# RF Flexible Outer Tube Displacement Sensor

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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
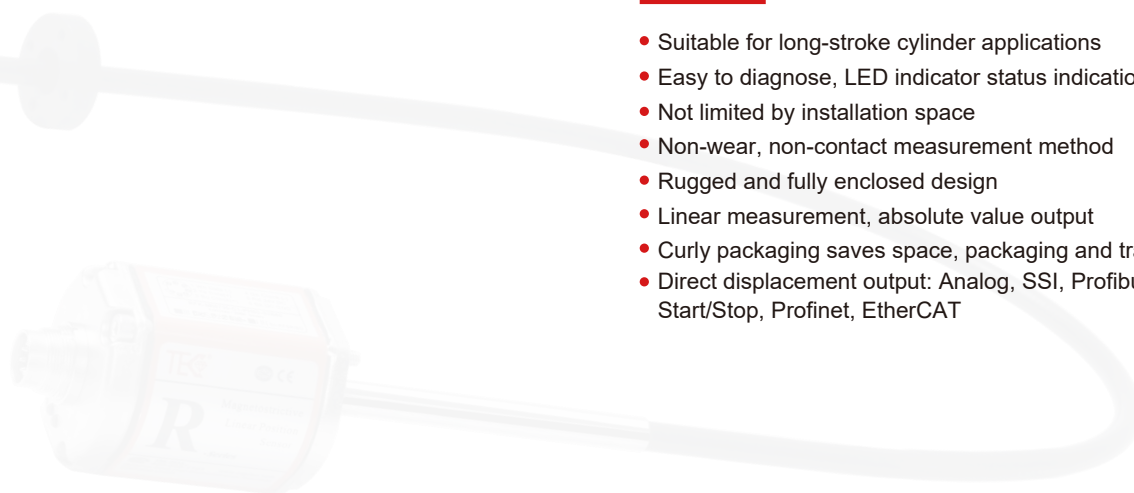
C c Product Parameters

● 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	Profinet IO RT	Data protocol	TEC Profile and Encoder Profile 4.1
Resolution	1 / 2 / 5 / 10 / 20 / 50 / 100 μm		
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

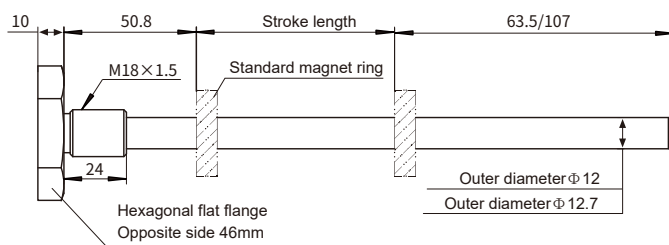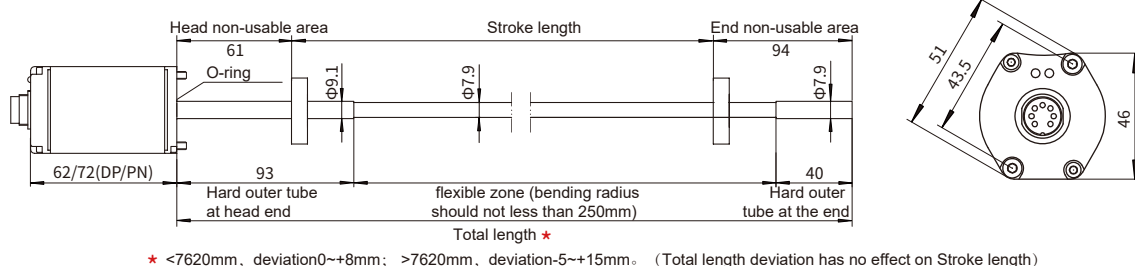|	
Magnet velocity	Arbitrary
Protection level	IP65（When combined with pressure-resistant outer tube，the protection level can reach IP67）
Operating temperature	-40℃ ~ +85℃ （up to105℃）
Humidity/dew point	Humidity 90%, no condensation
Shock index	GB/T2423.5 100g(6ms)
Vibration index	GB/T2423.10 20g/10~2000Hz
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

A a Installation and Use Instructions

● Dimensions of RF flexible outer tube sensor

| Head non-usable area | Stroke length | End non-usable area |
| 61 | | 94 |
O-ring Φ9.1 Φ7.9 Φ7.9

62/72(DP/PN) 93 40

Hard outer tube at head end | flexible zone (bending radius should not less than 250mm) | Hard outer tube at the end

Total length ★

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

51 43.5 46

10 50.8 Stroke length 63.5/107

M18×1.5 Standard magnet ring

24

Hexagonal flat flange
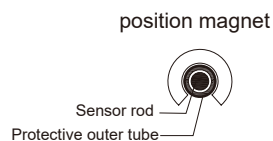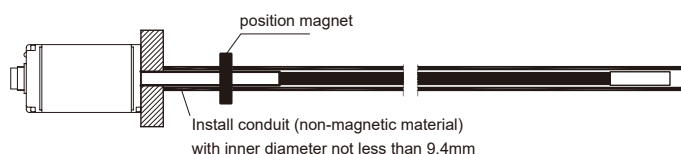Opposite side 46mm

