浙达精益
ZHEDA JINGYI

TEC®

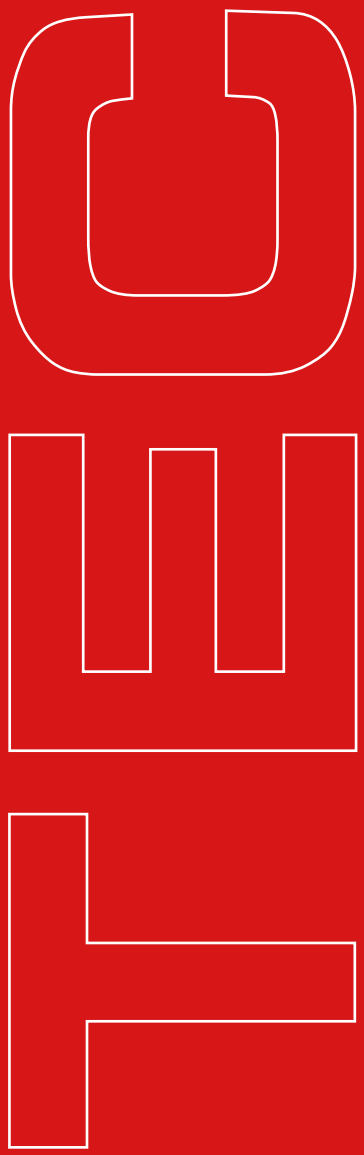
Magnetostrictive Displacement Sensor

M Series Product manual

杭州浙达精益机电技术股份有限公司
Hangzhou Zheda Jingyi Electromechanical Technology Corporation Limited

浙达精益

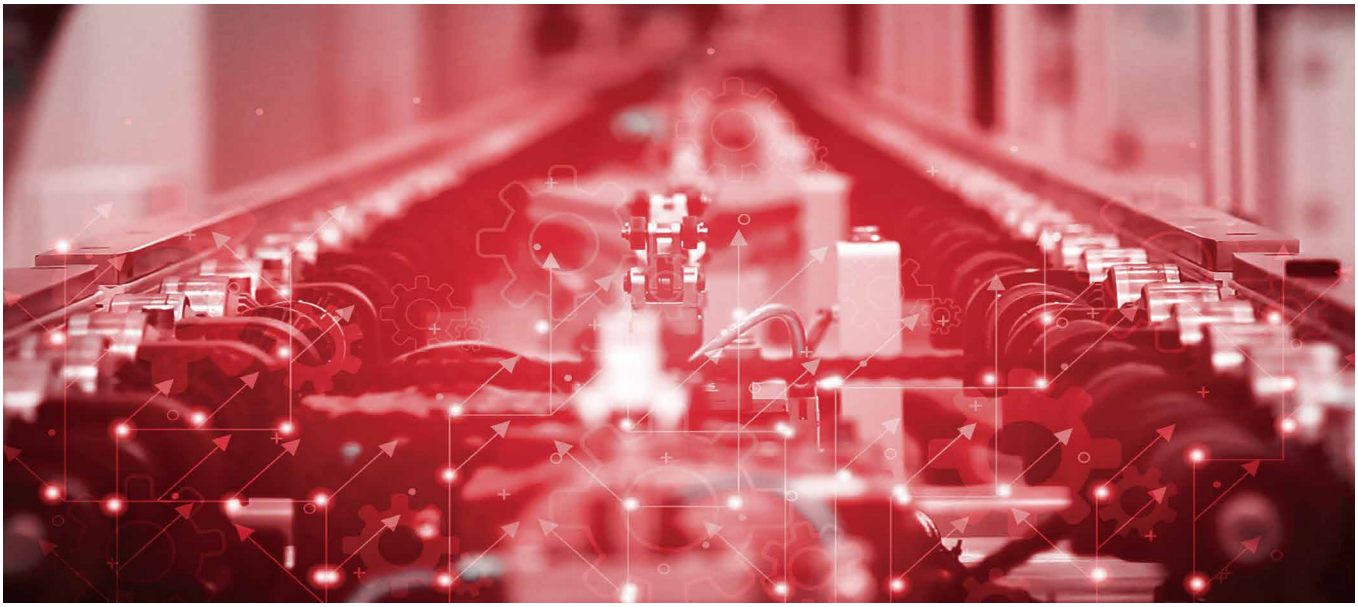
ZHEDA JINGYI



CONTENT

Company Profile

As a technological innovation enterprise born out of Zhejiang University, 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

