RS Waterproof Displacement Sensor

Technical Characteristics

Non-wear, non-contact measurement method Rugged and fully enclosed design
Linear measurement, absolute position output Low power consumption design effectively reduces system heating
Sealing grade up to IP67
Multiple signal type optional：Analog、SSI、CANopen、Start/Stop

Product Parameters

• Input

Measurement data	Position Magnet ring
Stroke length	50mm~5500mm，customized according to customer's needs
Number of measurements	1

• Output

Interface	Analog、SSI、CANopen、Start/Stop
Resolution	Analog: 16-bit D/A or 0.0015% of full scale (min. 1μm) Bital quantity:0.5 / 1 / 2 / 5 / 10 / 20 / 40 / 50 / 100 μm
Nonlinearity	< ± 0.01% of full scale, Min. ±50μm
Repetition accuracy	< ± 0.001% of full scale, Min. ± 1μm
Hysteresis	＜10um
Update time	1KHz（range≤1m） 500Hz（1m＜range≤2m） 250Hz（2m＜range≤3m），customizable
Temperature coefficient	＜30ppm/℃

• Working conditions

Magnet ring velocity	Arbitrary
Protection level	IP68
Operating temperature	-40℃ ~ +105℃
Humidity/dew point	Humidity100%，relative humidity
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

• Electrical connection

Input voltage	Normal:+24Vdc±20% Wide voltage: 9Vdc~28.8Vdc
operating current	＜90mA（ varying with range）
Polarity protection	Max.-30Vdc
Overpressure protection	Max.36Vdc
Insulation resistance	＞10MΩ
Insulation strength	500V

• Structure and materials

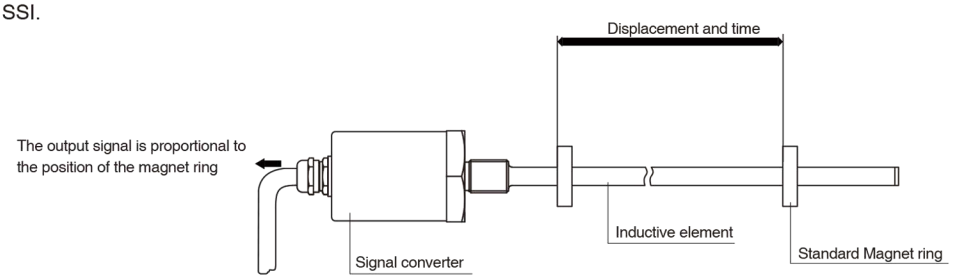
Electronic bin	304 stainless steel, or 316L according to customer requirements
Measuring rod	304 stainless steel, or 316L according to customer requirements
Outer tube pressure	35MPa (continuous)/70MPa (peak) or 350bar (continuous)/700bar (peak)
Position magnet	Standard Magnet ring and various magnet rings
Mounting thread form	M18×1.5、 M20×1.5、3/4"-16UNF-3A（customizable）
Installation direction	Any direction
Cable outlet mode	Cable outlet

A a Installation and Use Instructions

Output characteristic

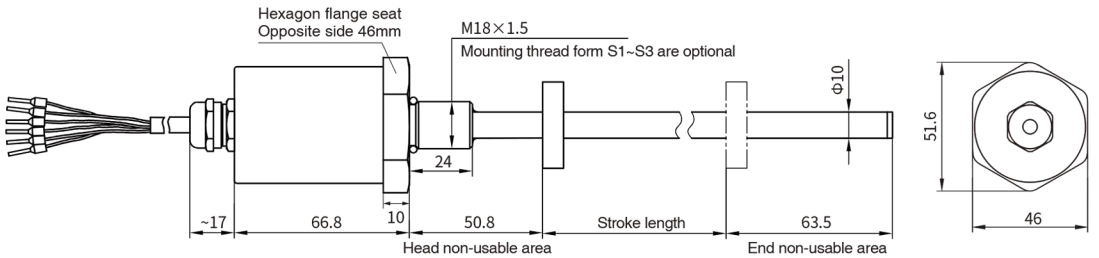
RS series sensors have strong protective shell, which is durable and can provide users with continuous, reliable and real-time displacement signals in harsh environment. The sensor is completely sealed with stainless steel shell, which fully meets the protection level IP68. Note: The electronic compartment is not detachable.

Because of the non-contact measurement technology, the sensor can be integrated in an isolated and sealed shell. The position magnet moves along the measuring rod, and the position can be measured without mechanical contact. For liquid level measurement, an alternative float can be used. The sensor with high protection level shell is easy to install and use, so as to better meet the application requirements. The measurement accuracy and all technical parameters depend on the output characteristics of the selected sensor, and the interface form can be selected: analog or SSI.



