



**TEC<sup>®</sup>**  
**Magnetostrictive  
Displacement Sensor**  
**RHC Series Product manual**



中国制造·创造中国

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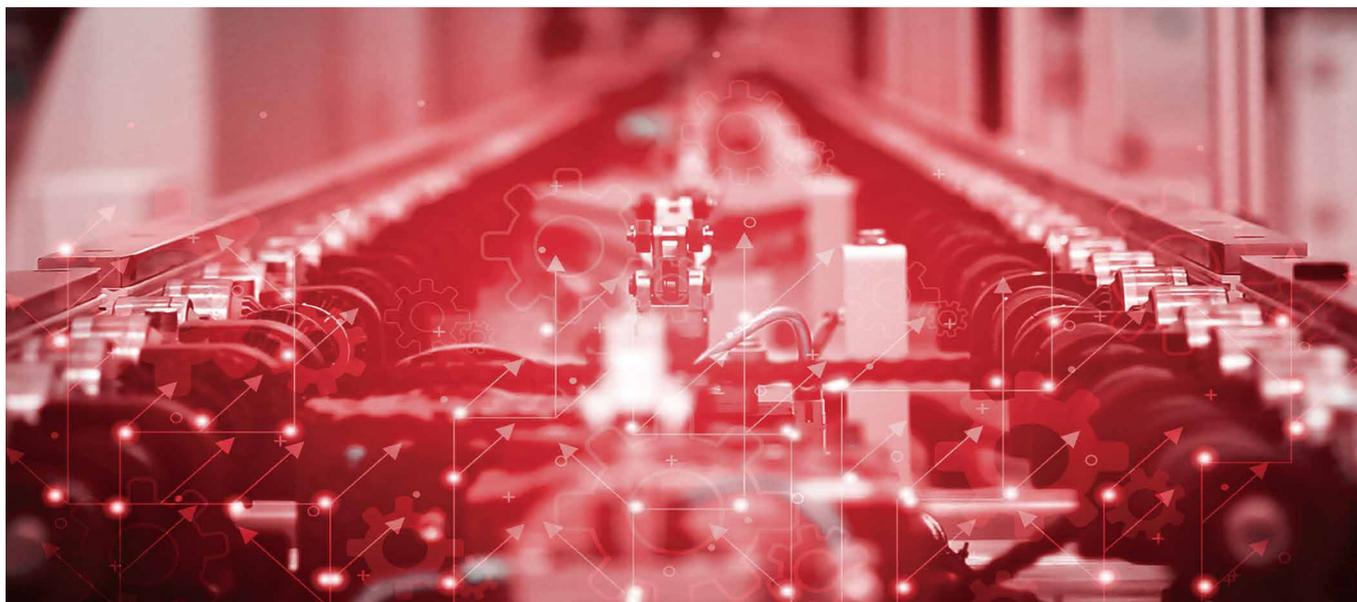
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## Company Profile

We are a technological innovation enterprise born out of Zhejiang University. It is a national high-tech enterprise, the fourth batch of "small giant" enterprises of the Ministry of Industry and Information Technology, and a special enterprise of Zhejiang Province. Our company has more than 180 employees, including 4 overseas talents, 4 professors, and 2 associate professors. There are also 12 doctors, and more than 86% of employees with a bachelor degree or above.



We are committed to intelligent manufacturing, high-end equipment, intelligent sensing, intelligent detection, military industry and other fields. Most of our company's products are independently researched and developed, and the market share ranks in the forefront of the domestic industry. A variety of equipment is the first set in China, which breaks the long-term monopoly of foreign companies.

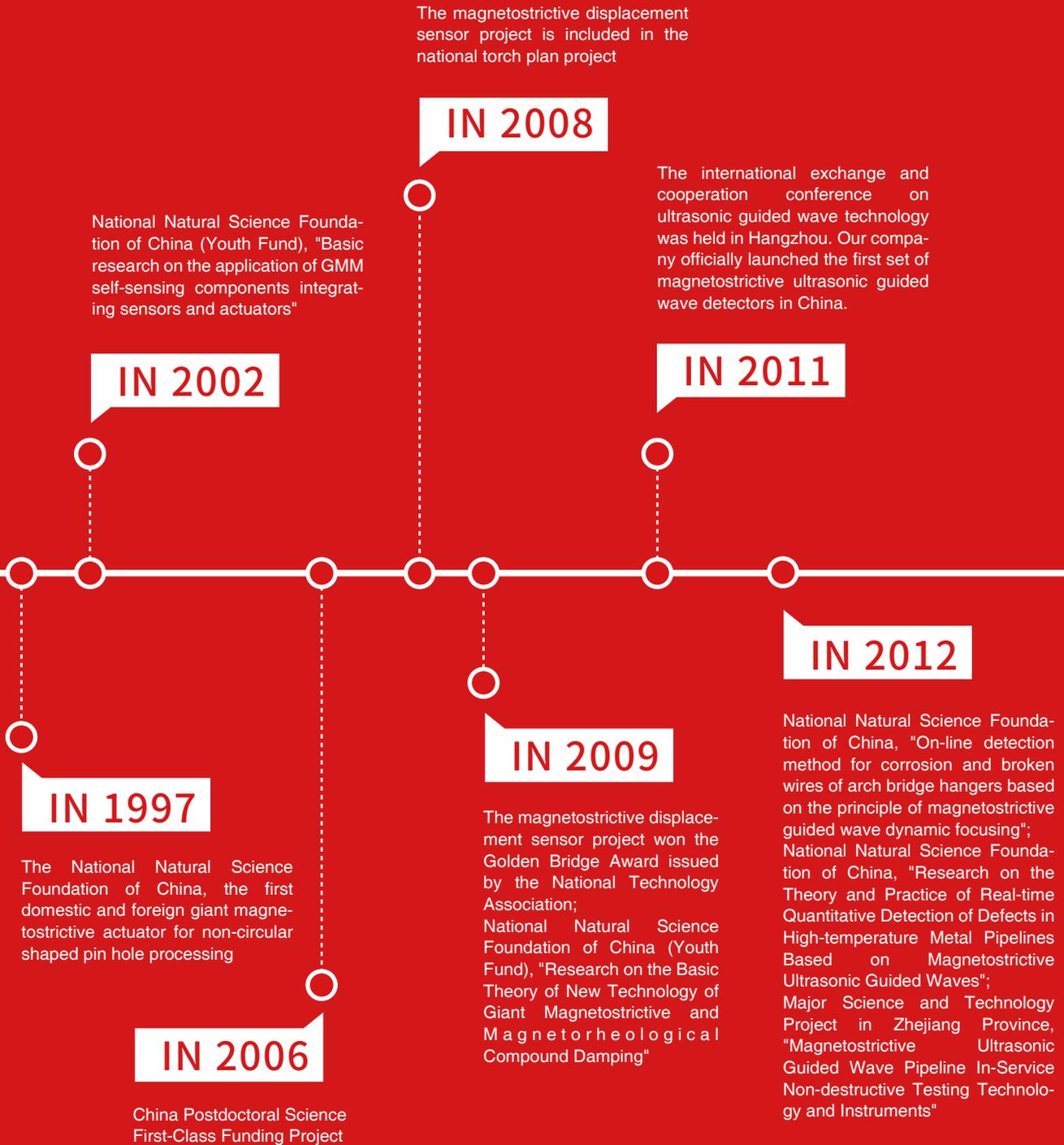
We are a national high-tech enterprise integrating scientific research, product development, engineering design, and technical consulting. Besides, the company has obtained 45 invention patents, 29 utility model patents, 10 software copyrights, and 4 registered trademarks.