IN 1997

The National Natural Science Foundation of China, the first domestic and foreign giant magnetostrictive actuator for non-circular shaped pin hole processing

IN 2002

National Natural Science Foundation of China (Youth Fund), "Basic research on the application of GMM self-sensing components integrating sensors and actuators"

IN 2006

China Postdoctoral Science First-Class Funding Project

IN 2008

The magnetostrictive displacement sensor project is included in the national torch plan project

IN 2009

The magnetostrictive displacement sensor project won the Golden Bridge Award issued by the National Technology Association;
National Natural Science Foundation of China (Youth Fund), "Research on the Basic Theory of New Technology of Giant Magnetostrictive and Magnetorheological Compound Damping"

IN 2011

The international exchange and cooperation conference on ultrasonic guided wave technology was held in Hangzhou. Our company officially launched the first set of magnetostrictive ultrasonic guided wave detectors in China.

浙达精益
ZHEDA JINGYI

IN 2012

National Natural Science Foundation of China, "On-line detection method for corrosion and broken wires of arch bridge hangers based on the principle of magnetostrictive guided wave dynamic focusing";
National Natural Science Foundation of China, "Research on the Theory and Practice of Real-time Quantitative Detection of Defects in High-temperature Metal Pipelines Based on Magnetostrictive Ultrasonic Guided Waves";
Major Science and Technology Project in Zhejiang Province, "Magnetostrictive Ultrasonic Guided Wave Pipeline In-Service Non-destructive Testing Technology and Instruments"

IN 2013

National Natural 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 2016

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

IN 2017

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 2018

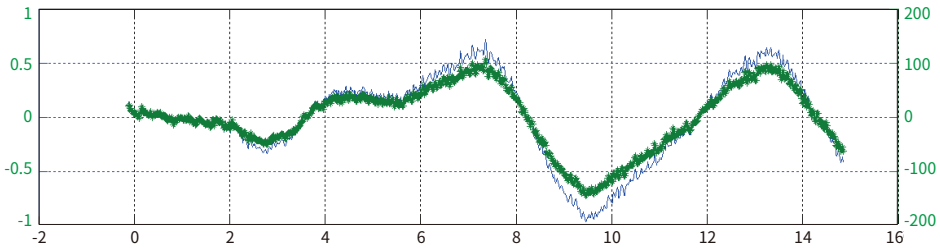
National Natural Science Foundation of China, "Research on the Theory and Practice of On-line Monitoring of Turnout Point Rail Defects Based on Phased Array Guided Wave Sound Field Control";
National Key R&D Project, "Research on Magnetoacoustic Compound Monitoring and Detection Technology for Typical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

IN 2019

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

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 Test (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)

Technical Characteristics

• 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 operating environment, and is widely used in metallurgical equipment, wind power equipment, construction machinery, rubber machinery, port machinery, energy and other industrial automation fields.