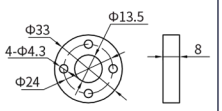
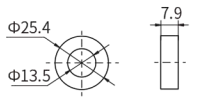
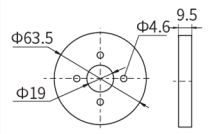
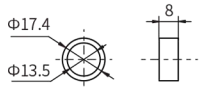
Installation dimensions of RS waterproof sensor

RS Series super protective Sensor, designed for cylinder built-in installation in harsh environment, withstands pressure of 35MPa for continuous, flexible and simple installation mode, and mounting thread form M18×1.5 or M20×1.5 or 3/4"-16UNF-3A.



Note: It is equipped with standard Magnet ring kit 288501, with magnetic isolation gasket and fixing screw.

C c Commonly Used Accessories

Accessory name/ model	Dimensions	Accessory name/ model	Dimensions	Accessory name/ model	Dimensions
Standard Magnet ring Order No.: 211501		Magnet ring Order No.: 211506		Enlarge magnet ring Order No.: 211504	
Magnet ring Order No.: 211507					

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

X x Selection Guide-Analog

R	S	–	M					–	S		–	D				–					–		
01	02		03	04	05	06	07		08	09		10	11	12	13		14	15	16	17		18	19

01 - 02 Sensor shell form

R S	Pressure-resistant pipe

03 - 07 Measuring range

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

08 - 09 Magnet ring type/mounting thread form

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

10 - 13 Connection form

10 - 11 Cable outlet mode

D H	PUR sheath, orange,-20~90℃, end scattered, cable color 1
D U	PVC sheath, orange,-20~105℃, end scattered, cable color 2
D B	PVC sheath, orange,-20~105℃, end scattered, c able color 3
D I	PUR sheath, orange,-20~90℃, end 6-pin connector
D V	PVC sheath, orange,-20~105℃, end 6-pin connector
D C	PVC sheath, orange,-20~105℃, end 8-pin connector

12 - 13 Cable outlet mode: cable length, 01~99 meters

10 - 13 Connector mode

P H 6 0	M16 male connector (6 pins)
P B 8 0	M16 male connector (8 pins)

Note: For supporting cables, please refer to Analog/Start-Stop Cable Accessories Selection

14 - 17 Signal output mode

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 ring

1	Single magnet ring

17 No magnet ring state

A	Keep the original value
B	Max. value
C	Min. value

18 - 19 Non-usable area at head and end, customizable

S 0	50.8mm+63.5mm
B 0	30mm+60mm

- 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 examples: RS-M0300-S1-DU02-V01B-S0

  Indicates: the installation mode of the ordered product is built-in waterproof steel structure, the stroke length is 300mm, the thread is M18×1.5, the measuring rod diameter is 10mm, the material is 304, cable outlet, cable length is 2 meters (PVC sheath, orange,-20~105℃, the end is scattered), the output is 0-10V, the output value of No Magnet ring is the Max., and the single Magnet ring is forward

Selection Guide-SSI

R	S	–	M					–			–					–	S						–		
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 S	Pressure-resistant pipe

03 - 07 Measuring range

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

08 - 09 Magnet ring type/mounting thread form

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

10 - 13 Connection form

10 - 11 Cable outlet mode

D H	PUR sheath, orange,-20~90℃, end scattered, cable color 1
D U	PVC sheath, orange,-20~105℃, end scattered, cable color 2
D B	PVC sheath, orange,-20~105℃, end scattered, cable color 3
D I	PUR sheath, orange,-20~90℃, end 6-pin connector
D V	PVC sheath, orange,-20~105℃, end 6-pin connector
D C	PVC sheath, orange,-20~105℃, end 8-pin connector

12 - 13 Cable outlet mode: cable length, 01~99 meters

10 - 13 Connector mode

P H 7 0	M16 male connector (7 pins)
P B 8 0	M16 male connector (8 pins)

Note: For supporting cables, please refer to the Guide for Selection of Cable Accessories

14 - 19 Signal output mode

15 Data length

1	24bit	2	25bit	3	26bit *

* 26-bit are parity bits and 25-bit are status bits

16 Data format

B	Binary	G	Gray code

17 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

18 Direction

0	Forward	1	Reverse

19 Mode

0	Regular	1	Synchronization	2	High update rate

20 - 21 Non-usable area at head and end, customizable

S 0	50.8mm+63.5mm
B 0	30mm+60mm

XX Selection Guide-CAN Bus

R	S	–	M					–			–					–	C					–		
01	02		03	04	05	06	07		08	09		10	11	12	13		14	15	16	17	18		19	20

01 - 02 Sensor shell form

RS	Pressure-resistant pipe

03 - 07 Measuring range

Four digits, less than four digits are preceded by zero. M means metric system, unit mm

08 - 09 Magnet ring type/mounting thread form

S1	M18×1.5，measuring rod diameter 10mm, 304 material
S2	M20×1.5，measuring rod diameter 10mm, 304 material
S3	3/4"-16UNF-3A，measuring rod diameter 10mm, 304 material

10 - 13 Connection form

10 - 11 Cable outlet mode

DA	PVC sheath, purple, 4 cores, -40℃~75℃, end scattered

12 - 13 Cable outlet mode: cable length, 01~99 meters

0DR1	PVC sheath, length 150mm, end 5-pin male connector

10 - 13 Connector mode

PD60	Set of 6-pin male connector (M16)