Outer diameter Φ12
Outer diameter Φ12.7

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.
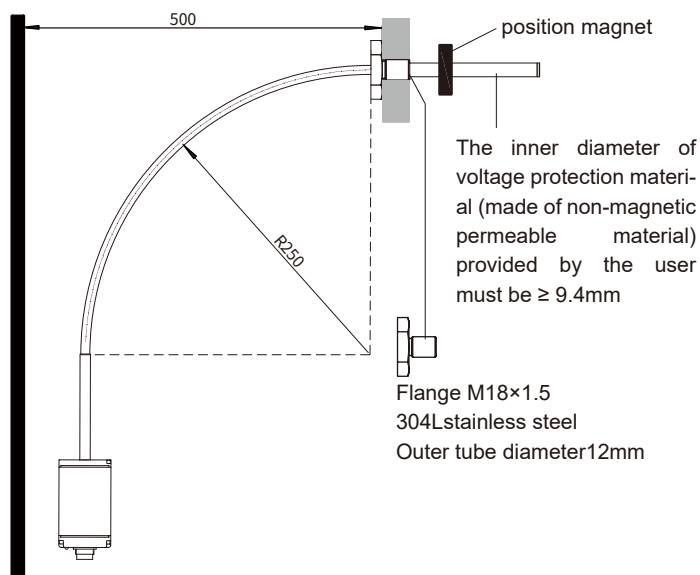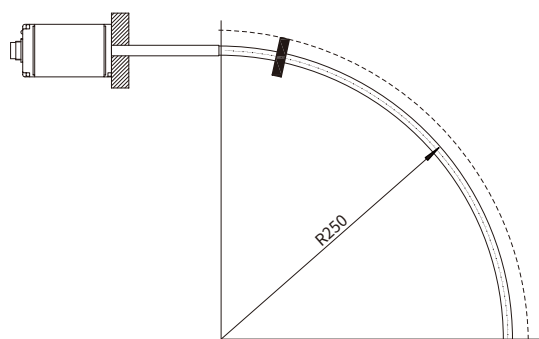
● Installation instruction of RF flexible outer tube sensor

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)

position magnet

position magnet

Install conduit (non-magnetic material)
with inner diameter not less than 9.4mm

Sensor rod
Protective outer tube

Arc measurement (external installation)

500

position magnet

R250

R250

The inner diameter of voltage protection materi-al (made of non-magnetic permeable material) provided by the user must be ≥ 9.4mm

Flange M18×1.5
304Lstainless steel
Outer tube diameter12mm

![浙达精益 ZHEDA JINGYI]

C C Common Accessories-Profinet Output

Accessory name/model	Dimensions
4-pin female connector（For power supply）Order No.： 522000-xx（xx- cable length, unit m）	30 M8
4-pin90° female connector（For power supply）Order No.： 522001-xx（xx- cable length, unit m）	27 17 M8
For power supply（Cat 5e) d-coded Order No.： 522004-xx（xx- cable length, unit m）	38 Φ14 32 M12 Connector type: two 4-pin 90° male connectors (M12) Cable sheath: PVC, light blue operating temperature:-40℃~80℃

Accessory name/model	Dimensions
For power supply（Cat 5e) d-coded Order No.： 522005-xx（xx- cable length, unit m）	38 Φ14 32 M12 Connector type: RJ45, 4-pin 90° male connector (M12) Cable sheath: PVC, light blue working temperature:-40℃~80℃
For power supply（Cat 5e) d-coded Order No.： 522006-xx（xx- cable length, unit m）	46.5 14 12 Connector Type: RJ45, 4-pin straight male connector(M12) Cable sheath: PVC, light blue Working temperature:-40℃~80℃
For power supply（Cat 5e) d-coded Order No.： 522008-xx（xx-cable length, unit m）	46.5 14 12 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	Φ33 Φ13.5 4-Φ4.3 Φ24 8

Accessory name/model	Dimensions
Sector magnet Order No.： 211502	120° 2-Φ4.3 R12 Φ33 8 Φ13.5

Accessory name/model	Dimensions
Slider magnet Order No.： 211503	13 37.5 25.5 21 M5 40

Accessory name/model	Dimensions
Square magnet Order No.： 211508	28 19 7.9 13 20 S N

Accessory name/model	Dimensions
Magnetic isolation gasket	Φ33 Φ13.5 4-Φ4.3 Φ24 5

Accessory name/model	Dimensions
Sector magnetic isolation gasket	120° 2-Φ4.3 R12 Φ33 5 Φ13.5

Accessory name/model	Dimensions
4-pin male connector Order No.： 312723	~62 M12

Note: Please refer to "Magnet Selection" and "Cable Selection" for details of cables, magnet rings and other models.

● Wiring mode
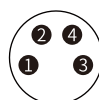
4-pin connector socket (for power supply)

● **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**

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

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

● **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**

Pin	Wire color1*	Wire color2*	Pin/wire function definition
1	Yellow	Yellow	Tx +
2	White	White	Rx +
3	Orange	Orange	Tx -
4	Blue	Blue	Rx -
5	Red	-	24Vdc
6	Black	-	COM

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

R	F	–	M					–			–					–	N			–			–	
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
R F	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
C 1	Without flange
C 2	With flange M18×1.5
C 3	With flange M20×1.5
C 4	With flange 3/4"-16UNF-3A

10 - 13	Connection form
D A * *	Single cable outlet, light green, PUR sheath (6 cores),-40℃~85C (cable length, unit: meters)
D B * *	Double cable outlet, light green, PUR sheath (one set of 6 cores, 40C~85C; one set of 4 cores,-40℃~70℃) (cable length, unit: meters)
P D 5 6	2 sets of 4-pin female connector, M12, 1 set of 4-pin male connector, M8

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

14 - 16	Communication interface
14 N	Profinet communication interface
15	Number of Magnet rings（1~9 optional）
16	0-General, customizable

17 - 18	Non-usable area at head and end, customizable
S 0	50.8mm+63.5mm
S 9	50.8mm+107mm

19-20	Country
	Refer to the country list，page 130.

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