Taking "Created in China, Create China" as our ideal, we are committed to building a century-old national brand. Our development goal is to become a well-known leading technology and strength-based enterprise in China's high-end equipment and intelligent inspection industries.

# Honorary Qualification



# TEC Magnetostriction Development



National Science Foundation of China, "Research on Theory and Practice of Real-time Quantitative Detection of Defects in High-temperature Metal Pipelines Based on Magnetostrictive Guided Waves"

IN 2013

IN 2016

National Major Scientific Instrument and Equipment Development Project, "R&D of Rail Broken Monitoring Equipment and Testing Network in Key Sections"

National Key R&D Program, "On-line Monitoring and Inspection of Pressure Equipment and Dynamic Risk Management Technology Research"; Zhejiang Province Key R&D Program, "Usonic Guided Wave-based Track Turnout Structural Health Monitoring System"

IN 2017

IN 2018

National Natural Science Foundation of China, "Research on the Theory and Practice of On-line Monitoring of Turnout Point Rail Defects Based on Phased Array Guided Wave Sound Field Control"; National Key R&D Project, "Research on Magnetoacoustic Compound Monitoring and Detection Technology for Typical Pressure-bearing Special Equipment Damage"

Key R&D Program of Zhejiang Province, "Research and Demonstration Application of Safety Early Warning Technology for Nearshore High Tower Equipment"

IN 2019

IN 2021

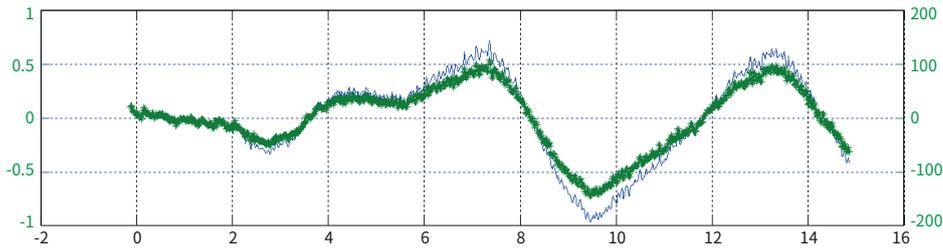
Science and Technology Progress Award of Zhejiang Province, "High-precision magnetoacoustic sensing technology and industrialization application of important components".

The fourth batch of "Small Giant" enterprises of the Ministry of Industry and Information Technology of the People's Republic of China, and the specialized and special new enterprises of Zhejiang Province

IN 2022

# Quality Assurance

After years of experience and precipitation, TEC magnetostrictive displacement sensor has built a modern, automatic and standardized production line, which ensures the reliability, stability and consistency of products. Before the new series of products are put into the market, they must pass EMC, vibration, impact, high and low temperature tests. Sensors need to go through signal verification before and after each manufacturing process. After assembly, they are tested and screened one by one. Finally, they pass the calibration and linearity detection of laser interferometer, and the detection results are uploaded to the database for subsequent tracking of products



Laser interferometer: Calibrated by laser interferometer can measure up to 1000 points per millimeter

# Parts Test

## Electro Magnetic Compatibility (EMC)

Electrostatic discharge immunity	( GB/T17626.2, IDT IEC61000-4-2 )
Radiation immunity of radio frequency electromagnetic field	( GB/T17626.3, IDT IEC61000-4-3 )
Immunity of electrical fast transient	( GB/T17626.4, IDT IEC61000-4-4 )
Surge (shock) immunity	( GB/T17626.5, IDT IEC61000-4-5 )
RF field induced conducted disturbance immunity	( GB/T17626.6, IDT IEC61000-4-6 )
Power frequency magnetic field immunity	( GB/T17626.8, IDT IEC61000-4-8 )

## Temperature Test

Low temperature	( GB/T2423.1, IDT IEC60068-2-1 )
High temperature	( GB/T2423.2, IDT IEC60068-2-2 )
Constant damp heat	( GB/T2423.3, IDT IEC60068-2-78 )
Alternating damp heat	( GB/T2423.4, IDT IEC60068-2-30 )
Temperature change	( GB/T2423.22, IDT IEC60068-2-14 )

## Other Tests

Explosion-proof test	( GB3836.1, IDT IEC60079-0 )
Explosion-proof test	( GB3836.2, IDT IEC60079-1 )
Explosion-proof test	( GB3836.4, IDT IEC60079-11 )
Insulation resistance, insulation strength	( GB/T15479 )
Impact test	( GB/T2423.5, IDT IEC68-2-27 )
Free drop test	( GB/T2423.8, IDT IEC68-2-32 )
Vibration test	( GB/T2423.10, IDT IEC68-2-6 )
Highly accelerated life test	( HALT )
Enclosure protection test	( GB/T4208-2017 )

# Technical Terminology

## ● Absolute position

The output of the sensor is relative to a fixed reference point, which does not need to be reset when power supply is restored after power failure; this position is an absolute position. However the general incremental sensor, such as incremental encoder and incremental grating ruler, which needs to find the reference point again.

## ● Environmental conditions

For normal Operating conditions of displacement sensors, the industry has the following standards:

- a ) Temperature: 25°C (±10°C)
- b ) Relative humidity: 90% or less

Generally, the environment for calibrating and testing sensors is more stringent than the standard requirements.

## ● Measuring range

For the sensor, the physical quantity to be measured is indicated by upper and lower limits. The measurement range is the full scale of motion.

## ● Full scale

Full scale (abbreviated as "F.S") (see measuring range).

## ● Resolution

Refers to the minimum amount of sensor output that can be distinguished. The highest resolution of TEC magnetostrictive displacement sensor can reach 1µm.

## ● Nonlinearity

Nonlinearity is the absolute deviation as a percentage of the Stroke length. In a magnetostrictive sensor, this change is caused by the difference in the propagation velocity of the return signal propagating in the waveguide medium.

## ● Non-contact

Magnetostrictive displacement sensor uses non-contact magnetic induction technology to measure position. Non-contact measurement does not exist mechanical wear and mechanical vibration, which improves the reliability and service life of the sensor.

## ● Temperature coefficient

The temperature coefficient unit is ppm/°C (one millionth per degree Celsius). It refers that the ambient temperature changes by 1 degree Celsius, the amount of change in the position value output by the sensor.

## ● Update time

The time interval between two measurements made by the sensor. The larger the range of the sensor, the longer the update time required.

## ● Multiple position measurement

Measure the position of multiple magnet rings on the sensor stroke shaft or guide rail at the same time.

## ● Precision

The difference between the indicated measured value and the true value can be calculated from the root mean square of the nonlinear deviation, repeatability, and hysteresis.

## ● Hysteresis

The difference in displayed position when reaching the same point from opposite directions along the length of stroke (Note: Magnetostrictive displacement sensors have very little hysteresis and are therefore negligible in most applications).

## ● Drift

Drift refers to the change of output signal or output value under the influence of surrounding environment, such as time or temperature. Please refer to "preheating period" and "temperature coefficient" at the same time.