• Product characteristics

High precision

The highest resolution and repetition accuracy can reach 1μm

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

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

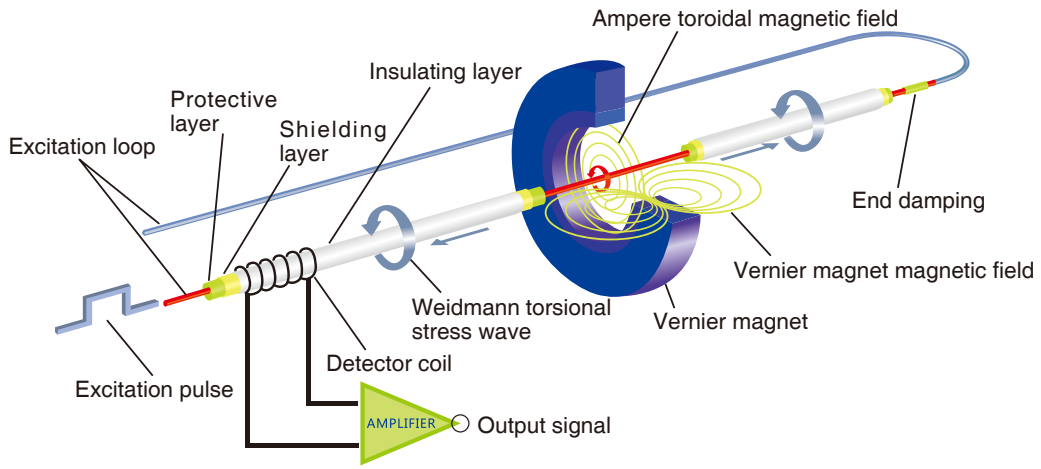
M18×1.5、M20×1.5、3/4"-16UNF-3Athreaded installation is optional. When replacing the sensor, only the electronic compartment can be replaced without removing the pressure measuring rod.

Reliable operation

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

• 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

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.

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.

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.

Environmental conditions

For normal Operating conditionsof displacement sensors, the industry has the following standards:
a） Temperature:25℃（±10℃）
b） Relative humidity: 90%or less
Generally, the environment for calibrating and testing sensors is more stringent than the standard requirements.

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.

Shell protection class

The IP (Ingress Prection) 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.

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.

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.

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.

Full scale

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

Multiple position measurement

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

Load impedance

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

Resolution

Refers to the minimum amount of sensor output that can be distinguished. The highest resolution of TEC magnetostrictive displacement sensor can reach1μm.

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.

Repetition accuracy

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

Nonlinearity

Nonlinearity is the absolute deviation as a percentage of the Stroke length 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.

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).