Note: For supporting cables, please refer to CAN bus cable Accessories selection

14 - 18 Signal output mode

14 Interface

C	CAN bus

15 Protocol type

1	CANopen	2	CANBasic

16 Baud

1	1000kBit/s	2	800kBit/s
3	500kBit/s	4	250kBit/s
5	125kBit/s	6	100kBit/s
7	50kBit/s	8	20kBit/s

17 Resolution

1	0.1mm	2	0.05mm
3	0.02mm	4	0.01mm
5	0.005mm	6	0.002mm
7	0.001mm		

18 Number of Magnet rings (1~9 optional)

19 - 20 Non-usable area at head and end, customizable

S0	50.8mm+63.5mm
B0	30mm+60mm

XX Selection Guide-Start/Stop Output

R	S	–	M					–			–			–					–	R				–		
01	02		03	04	05	06	07		08	09		10	11	12	13					14	15	16	17		18	19

01 - 02 Sensor shell form

R S	Pressure-resistant pipe

03 - 07 Measuring range

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

08 - 09 Magnet ring type/mounting thread form

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

10 - 13 Connection form

10 - 11 Cable outlet mode

D H	PUR sheath, orange,-20~90℃, end scattered, cable color 1
D U	PVC sheath, orange,-20~105℃, end scattered, cable color 2
D B	PVC sheath, orange,-20~105℃, end scattered, cable color 3
D I	PUR sheath, orange,-20~90℃, end 6-pin connector
D V	PVC sheath, orange,-20~105℃, end 6-pin connector
D C	PVC sheath, orange,-20~105℃, end 8-pin connector

12 - 13 Cable length, 01~99 units: m, (Cable outlet mode)

10 - 13 Cable outlet mode

0 D R	cable outlet first and end with plastic connector
0 D R 2	Scattered wire with plastic connector 65 mm
0 D R 3	Scattered wire with plastic connector 170 mm
0 D R 4	Scattered wire with plastic connector 230 mm
0 D R 5	Scattered wire with plastic connector 350 mm

10 - 13 Connector mode

P H 6 0	M16 male connector (6 pins)
P B 8 0	M16 male connector (8-pin)

Note: For supporting cables, please refer to Analog/Start-stop Cable Accessories Selection

14 - 17 Signal output mode

15 Input voltage

1	+ 24Vdc （ - 20% ~ + 20% ）
2	+ 9 ~ 28.8Vdc

16 - 17 Output signal

0 1	Start/Stop，multi-Magnet

18 - 19 Non-usable area at head and end, customizable

S 0	50.8mm+63.5mm
B 0	30mm+60mm

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 cable output, refer to the cable color definition in the following table for connection mode

Analog

• Pin arrangement of six-pin male connector (facing the sensor head)

Pin	Cable color 1*	Cable color 2*	Pin/wire function definition
1	Blue	Grey	No.1 Magnet position signal(+)
2	Green	Pink	Position signal of No.1 Magnet(-)
3	Yellow	Yellow	Reservation
4	White	Green	Reservation
5	Red	Brown	+24Vdc power supply (-20%~+20%)
6	Black	White	0 Vdc (power supply circuit)

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

Analog

• Pin arrangement of eight-pin male connector (facing the sensor head direction)

Pin	Cable color3*	Pin/wire function definition
1	Yellow	Current output
2	Grey	0Vdc(Current/Voltage Loop)
3	Pink	Reservation
4	-	Reservation
5	Green	0...10V
6	Blue	0 Vdc (power supply circuit)
7	Brown	+24Vdc power supply (-20%~+20%)
8	White	Reservation

SSI

• Pin arrangement of seven-pin male connector (facing the sensor head)

Pin	Cable color 1*	Cable 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

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

SSI

• Pin arrangement of eight-pin male connector (facing the sensor head direction)

Pin	Cable color3*	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

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 cable output, refer to the cable color definition in the following table for connection mode

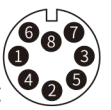
Start/Stop Output

- 6-pin male connector arrangement (facing the sensor head)

Pin	Line color 1*	Line color 2*	Pin/wire function definition
1	Blue	Grey	Stop (-)
2	Green	Pink	Stop (+)
3	Yellow	Yellow	Start (+)
4	White	Green	Start (-)
5	Red	Brown	+24Vdc power supply (-20%~+20%)
6	Black	White	0 Vdc(power supply circuit)

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

Start/Stop Output



- Pin arrangement of eight-pin male connector (facing the sensor head direction)

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

CAN bus output

- Pin arrangement of six-pin male connector (facing the sensor head)

Pin	Cable color	Pin/wire function definition
1	Green	CAN (-)
2	Yellow	CAN (+)
3	-	Do not connect
4	-	Do not connect
5	Brown	+24Vdc power supply (-20%~+20%)
6	White	0 Vdc (power supply circuit)