## ● Shell protection class

The IP (Ingress Protection) standard for shell intrusion protection issued by the International Electrotechnical Commission. For specific IP standard instructions, please refer to the official website of IEC. The optional protection levels of sensors are IP65, IP67 and IP68.

## ● Preheating period

The time required for the sensor to be energized until the output is stable, this deviation can be seen from the calibration curve of the sensor.

## ● Load impedance

The impedance when the external circuit is connected to the output end of the sensor.

## ● Repetition accuracy

The difference in sensor output when the magnet repeatedly reaches the same position from the same direction when measured along the stroke.

# Technical Characteristics

## CC Product Introduction

TEC magnetostrictive displacement sensor is a new generation of linear displacement sensor independently developed by Zheda Jingyi. It can provide users with real-time, reliable, accurate and continuous linear displacement signals under harsh working environment, and is widely used in metallurgical equipment, wind power equipment, construction machinery, rubber machinery, port machinery, energy and other industrial automation fields.

## CC Product Characteristics

### High precision

The highest resolution and repetition accuracy can reach  $0.1\mu\text{m}$

### Extra long stroke

Up to 23 meters

### Never wear

Non-contact measurement, maintenance-free and calibration-free, and the detection accuracy is always as new.

### Various signal output forms

Analog (voltage, current), SSI, Start/Stop, Profibus-DP, CANopen, Profinet, EtherCAT

### Strong adaptability

It can work in harsh environment such as high and low temperature, humidity, vibration, impact, corrosion, dust and so on. It can work in harsh environment such as high and low temperature, humidity, vibration, impact, corrosion, dust and so on.

### Strong shell

The 304 stainless steel tube shell is precision welded, with pressure resistance, dust resistance, pollution resistance, and electrical protection grades up to IP65, IP67, and IP68.

### Easy to use

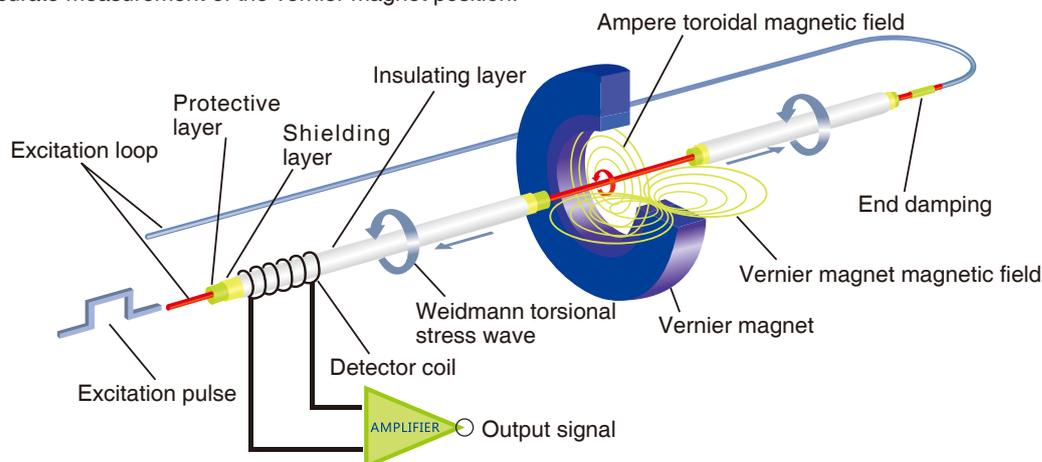
M18×1.5、M20×1.5、3/4"-16UNF-3A threaded installation is optional. When replacing the sensor, only the electronic compartment can be replaced without removing the pressure measuring rod.

### Reliable operation

The core components have been tested for durability, impact, vibration, temperature and absolute displacement, and are not affected by power failure.

## Gg Working Principle

The detection mechanism of the magnetostrictive displacement sensor is based on the "Weidmann effect" between the magnetostrictive waveguide wire and the vernier magnet which is the core detection element of the sensor. The excitation module in the sensor electronic bin will apply a query pulse at both ends of the loop where the sensitive detection element (magnetostrictive waveguide wire) is located, and the pulse forms a circumferential ampere annular magnetic field around the waveguide wire at speed of light. The magnetic field is coupled with the permanent magnet magnetic field at the position of the vernier magnet, and a "Weidmann effect" torsional stress wave is formed on the surface of the waveguide wire. The torsional wave transmitted to the end is absorbed by the damping device, and the signal transmitted to the excitation end is received by the detection device. The control module calculates the time difference between the inquiry pulse and the received signal, and multiplies it by the propagation speed of torsional stress wave in the waveguide material, so as to calculate the distance between the torsional wave occurrence position and the measurement reference point, and realize the real-time accurate measurement of the vernier magnet position.



Working principle of magnetostrictive linear displacement sensor

# 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

## Cc Product Parameters-Analog Output

### • Input

Measurement data	Position magnet ring
Stroke length	25~5500 mm, customized according to customer needs
Number of measurements	2

### • Output

Current	4 ~ 20mA or 20 ~ 4mA(min/max load 0/5002)						
Voltage	0 ~ 10Vdc or 0~5Vdc (min load resistance $\geq 10K$ )						
Resolution	16-bit D/A or 0.0015% of full scale (min 1 $\mu$ m)						
Nonlinearity	$< \pm 0.01\%$ of full scale, min $\pm 50\mu$ m						
Repetition accuracy	$< \pm 0.001\%$ of full scale, min $\pm 1\mu$ m						
Hysteresis	$< 10\mu$ m						
Update time	Measuring range	$\leq 200\text{mm}$	$\leq 350\text{mm}$	$\leq 1200\text{mm}$	$\leq 2400\text{mm}$	$\leq 4800\text{mm}$	$\leq 7620\text{mm}$
	Update time	0.25ms	0.333ms	0.5ms	1.0ms	2.0ms	5.0ms
Temperature coefficient	$< 30\text{ppm}/\text{C}$						

### • Operating conditions

Magnet velocity	Arbitrary
Protection level	IP67 RH Stainless Stell Rod /IP65 RP Aluminum profile
Operating temperature	$-40\text{C} \sim +85\text{C}$
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	
RHC 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
RPC Series	Electronic bin	Aluminum alloy
	Measuring rod	Aluminum alloy
	Position magnet	Slider magnet, square magnet, sector magnet
Mounting thread form	M18 $\times$ 1.5、M20 $\times$ 1.5、3/4"-16UNF-3A (customizable)	
Installation direction	Any direction	
Outgoing mode	Cable outlet or Connector	

### • Electrical Connections

Input voltage	+24Vdc $\pm 20\%$
Operating current	$< 120\text{mA}$ (varying with range)
Polarity protection	Max.-30Vdc
Overvoltage protection	Max.36Vdc
Insulation resistance	$> 10M\Omega$
Insulation strength	500V