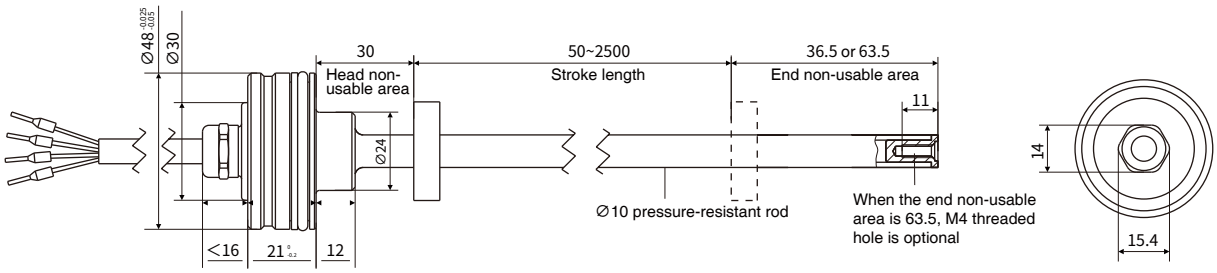
MH Displacement Sensor

Technical characteristics

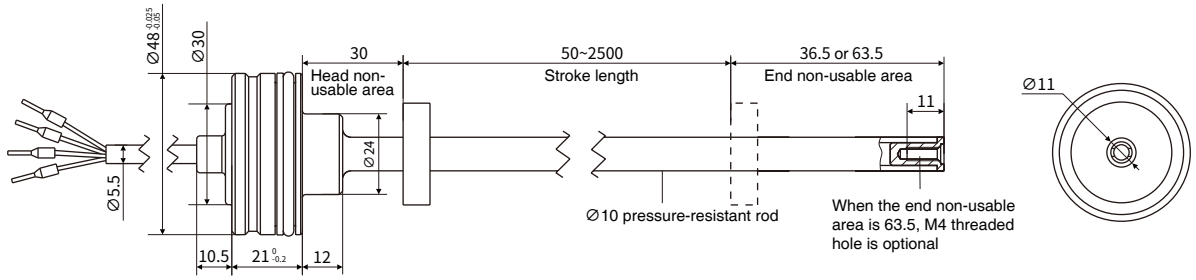
- Specially designed for construction machinery
- High vibration resistance and impact resistance
- Low power consumption design effectively reduces system heating
- Multiple outgoing modes, suitable for different sizes of cylinder
- Linear measurement, absolute position output
- Adapt to harsh environment, IP67 protection level
- Multiple signal (analog and digital signal) output modes
- Assembled in cylinder, free from environmental and electromagnetic interference, non-contact measurement

Structural Shape

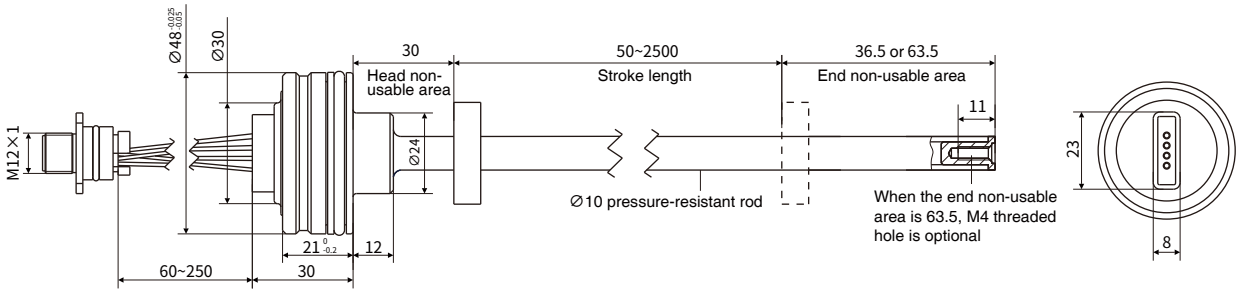
External dimensions of cable outlet (fastening mode DM)



External dimensions of cable outlet (fastening method QM)

