20×1.5, measuring rod diameter 10mm, 304 material
	S 3	3/4"-16UNF-3A, measuring rod diameter 10mm, 304 material
Only for RP series	C 1	Sector magnet
	C 2	Slider magnet
	C 3	Square magnet

10 - 13	Connection form
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10 - 11		Cable outlet mode
D	H	PUR sheath, orange, -20~90℃, end scattered, wire color 1
D	U	PVC sheath, orange, -20~105℃, end scattered, wire color 2
D	B	PVC sheath, orange, -20~105℃, end scattered, wire color 3
D	I	PUR sheath, orange, -20~90℃, end with 6-pin connector
D	V	PVC sheath, orange, -20~105℃, end with 6-pin connector
D	C	PVC sheath, orange, -20~105℃, end with 8-pin connector

12 - 13	Cable outlet mode: cable length, 01~99 meters
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**Note:** For supporting cables, please refer to Analog/Start-Stop Cable Accessories Selection

10 - 13		Connector mode
P	H 6 0	M16 male connector (6-pin)
P	B 8 0	M16 male connector (8-pin)

14 - 17		Signal output mode
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14 - 15		Output form and direction
A	0	Current output, 4 ~ 20mA
A	1	Current output, 20 ~ 4mA
A	2	Current output, 0 ~ 20mA
A	3	Current output, 20 ~ 0mA
V	0	Voltage output, 0 ~ 10V
V	1	Voltage output, 10 ~ 0V
V	2	Voltage output, -10 ~ +10V
V	3	Voltage output, +10 ~ -10V
V	4	Voltage output, 0 ~ 5V
V	5	Voltage output, 5 ~ 0V
V	6	Voltage output, -5 ~ +5V
V	7	Voltage output, +5 ~ -5V

16	Number of magnet rings
1	Single magnet ring

17	No magnet ring state
A	Keep the original value
B	Maximum value
C	Minimum value

18 - 19		Non-usable area at head and end, customizable
S	0	50.8mm+63.5mm
B	0	30mm+60mm
S	1	28mm+66mm (used in RP series)

20-21		Country
		Refer to the country list, page 130.

**Note:** The forward output of the sensor means that when the magnet ring moves away from the electronic bin, the output value increases and decreases when the magnet ring moves in the reverse direction.

Selection example : RH-M0800-S1-DH02-A01C-S0-CN

Indicates: the ordered product model is RH structural displacement sensor, the measuring range is 800mm, and the mounting thread form is M18×1.5; the diameter of the measuring rod is 10mm, and the material is 304; cable outlet connection, 2m long PUR orange cable end scattered; 4~20mA current output; no magnet ring display value is the minimum value; single magnet ring; the non-usable area of the first end is 50.8mm, and the non-usable area of the end is 63.5mm.

## M M Selection of Analog/Start-Stop Cable Fittings

A S T - M    -     
 01 02 03 04 05 06 07 08 09 10

01 - 03			Type
<span style="border: 1px solid black; padding: 2px;">A</span>	<span style="border: 1px solid black; padding: 2px;">S</span>	<span style="border: 1px solid black; padding: 2px;">T</span>	Analog/Start-Stop interface
04 - 07			Cable length
<span style="border: 1px solid black; padding: 2px;">M</span>	<span style="border: 1px solid black; padding: 2px;">*</span>	<span style="border: 1px solid black; padding: 2px;">*</span>	Less than 3 digits are preceded by zeros, and M means metric system, unit m
08 - 10			Cable type and outlet mode
<span style="border: 1px solid black; padding: 2px;">H</span>	<span style="border: 1px solid black; padding: 2px;">0</span>	<span style="border: 1px solid black; padding: 2px;">1</span>	One end of 6-pin (M16) female connector, and one end scattered, wire color 1
<span style="border: 1px solid black; padding: 2px;">H</span>	<span style="border: 1px solid black; padding: 2px;">0</span>	<span style="border: 1px solid black; padding: 2px;">3</span>	One end of 6-pin (M16) right angle female connector, and one end scattered, wire color 1
<span style="border: 1px solid black; padding: 2px;">U</span>	<span style="border: 1px solid black; padding: 2px;">0</span>	<span style="border: 1px solid black; padding: 2px;">1</span>	One end of 6-pin (M16) female connector, and one end scattered, wire color 2
<span style="border: 1px solid black; padding: 2px;">U</span>	<span style="border: 1px solid black; padding: 2px;">0</span>	<span style="border: 1px solid black; padding: 2px;">2</span>	One end of 8-pin (M16) female connector, and one end scattered, wire color 3
<span style="border: 1px solid black; padding: 2px;">U</span>	<span style="border: 1px solid black; padding: 2px;">0</span>	<span style="border: 1px solid black; padding: 2px;">3</span>	One end of 6-pin (M16) right angle female connector, and one end scattered, wire color 2
<span style="border: 1px solid black; padding: 2px;">U</span>	<span style="border: 1px solid black; padding: 2px;">0</span>	<span style="border: 1px solid black; padding: 2px;">4</span>	One end of 8-pin (M16) right angle female connector, and one end scattered, wire color 3
Note			H: Cable type, PUR sheath, orange, -20~90 °C
			U: Cable type, PVC sheath, orange, -20~105 °C

- Selection example: AST-M005-H01  
Indicates: Analog or Start-Stop interface cable, cable length 5 meters, PUR sheath, orange, -20~90°C, one end of the cable is 6-pin (M16) female connector, and one end scattered.
- Selection example: AST-M010-U04  
Indicates: Analog or Start-Stop interface cable, cable length 10 meters, PVC sheath, orange, -20~105°C, one end of the cable is an 8-pin (M16) right angle female connector, and one end scattered.