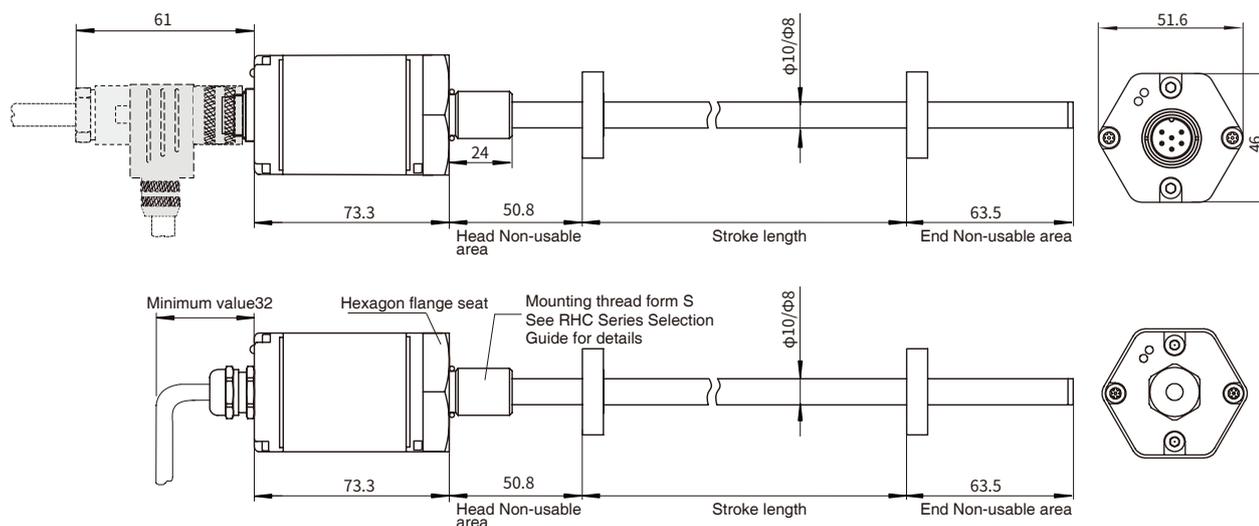
## A a Installation Instructions-Analog Output

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 RHC pressure-resistant rod sensor

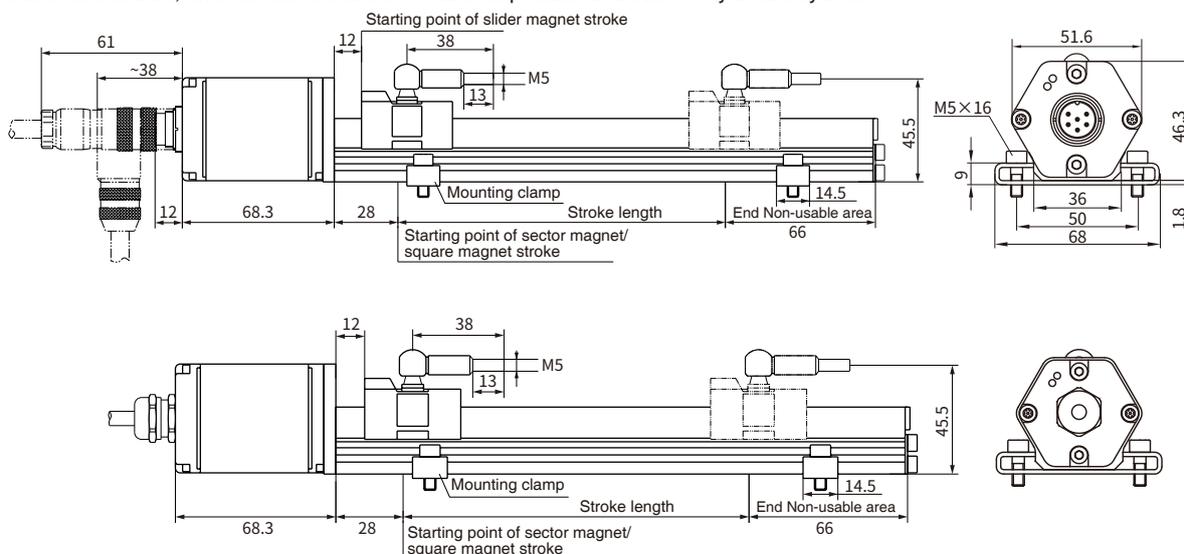
RH series pressure-resistant rodshell, built-in installation design for hydraulic system, pressure-resistant 35MPa continuous, flexible and simple installation mode. Mounting thread form M18×1.5 or M20×1.5 or 3/4"-16UNF-3A.

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.

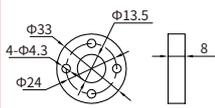
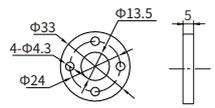
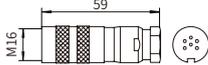
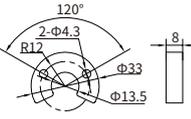
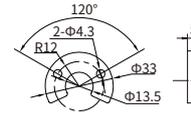
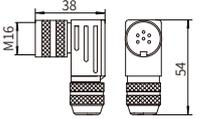
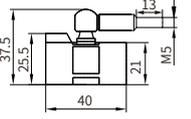
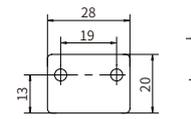


### • Dimensions and installation guidance of RPC aluminum profile sensor

RPC 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 line color definition in the following table for connection mode



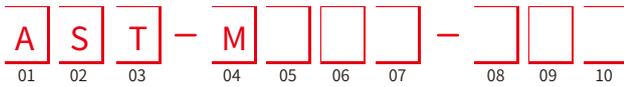
• 6-pin male connector arrangement (facing the sensor head)			
Pin	Line color 1*	Line color 2*	Pin/wire function definition
1	Blue	Grey	No. 1 magnet ring position signal(+)
2	Green	Pink	No. 1 magnet ring position signal(-)
3	Yellow	Yellow	No.2 magnet ring position (No.1 magnet ring speed) signal (+)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

• 8-pin male connector arrangement (facing the sensor head)		
Pin	Line color 3*	Pin/wire function definition
1	Yellow	Current output
2	Grey	0Vdc(Current/Voltage Loop)
3	Pink	Voltage/current
4	-	Reservation
5	Green	Voltage
6	Blue	0 Vdc (power supply circuit)
7	Brown	+24Vdc power supply (-20%~+20%)
8	White	Reservation

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



## M M Selection of Analog Cable Fittings



<b>01 - 03</b>	Type
A S T	Analog quantity
<b>04 - 07</b>	Cable length
M * * *	Less than 3-bit are preceded by zeros, and M means metric system, unit m
<b>08 - 10</b>	Cable type, outlet mode
H 0 1	One end of 6-pin (M16) female connector, and one end scattered
H 0 3	One end of 6-pin (M16) right angle female connector, and one end scattered
U 0 1	One end of 6-pin (M16) female connector, and one end scattered
U 0 2	One end of 8-pin (M16) female connector, and one end scattered
U 0 3	One end of 6-pin (M16) right angle female connector, and one end scattered
U 0 4	One end of 8-pin (M16) right angle female connector, and one end scattered
<b>Note</b>	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 interface cable, 5m long, PUR sheath, orange, -20~90°C, one end of the cable is a 6-pin (M16) right angle female connector, and one end scattered
- Selection example: AST-M010-U04  
Indicates: Analog interface cable, 10 meters long, PVC sheath, orange, -20 ~ 105°C, one end of the cable is a 8-pin (M16) right angle female connector, and one end scattered

