RF Flexible Outer Tube Displacement Sensor

Technical Characteristics

- Suitable for long-stroke cylinder applications
- Easy to diagnose, LED indicator status indication
- Not limited by installation space
- Non-wear, non-contact measurement method
- Rugged and fully enclosed design
- Linear measurement, absolute value output
- Curly packaging saves space, packaging and transportation costs
- Direct displacement output: Analog, SSI, Profibus-DP, CANopen, Start/Stop, Profinet, EtherCAT

Product Parameters

• Input

Measurement data	Position magnet
Stroke length	500~7620mm，customized according to customer needs，Up to 23 meters
Number of measurements	1~9

• Output

Interface	EtherCAT
Resolution	1 ~ 100 μm，adjustable
Nonlinearity	<±0.01% of full scale, minimum ±50μm
Repetition accuracy	<±0.001% of full scale, min. 1μm
Hysteresis	＜10μm
Update time	1KHz（range≤1m） 500Hz（1m＜range≤2m） 250Hz（2m＜range≤3m），customizable
Temperature coefficient	＜30ppm/℃

• Operating conditions

Magnet velocity	Arbitrary
Protection level	IP65（When combined with pressure-resistant outer tube，the protection level can reach IP67）
Operating temperature	-40℃ ~ +85℃（up to105℃）
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

• Electrical connection

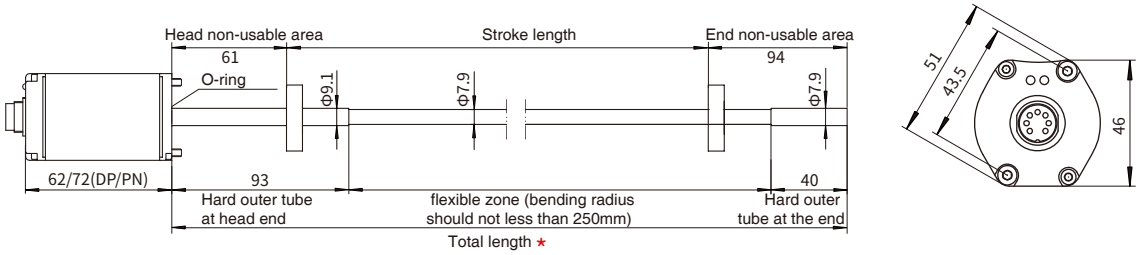
Input voltage	+24Vdc±20%
operating current	＜90mA（ varying with range）
Polarity protection	Max.-30Vdc
Overvoltage protection	Max.36Vdc
Insulation resistance	＞10MΩ
Insulation strength	500V

• Structure and materials

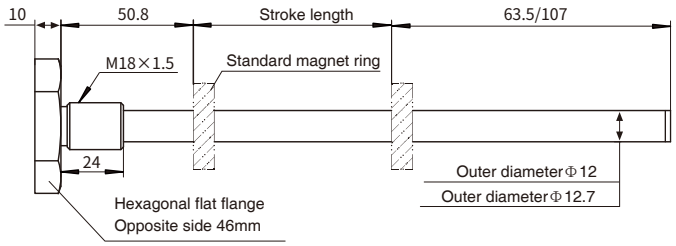
Failure indication	Electronic bin cover with LEDs display
Electronic bin	Aluminum alloy
Measuring rod	Stainless steel hose, minimum bending radius 250mm, shipping radius 400mm
Position magnet	Standard magnet ring and various ring magnets
Installation direction	Any direction
Outgoing mode	Cable outlet or Connector

Aa Installation and Use Instructions

• Dimensions of RF flexible outer tube sensor



★ <7620mm，deviation0~+8mm； >7620mm，deviation-5~+15mm。（Total length deviation has no effect on Stroke length）



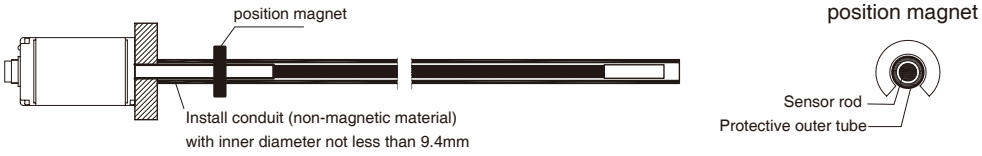
Option: Pressure-resistant outer pipe with flange, outer diameter 12mm/12.7mm

The flanged pressure-resistant outer pipe is used to cooperate with RF flexible sensor, which can withstand 35MPa pressure for hydraulic cylinder and provide protection for RF sensor. For large Cylinder, it is necessary to drill a ϕ18mm deep hole in the piston rod when selecting the pressure pipe with 12mm outer diameter, which can match our magnet ring with large inner diameter.