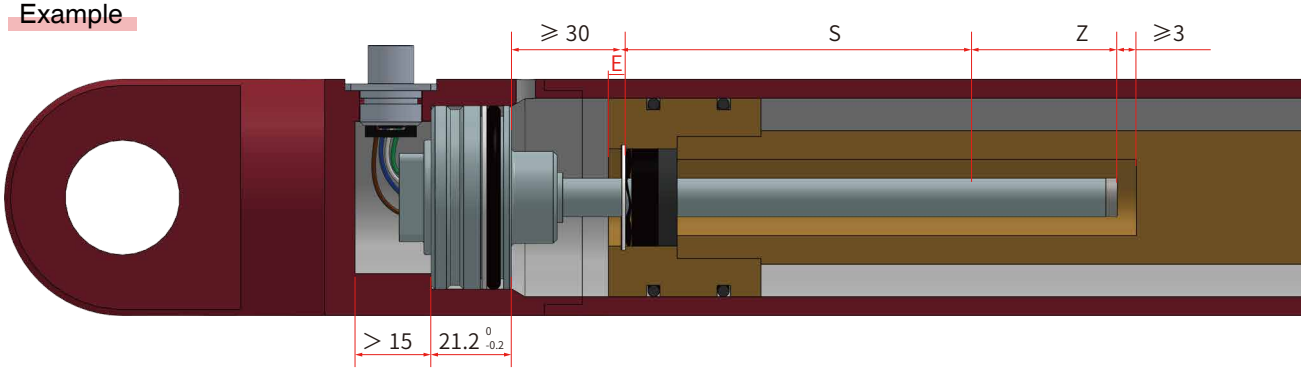


Head non-usable area



Assembly mode

Example

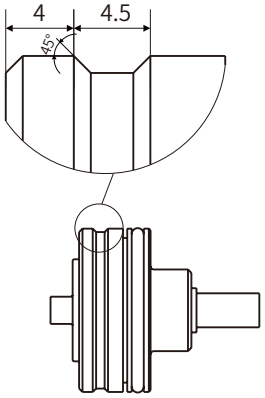


The assembly method depends on the design of the hydraulic cylinder. The commonly used assembly method is to assembly from the rod end of the hydraulic cylinder, or to assembly from the cylinder head end of the hydraulic cylinder. In both assembly methods, O-ring and auxiliary gasket are used for air sealing.

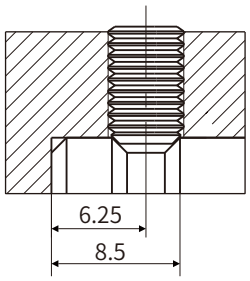
Note: 1.The position magnet should not contact the stell rod;
2.Drilling depth of piston rod≥E+Z+3mm;
3.Piston rod hole diameter

Pressure-resistant rod	∅10
Aperture size	⩾∅13

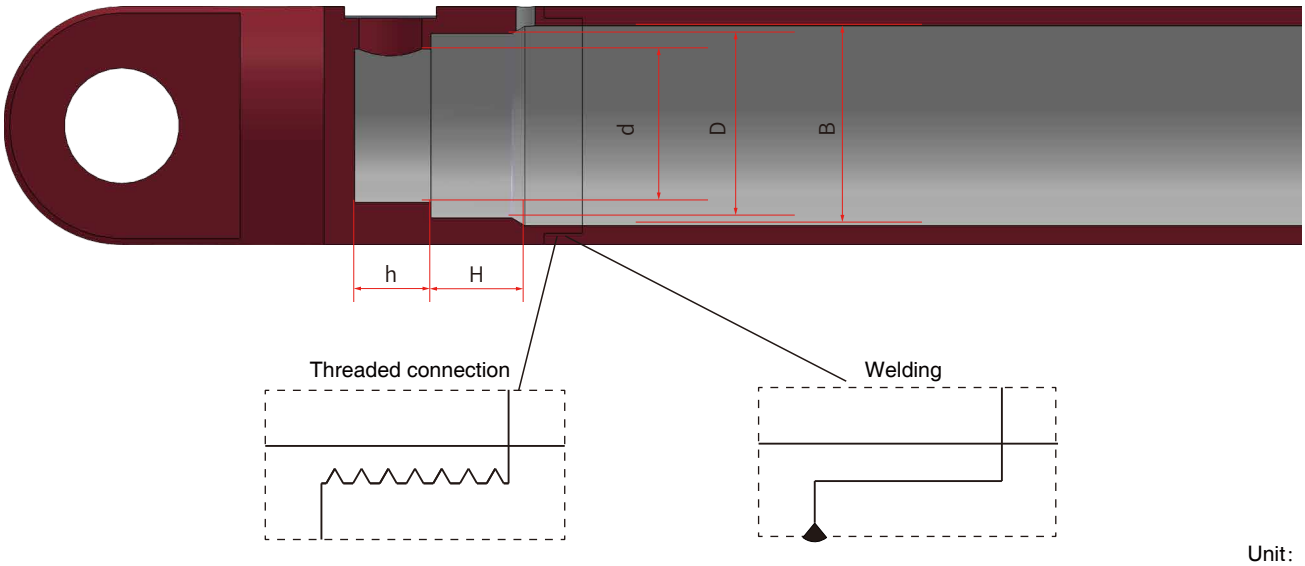
4.Do not exceed the operating pressure during use.