# RHC/RPC Displacement Sensor - SSI Output



## Technical Characteristics

- Rugged and fully enclosed design
- Non-wear, non-contact measurement method
- Linear measurement, absolute output
- High resolution, up to 0.5 $\mu$ m
- Easy diagnosis, LEDs real-time condition monitoring
- Real-time induction and synchronous measurement
- Direct SSI signal output can directly replace encoder

## CC Product Parameters - SSI Output

### • Input

Measurement data	Position magnet ring
Stroke length	25~5500 mm, customized according to customer needs
Number of measurements	2

### • Output

Interface	SSI Synchronous Serial Interface					
Data Format	Binary or Gray code					
Data length	8~32bit					
Resolution	0.1/0.5 / 1 / 2 / 5 / 10 / 20 / 40/ 50 / 100 $\mu$ m					
Nonlinearity	< $\pm$ 0.01% of full scale, minimum $\pm$ 50 $\mu$ m					
Repetition accuracy	< $\pm$ 0.001% of full scale or the same resolution					
Transmission rate	50KBD~1MBD					
	line length	<3	<50	<100	<200	<400 (m)
	Rate	1000	<400	<300	<200	<100 (KBD)
Update time (High update rate)	Stroke:	300	750	1000	2000	5000 mm
	Frequency:	3.7	3.0	2.3	1.2	0.5 kHz
Update time (general)	1KHz (range $\leq$ 1m) 500Hz (1m < range $\leq$ 2m)					
	250Hz (2m < range $\leq$ 3m), customizable					
Hysteresis	<10 $\mu$ m					
Temperature coefficient	<15ppm/C					
Working mode	Asynchronous, Synchronous (Sync 1)					

### • Operating conditions

Magnet velocity	Arbitrary
Protection level	IP67RHC Stainless Stell Rod/IP65RPC Aluminum profile
Operating temperature	-40 $^{\circ}$ C ~ +85 $^{\circ}$ C
Humidity/dew point	Humidity 90%, no condensation
Shock index	GB/T2423.5 100g(6ms)
Vibration index	GB/T2423.10 15g/10~2000Hz
EMC Test	GB/T17626.2/3/4/6/8, Grade3/3/3/2/3, Class A, CE Certification

### • Structure and Materials

Failure indication	Electronic bin coverwith LEDs display	
RH Series	Electronic bin	Aluminum alloy
	Measuring rod	304 stainless steel
	Outer tube pressure	35MPa (continuous)/70MPa (peak value) (measuring rod diameter $\phi$ 10)
	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 $\times$ 1.5、 M20 $\times$ 1.5、 3/4"-16UNF-3A (customizable)	
Installation direction	Any direction, Threaded mounting (thread size optional)	
Outgoing mode	Cable outlet(Loose wire connection) or Connector(M16)	

### • Electrical Connections

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

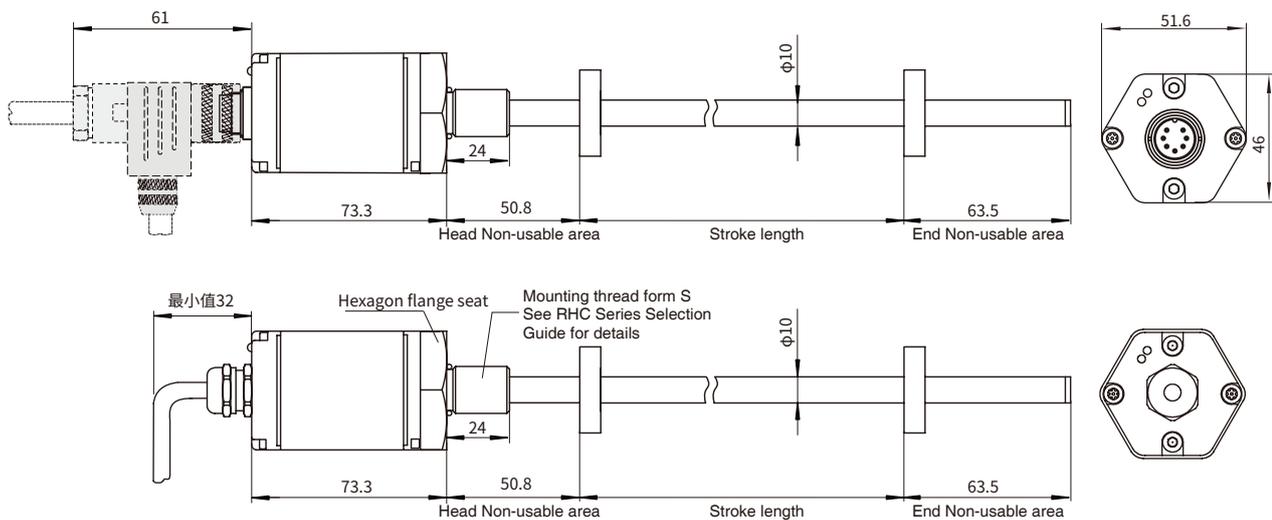
## A a Installation Instructions SSI Output

SSI output magnetostrictive linear displacement sensor provides synchronous serial signal output, which can convert the real-time position of vernier magnet into 24, 25 or 26-bit (binary or Gray code) data form, and transmit the data to the controller by serial communication after receiving the clock signal provided by the controller. The data format of SSI output is identical with absolute output encoder, and it can be connected directly with the function module of PLC, so it can be conveniently used to replace absolute encoder.

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

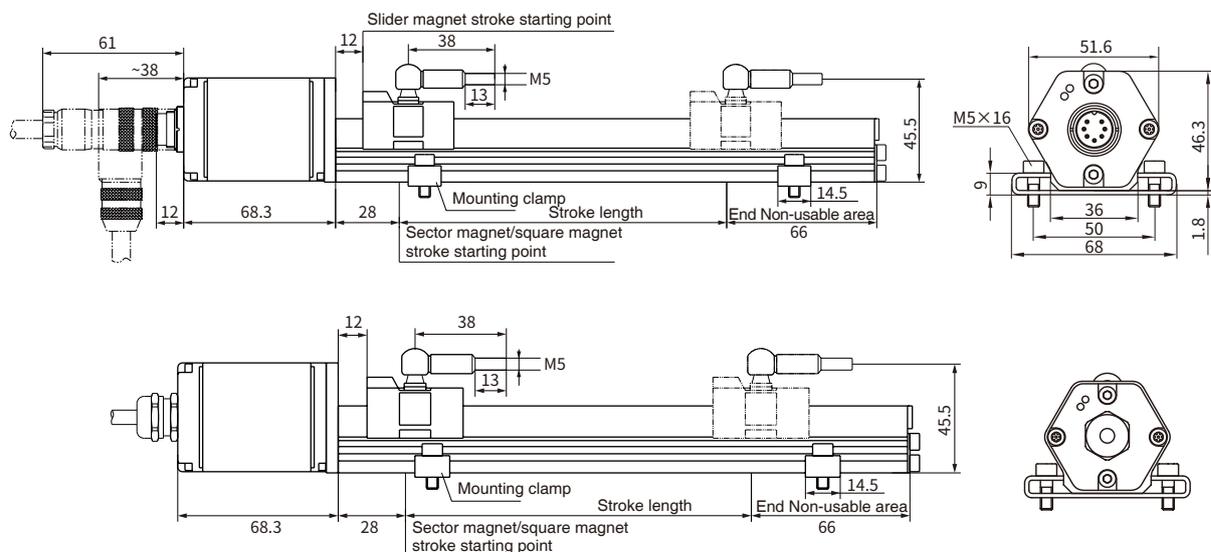
RHC series pressure-resistant rod shell, built-in installation design for hydraulic system, pressure-resistant 35MPa continuous, flexible and simple installation mode, mounting thread form M18×1.5 or M20×1.5 or 3/4" -16UNF-3A.