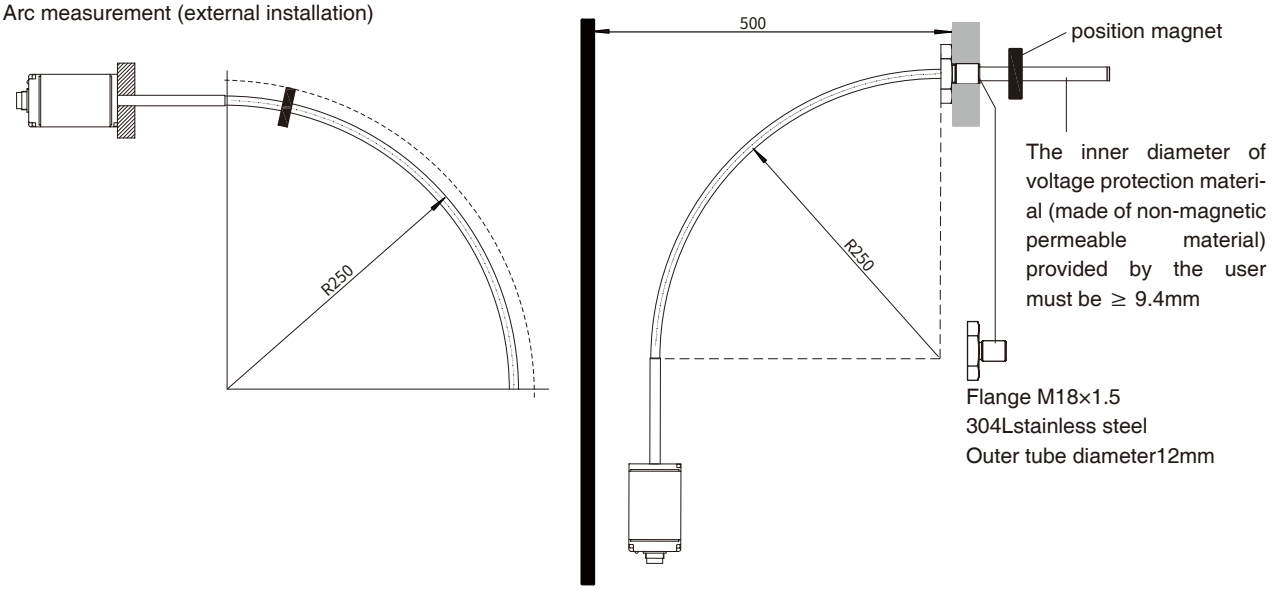
• Installation instruction of RF flexible outer tube sensor

Two non-magnetic bolts are required for the installation of the sensor electronic bin. Long-stroke sensors need non-magnetic tube support (inner diameter ≥ 9.4), or bend into the desired shape. Sensors with hexagonal flanges can be easily mounted using non-magnetic bolts. Or you can choose a flanged pressure-resistant outer pipe with an outer diameter of 12mm, with a maximum stroke of 7620mm.

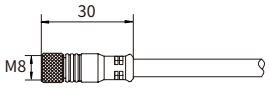
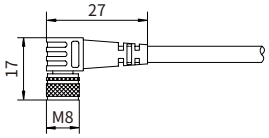
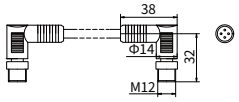
Linear measurement (external installation)

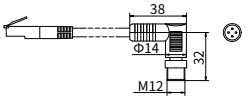
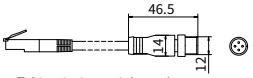
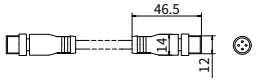


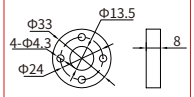
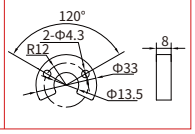
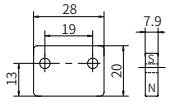
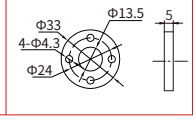
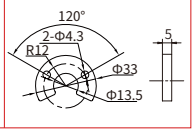
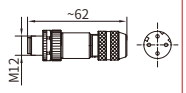
Arc measurement (external installation)



Common Accessories-EtherCAT Output

Accessory name/ model	Dimensions
Female Connector (for power supply) Order No.: 522000-xx (xx- cable length, unit m)	
4-pin90° female connector (for power supply) Order No.: 522001-xx (xx- cable length, unit m)	
Industrial Ethernet Cable (Cat 5e) d-coded Order No.: 522004-xx (xx- cable length, unit m)	 Connector type: two 4-pin 90° male connectors (M12) Cable sheath: PVC, light blue operating temperature:-40℃~80℃