Flange shell with O-ring and auxiliary washer



Use M5 internal hexagon flat-end set screws for fixation with a maximum torque of 0.5 N/m

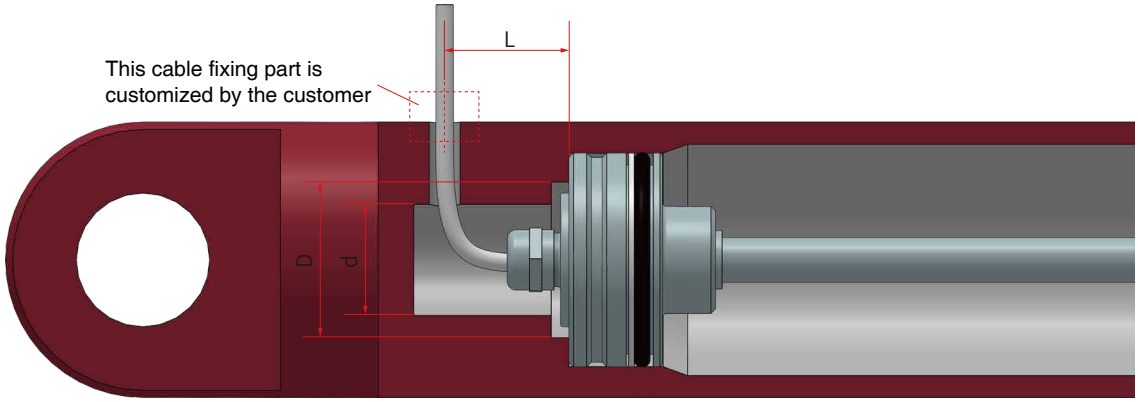


Unit: mm

Model	B Minimum diameter of hydraulic cylinder	D Minimum diameter	H Depth	d Minimum diameter	h Depth
MH	52	48H8（thread） 48G7（welding）	$21.2^{+0.2}$	＞32.5＜40	＞15

Assembly mode

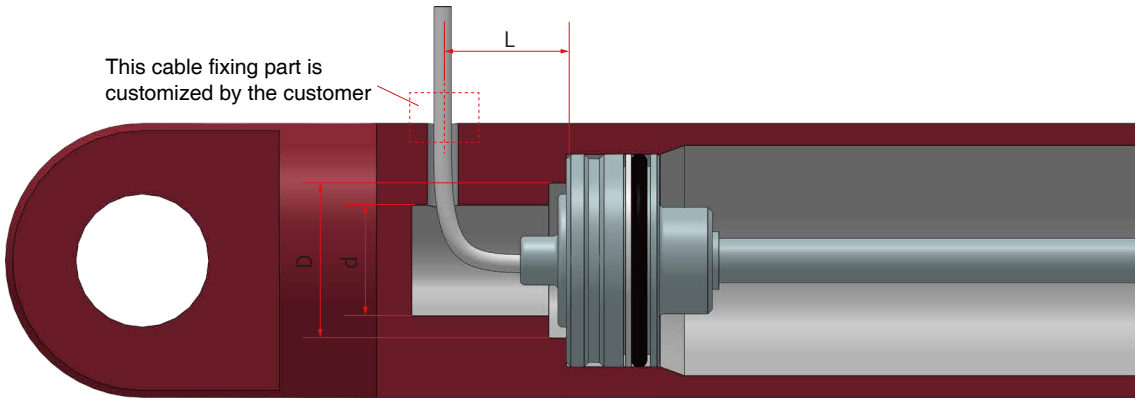
Assembly dimensions of outgoing mode-cable outlet (DM)



D	d	L
＞32＜40	＞18	＞28

Note: Other dimensions are the same as those of connector cable outlet

Assembly dimensions of outgoing mode-cable outlet (QM)



D	d	L
＞32＜40	＞18	＞20

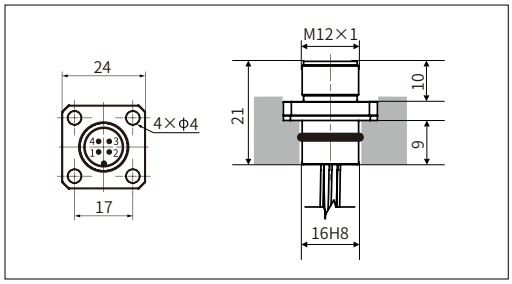
Note: Other dimensions are the same as those of connector outlet