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.

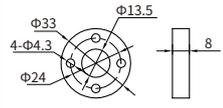
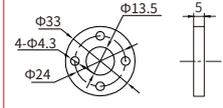
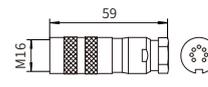
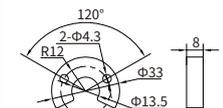
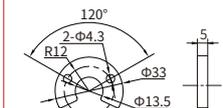
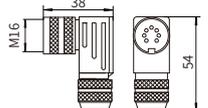
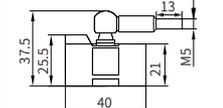
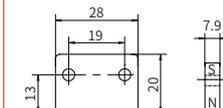


### • Dimensions and installation guidance of RPC aluminum profile sensor

RPC 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 - SSI Output

Accessory name/ model	Dimensions	Accessory name/ model	Dimensions	Accessory name/ model	Dimensions
Standard Magnet ring Order No.: 211501		Magnetic isolation gasket		7-pin Female Connector Order No.: 312703	
Sector magnet Order No.: 211502		Sector magnetic isolation gasket		7-pin 90 Female Connector Order No.: 312704	
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 connector output, refer to the pin definition in the following table for wiring mode; when the sensor is cable outlet output, refer to the line color definition in the following table for connection mode



#### • 7-pin male connector arrangement (facing the sensor head)

Pin	Line color 1*	Line color 2*	Pin/wire function definition
1	White	Grey	Data (-)
2	Yellow	Pink	Data (+)
3	Blue	Yellow	Clock (+)
4	Green	Green	Clock (-)
5	Red	Brown	+24Vdc power supply (-20%~+20%)
6	Black	White	0 Vdc
7	-	-	Do not connect

#### • 8-pin male connector arrangement (facing the sensor head)

Pin	Line color 3*	Pin/wire function definition
1	Yellow	Clock (+)
2	Grey	Data (+)
3	Pink	Clock (-)
4	-	Reservation
5	Green	Data (-)
6	Blue	0 Vdc (power supply circuit)
7	Brown	+24Vdc power supply (-20%~+20%)
8	White	Reservation

Note: \* Line color 1: cable PUR sheath, orange, -20~90℃  
\* Line color 2/3: Cable PVC sheath, orange, -20~105℃

## C Selection Guide - SSI Output



### 01 - 03 Sensor shell form

R	H	C	Pressure-resistant rod (internal or external)
R	P	C	Aluminum molded shell (external only)

### 04 - 08 Measuring range

Four-bit, less than four-bit are preceded by zero, M means metric system, unit mm

### 09 - 10 Magnet ring type/mounting thread form

Only for RHC Series	S	1	M 18 × 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
	T	1	M18X1.5, measuring rod diameter 8mm, 304 material
	T	2	M20X1.5, measuring rod diameter 8mm, 304 material
	T	3	3/4 "-16UNF-3A, measuring rod diameter 8mm, 304 material
Only for RPC Series	C	1	Sector magnet
	C	2	Slider magnet ring
	C	3	Square magnet

### 11 - 14 Connection form

#### 11- 12 Outgoing line type: straight-out cable mode

D	H	PUR sheath, orange, -20 ~ 90°C, end scattered, cable color 1
D	U	PVC sheath, orange, -20~105°C, loose wire at the end, cable color 2
D	B	PVC sheath, orange, -20 ~ 105°C, end scattered, cable color 3
D	I	PUR sheath, orange, -20 ~ 90°C, end 7-pin connector
D	V	PVC sheath, orange, -20 ~ 105°C, end 7-pin connector
D	C	PVC sheath, orange, -20 ~ 105°C, end 8-pin connector

#### 13 - 14 Cable outlet mode: cable length, 01 ~ 99 meters

#### 11 - 14 Connector form

P	H	7	0	M16 male plug (7 pins)
---	---	---	---	------------------------

**Note:** See SSI cable fittings selection for supporting cables

### 15 - 22 Signal output mode

15	S	SS1
16	1	Position
17	0	Standard

### 18 Data length

1	24bit	2	25bit	3	26bit *
* 26-bit are parity bits and 25-bit are status bits					

### 19 Data format

B	Binary	G	Gray code
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### 20 Resolution

1	0.1mm	2	0.05mm
3	0.02mm	4	0.01mm
5	0.005mm	6	0.002mm
7	0.001mm	8	0.04mm
9	0.0005mm	0	0.0001mm

### 21 Direction

0	Forward	1	Reverse
---	---------	---	---------

### 22 model

0	asynchronous	1	Synchronization 1	2	High response asynchronous
---	--------------	---	-------------------	---	----------------------------

### 23 - 24 Non-usable area at head and end, customizable

S	0	50.8mm+63.5mm
B	0	30mm+60mm
S	1	28mm+66mm (used in RPC series)

### 25-26 Country

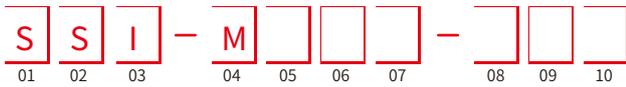
Refer to the country list, page 23.	
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• **Note:** The forward output of the sensor means that when the magnet ring moves away from the electronic bin, the output value increases and decreases when the magnet ring moves in the reverse direction.

• **Selection example:** RHC-M0300-S1-PH70-S101B700-S0

Indicates: RHC rod structure series, 30 mm effective stroke, M 18 X 1.5 mounting thread, measuring rod diameter 10 mm, 304 material, connector outlet form, no cable plug, SSI protocol output (position output, data length 24 bits, data format binary, resolution 0.001 mm, forward output, asynchronous mode), head non-usable area 50.8 mm, end non-usable area 63.5 mm.

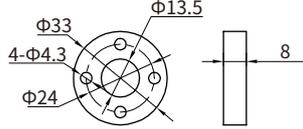
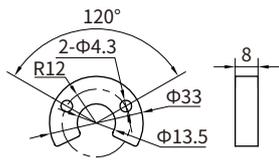
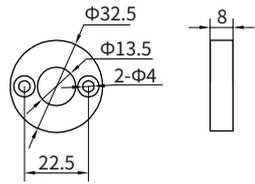
## SS SSI Cable accessories selection Guide



01 - 03		Type	
S	S	I	SSI interface
04 - 07		Cable length	
M	*	* * *	Less than 3 digits are preceded by zeros, and M means metric system, unit m
08 - 10		Cable type, outlet mode	
H	0	1	One end of 7-pin (M16) is female connector, and one end scattered
H	0	3	One end of 7-pin (M16) right angle female connector, and one end scattered
U	0	1	One end of 7-pin (M16) is female connector, and one end scattered
U	0	2	One end of 8-pin (M16) is female connector, and one end scattered
U	0	3	One end of 7-pin (M16) right angle female connector, and one end scattered
U	0	4	One end of 8-pin (M16) right angle female connector, and one end scattered
Note		H: Cable type, PURsheath, orange, -20~90 C	
		U: Cable type, PVC sheath, orange, -20~105 C	

- Selection example: SSI-M005-H01  
Indicates: SSI interface cable, cable length 5 meters, PURsheath, orange, -20~90 C, one end of the cable is 7-pin (M16) female connector, and one end scattered.
- Selection example: SSI-M010-U04  
Indicates: SSI 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.