Accessory name/ model	Dimensions
Industrial Ethernet Cable (Cat 5e) d-coded Order No.: 522005-xx (xx- cable length, unit m)	 Connector type: RJ45, 4-pin 90° male connector (M12) Cable sheath: PVC, light blue working temperature:-40℃~80℃
Industrial Ethernet Cable (Cat 5e) d-coded Order No.: 522006-xx (xx- cable length, unit m)	 Connector Type: RJ45, 4-pin straight male connector (M12) Cable sheath: PVC, light blue Working temperature:-40℃~80℃
Industrial Ethernet Cable (Cat 5e) d-coded Order No.: 522008-xx (xx- cable length, unit m)	 Connector type: Two straight male connectors (M12) Cable sheath: PVC, light blue Working temperature:-40℃~80℃

Accessory name/ model	Dimensions
Standard magnet ring Order No.: 211501	
Sector magnet Order No.: 211502	
Square magnet Order No.: 211508	
Magnetic isolation gasket	
Sector magnetic isolation gasket	
4-pin male connector Order No.: 312723	

Note: Please refer to "Magnet ring Selection" and "Cable Selection" for details of cables, magnet rings 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 cable output, refer to the wire color definition in the following table for connection mode

EtherCAT Output 

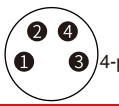
- Connector Connection Mode (Interface 1, 2)

Pin	Wire color	Pin/wire function definition
1	Yellow	Tx +
2	White	Rx +
3	Orange	Tx -
4	Blue	Rx -

- Single cable outlet connection mode

Wire color 1*	Pin/wire function definition
Yellow	Tx +
White	Rx +
Orange	Tx -
Blue	Rx -
Red	24Vdc
Black	COM

Note: * Wire color 1: light green, PUR sheath, 6 cores,-40C~85℃

EtherCAT Output  4-pin connector socket (for power supply)

- Connector Connection Mode (Interface 3)

Pin	Wire color	Pin/wire function definition
1	Brown	+24Vdc (-20%~+20%)
2	White	Do not connect
3	Blue	COM
4	Black	Do not connect

- Double cable outlet connection mode

Wire color1*	Wire color2*	Pin/wire function definition
Yellow	Yellow	Tx +
White	White	Rx +
Orange	Orange	Tx -
Blue	Blue	Rx -
Red	-	24Vdc
Black	-	COM

Note: * Wire color 2: light green, PUR sheath, 4 cores,-40C~70℃

Selection Guide-EtherCAT Output

R	F	–	M					–			–					–	E				–			–		
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

RF	Hose shell

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

C1	Without flange
C2	With flange M18×1.5
C3	With flange M20×1.5
C4	With flange 3/4"-16UNF-3A

10 - 13 Connection form

DA**	Single cable outlet, light green, PUR sheath (6 cores),-40℃~85℃ (** means cable length, unit: meters)
DB**	Double cable outlet, light green, PUR sheath (one set of 6 cores,-40℃~85℃; one set of 4 cores,-40℃~70℃) (** means cable length, unit: meters)
PD56	2 sets of 4-pin M12 female connector, 1 set of 4-pin M8 male connector

14 - 17 Communication interface

14 - 15 Sensor form

E1	EtherCAT, 1-9magnets, position and speed, distributed clock optional

16 - 17 Number of Magnet rings

	01~09 optional

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

S0	50.8mm+63.5mm
S9	50.8mm+107mm

20-21 Country

	Refer to the country list

G g Selection of Cable Accessories for Industrial Ethernet

N	E	T	–	M				–			
01	02	03		04	05	06	07		08	09	10

01 - 03	Type
N E T	Industrial Ethernet

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
08	Cable type
D	PVC sheath, blue, 8-pin, shielded, CAT-5e,-40~85°C
A	PUR sheath, green, 4-pin, shielded, CAT-5eES,-40~70C
09 10	Connection
1 1	Two 4-pin connector, M12, d-code
2 2	Two 4-pin right angle male connectors, M12, d-code
1 3	One end 4-pin connector, M12, d-code, one end shielded RJ45 connector
2 3	One end 4-pin right angle male connector, M12, d-code, one end shielded RJ45 connector

- Selection example: NET-M010-D11

  Indicates: Ethernet cable, 10m long, PVC sheath, blue, 8-pin, CAT-5e standard, shielded,-40~85C, 4-pin connector at both ends, M12, d-code.

- Selection example: NET-M020-A23

  Indicates: Ethernet cable, 20 meters long, PUR sheath, green, 4-pin, shielded, CAT-5eES,-40~70°C, 4-pin right angle male connector at one end of the cable, M12, d-code, and shielded RJ45 connector at one end.

L l LED real-time state monitoring and diagnosis

Green light	ON	ON	ON	Flash
Red light	OFF	ON	Flash	×
Function	Normal work	The network cable is not connected	Configuring	Fault