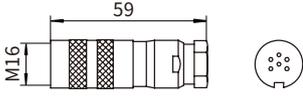
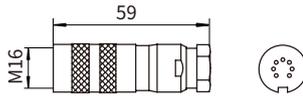
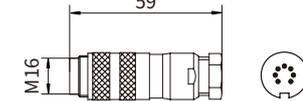
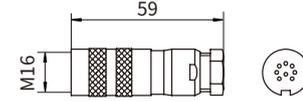
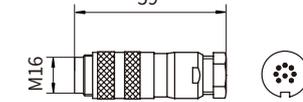
# Magnet ring Selection

Accessory name/model	Dimensions	Description/application
 <p>Standard magnet ring Kit Order No.: 288501</p>		<p>Magnetic insulation gasket: size same as magnet ring, thickness 5mm Screw: GB/T70.1, M4X18, Material 304 Spring gasket: GB/T 93, Φ 4, Material 304 Includes: 1 Magnet, 1 gasket, 4 screws with spring washer Application: RHC/RF/FBGB/RS/RD/RB</p>
 <p>Sector magnet kit Order No.: 288502</p>		<p>Magnetic insulation gasket: size same as magnet ring, thickness 5mm Screw: GB/T70.1, M4X18, Material 304 Spring gasket: GB/T 93, Φ4, Material 304 Includes: 1 Magnet, 1 gasket, 2 screws with spring washer Application: RPC</p>
 <p>Weak magnet Magnet ring 32 kit Order No.: 288519</p>		<p>Magnetic insulation gasket: size same as magnet ring, thickness 5mm Screw: GB/T70.1, M4X20, Material 304 Spring gasket: GB/T93, Φ4, material 304 Includes: 1 Magnet, 1 gasket, 2 screws with spring washer Application: RHC/RF/FBGB/RS/RD/RB</p>

# Cable Selection

Accessory name/model	Dimensions	Application
 <p>Standard Cable (H) Order No.: 511802</p>	<p>3P×0.25mm<sup>2</sup>; Φ7.2mm Conductor: 6-core, red/black, blue/green, yellow/white Sheath: Orange, PUR Shielding layer: tinned copper wire mesh + aluminum foil Application characteristics: soft, oil resistance and bending resistance Temperature: (-20~90℃)</p>	<p>Interface: Analog/SSI Interface/Start/Stop Structure: RHC/PC/RF/FBGB/RS/RB/RD</p>
 <p>Orange European Standard Cable (U) Order No.: 511807</p>	<p>7×0.25mm<sup>2</sup>; Φ7mm Conductor: 7-core, white/brown/green/yellow/gray/pink/blue Sheath: Orange, modified PVC Shielding layer: tinned copper wire mesh + aluminum foil Application characteristics: Extremely soft, oil resistance, bending resistance, high temperature resistance compliant with European colour code Temperature: (-20~105℃)</p>	<p>Interface: Analog/SSI Interface/Start/Stop Structure: RHC/PC/RF/FBGB/RS/RB/RD</p>

# Connector Selection

Accessory name/model	Dimensions	Application
 Six-pin female connector female Order No.: 312701		 Analog
 Seven-pin female connector Order No.: 312703		 SSI
 Seven-pin male connector Order No.: 312718		 SSI
 Eight-pin female connector Order No.: 312720		 SSI
 Eight-pin male connector Order No.: 312721		 SSI/Analog

**Note:** Please contact other accessories such as magnet rings, connectors and cables of other specifications!

# Industrial Application



**Metallurgical industry**



**Port machinery**



**Hydraulic machinery**



**Wind power industry**



**Injection molding machinery**



**Vulcanizing machinery**



**Die casting machinery**



**Vertical mill machinery**



**Construction machinery**



**Papermaking machinery**



**Liquid level tank**



**Forming machinery**

## Country list

- AF - Afghanistan 阿富汗  
AL - Albania 阿尔巴尼亚  
DZ - Algeria 阿尔及利亚  
AS - American Samoa 东萨摩亚  
AD - Andorra 安道尔  
AO - Angola 安哥拉  
Av - Anguilla 安圭拉岛  
AQ - Antarctica 南极洲  
AG - Antigua and Barbuda 安提瓜和巴布达  
AR - Argentina 阿根廷  
AM - Armenia 亚美尼亚  
AA - Aruba 阿鲁巴  
AU - Australia 澳大利亚  
AT - Austria 奥地利  
AZ - Azerbaijan 阿塞拜疆
- BF - Bahamas 巴哈马  
BH - Bahrain 巴林  
BB - Barbados 巴巴多斯  
BD - Bangladesh 孟加拉  
BY - Belarus 白俄罗斯  
BE - Belgium 比利时  
BZ - Belize 伯里兹  
BJ - Benin 贝宁  
BM - Bermuda 百慕大  
BS - Bahamas 巴哈马  
BT - Bhutan 不丹  
BW - Botswana 博茨瓦纳  
BO - Bolivia 玻利维亚  
BA - Bosnia and Herzegovina 波黑  
BV - Bouvet Island 布韦岛  
BR - Brazil 巴西  
IO - British Indian Ocean Territory 英属印度洋领地  
BN - Brunei Darussalam 文莱布鲁萨兰  
BG - Bulgaria 保加利亚  
BF - Burkina Faso 布基纳法索  
BI - Burundi 布隆迪
- KH - Cambodia (Internet) 柬埔寨  
CB - Cambodia (CIA World Fact Book) 柬埔寨  
CM - Cameroon 喀麦隆  
CA - Canada 加拿大
- CV - Cape Verde 佛得角  
KY - Cayman Islands 开曼群岛  
CF - Central African Republic 中非  
TD - Chad 乍得  
CL - Chile 智利  
CN - China 中国  
CX - Christmas Island 圣诞岛  
CC - Cocos (Keeling) Islands 可可斯群岛  
CO - Colombia 哥伦比亚  
KM - Comoros 科摩罗  
CG - Congo 刚果  
CD - Congo, Democratic Republic 刚果  
CK - Cook Islands 库克群岛  
CR - Costa Rica 哥斯达黎加  
CI - Cote D'Ivoire (Ivory Coast) 象牙海岸  
HR - Croatia (Hrvatska) 克罗地亚  
CU - Cuba 古巴  
CY - Cyprus 塞浦路斯  
CZ - Czech Republic 捷克  
CS - Czechoslovakia (former) 捷克斯洛伐克
- DK - Denmark 丹麦  
DJ - Djibouti 吉布提  
DM - Dominica 多米尼加共和国  
DO - Dominican Republic 多米尼加联邦
- TP - East Timor 东帝汶  
EC - Ecuador 厄瓜多尔  
EG - Egypt 埃及  
SV - El Salvador 萨尔瓦多  
GQ - Equatorial Guinea 赤道几内亚  
ER - Eritrea  
EE - Estonia 爱沙尼亚  
ET - Ethiopia 埃塞俄比亚
- FK - Falkland Islands (Malvinas) 福兰克群岛  
FO - Faroe Islands 法罗群岛  
FJ - Fiji 斐济  
FI - Finland 芬兰  
FR - France 法国  
FX - France, Metropolitan  
GF - French Guiana 法属圭亚那  
PF - French Polynesia 法属玻里尼西亚

TF - French Southern Territories 法国南部  
领地  
MK - F.Y.R.O.M. (Macedonia)

GA - Gabon 加蓬  
GM - Gambia 冈比亚  
GE - Georgia 格鲁吉亚  
DE - Germany 德国  
GH - Ghana 加纳  
GI - Gibraltar 直布罗陀  
GB - Great Britain (UK) 英国  
GR - Greece 希腊  
GL - Greenland 格陵兰岛  
GD - Grenada 格林纳达  
GP - Guadeloupe 法属德洛普群岛  
GU - Guam 关岛  
GT - Guatemala 危地马拉  
GN - Guinea 几内亚  
GW - Guinea-Bissau 几内亚比绍  
GY - Guyana 圭亚那

HT - Haiti 海地  
HM - Heard and McDonald Islands 赫德和  
麦克唐纳群岛  
HN - Honduras 洪都拉斯  
HK - Hong Kong 中国香港特区  
HU - Hungary 匈牙利

IS - Iceland 冰岛  
IN - India 印度  
ID - Indonesia 印度尼西亚  
IR - Iran 伊朗  
IQ - Iraq 伊拉克  
IE - Ireland 爱尔兰  
IL - Israel 以色列  
IT - Italy 意大利

JM - Jamaica 牙买加  
JP - Japan 日本  
JO - Jordan 约旦

KZ - Kazakhstan 哈萨克斯坦  
KE - Kenya 肯尼亚  
KI - Kiribati 基里巴斯

KP - Korea (North) 朝鲜  
KR - Korea (South) 韩国  
KW - Kuwait 科威特  
KG - Kyrgyzstan 吉尔吉斯斯坦

LA - Laos 老挝  
LV - Latvia 拉托维亚  
LB - Lebanon 黎巴嫩  
LI - Liechtenstein 列支顿士登  
LR - Liberia 利比里亚  
LY - Libya 利比亚  
LS - Lesotho 莱索托  
LT - Lithuania 立陶宛  
LU - Luxembourg 卢森堡

MO - Macau 中国澳门特区  
MG - Madagascar 马达加斯加  
MW - Malawi 马拉维  
MY - Malaysia 马来西亚  
MV - Maldives 马尔代夫  
ML - Mali 马里  
MT - Malta 马耳他  
MH - Marshall Islands 马绍尔群岛  
MQ - Martinique 法属马提尼克群岛  
MR - Mauritania 毛里塔尼亚  
MU - Mauritius 毛里求斯  
YT - Mayotte

MX - Mexico 墨西哥  
FM - Micronesia 密克罗尼西亚  
MC - Monaco 摩纳哥  
MD - Moldova 摩尔多瓦  
MA - Morocco 摩洛哥  
MN - Mongolia 蒙古  
MS - Montserrat 蒙塞拉特岛  
MZ - Mozambique 莫桑比克  
MM - Myanmar 缅甸

NA - Namibia 纳米比亚  
NR - Nauru 瑙鲁  
NP - Nepal 尼泊尔  
NL - Netherlands 荷兰  
AN - Netherlands Antilles 荷属安德列斯  
NT - Neutral Zone 中立区(沙特-伊拉克间)  
NC - New Caledonia 新卡里多尼亚

NZ - New Zealand (Aotearoa) 新西兰  
NI - Nicaragua 尼加拉瓜  
NE - Niger 尼日尔  
NG - Nigeria 尼日利亚  
NU - Niue 纽爱  
NF - Norfolk Island 诺福克岛  
MP - Northern Mariana Islands 北马里亚纳群岛  
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PK - Pakistan 巴基斯坦  
PW - Palau 帕劳  
PA - Panama 巴拿马  
PG - Papua New Guinea 巴布亚新几内亚  
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PE - Peru 秘鲁  
PH - Philippines 菲律宾  
PN - Pitcairn 皮特克恩岛  
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QA - Qatar 卡塔尔  
  
RE - Reunion 法属尼留旺岛  
RO - Romania 罗马尼亚  
RU - Russian Federation 俄罗斯  
RW - Rwanda 卢旺达  
  
GS - S. Georgia and S. Sandwich Isls.  
KN - Saint Kitts and Nevis 圣基茨和尼维斯  
LC - Saint Lucia 圣卢西亚  
VC - Saint Vincent and the Grenadines 圣文森特和格陵纳丁斯  
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SM - San Marino 圣马力诺  
ST - Sao Tome and Principe 圣多美和普林西比  
SA - Saudi Arabia 沙特阿拉伯  
SN - Senegal 塞内加尔  
SC - Seychelles 塞舌尔  
SL - Sierra Leone 塞拉利昂  
  
SG - Singapore 新加坡  
SI - Slovenia 斯洛文尼亚  
SK - Slovak Republic 斯洛伐克  
Sb - Solomon Islands 所罗门群岛  
SO - Somalia 索马里  
ZA - South Africa 南非  
ES - Spain 西班牙  
LK - Sri Lanka 斯里兰卡  
SH - St. Helena  
PM - St. Pierre and Miquelon 圣皮埃尔和密克隆群岛  
SD - Sudan 苏丹  
SR - Suriname 苏里南  
SJ - Svalbard and Jan Mayen Islands 斯瓦尔巴特和扬马延岛  
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TH - Thailand 泰国  
TG - Togo 多哥  
TK - Tokelau 托克劳群岛  
TO - Tonga 汤加  
TT - Trinidad and Tobago 特立尼达和多巴哥  
TN - Tunisia 突尼斯  
TR - Turkey 土耳其  
TM - Turkmenistan 土库曼斯坦  
TC - Turks and Caicos Islands 特克斯和凯科斯群岛  
TV - Tuvalu 图瓦卢  
  
UG - Uganda 乌干达  
UA - Ukraine 乌克兰  
AE - United Arab Emirates 阿联酋  
UK - United Kingdom 英国  
US - United States 美国  
UM - US Minor Outlying Islands 美国海外领地  
UY - Uruguay 乌拉圭

SU - USSR (former) 前苏联  
UZ - Uzbekistan 乌兹别克斯坦

VU - Vanuatu 瓦努阿鲁  
VA - Vatican City State (Holy See) 梵蒂岗  
VE - Venezuela 委内瑞拉  
VN - Viet Nam 越南  
VG - Virgin Islands (British) 英属维京群岛  
VI - Virgin Islands (U.S.) 美属维京群岛

WF - Wallis and Futuna Islands 瓦里斯和福图纳群岛  
EH - Western Sahara 西撒哈拉

YE - Yemen 也门  
YU - Yugoslavia 南斯拉夫

ZM - Zambia 赞比亚  
(ZR - Zaire) - See CD Congo, Democratic Republic 扎伊尔  
ZW - Zimbabwe 津巴布韦

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