Electrical connections

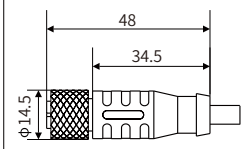
• Analog (connector)

M12-4Pin Definition	No.	PA	PB	PC
	1	Power supply	Do not connect	Power supply
	2	Signal	Power supply	Do not connect
	3	Ground	Ground	Ground
	4	Do not connect	Signal	Signal

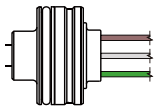
• M12-4 pin socket



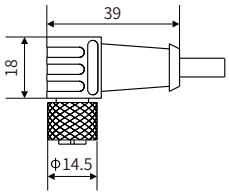
• Analog output (line color definition of female connector)

M12-5 pin female connector		Line color		
	Definition	PA	PB	PC
	Power supply	Brown	White	Brown
	Ground	Blue	Blue	Blue
	Signal	White	Black	Black

• Analog output (scattered output)

Scattered output	PT	
	Definition	Line color
	Power supply	Brown
	Ground	White
	Signal	Green

• Analog output (line color definition of right angle female connector)

M12-5 pin right angle female connector		Line color		
	Definition	PA	PB	PC
	Power supply	Brown	White	Brown
	Ground	Blue	Blue	Blue
	Signal	White	Black	Black

• Analog output (cable outlet)

Cable code:511806	Definition	Line color
	Power supply	Brown
	Ground	White
	Signal	Green

Product Parameters-Analog Output

• Input

Measurement data	Position (vernier magnet)
Stroke length	50~2500 mm

• Output

Current	4 ~ 20mA（load resistance≤250Ω）
Voltage	0.5 ~ 4.5Vdc or 0.25~4.75Vdc（load resistance≥10KΩ）
Resolution	±0.1mm（range＜500mm） range÷4096（range＞500mm）
Nonlinearity	±0.1mm（≤250mm）or 0.04%F.S（＞250mm）
Repetition accuracy	±0.1mm
Update time	2ms

• Operating conditions

Magnet velocity	Arbitrary
Protection level	IP67
Operating temperature	-40℃ ~ +105℃
Humidity/dew point	Humidity 90%, no condensation
Temperature drift coefficient	<30ppm/℃
Shock index	GB/T2423.5 100g（11ms）
Vibration index	GB/T2423.10 25g/10~2000Hz
EMC test	GB/T17626.2 Electrostatic Discharge Anti-interference, Grade 3, Class A GB/T17626.3 Radio Frequency Electromagnetic Field Radiation Anti-interference, Grade 3, Class A GB/T17626.4 Electric Fast Transient Pulse Group Anti-interference, Grade 3, Class B GB/T17626.5 Surge (Impact) Anti-interference, Grade 3, Class B GB/T17626.6 Radio Frequency Field Induced Conducted Disturbance Anti-interference, Grade 3, Class A GB/T17626.8 Power Frequency Magnetic Field Anti-interference, Grade 4, Class A

• Electrical connections

Input voltage	9~ 32Vdc
Power consumption	<1W
Polarity protection	Maximum-30Vdc
Overvoltage protection	Maximum36Vdc
Insulation resistance	＞10MΩ
Insulation strength	500V
Outgoing mode	Cable outlet or connector

• Construction and materials

Electronic compartment	304Lstainless steel
Measuring rod	304Lstainless steel
Operating pressure grade	Rated pressure Pn: 35MPa maximum pressure Pmax: 45MPa for stell rod with diameter of 10mm
Assembly	Any direction
Position magnet	Various ring magnets

Selection Guide-Analog Output

M	H	–	M					–	S		–					–				–	M		–		
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

MH	Flange shell Φ48mm

03 - 07 Measuring range

0050~2500 mm，step length 1mm

08 - 09 Mounting thread form

SA	Pressure-resistant rod, diameter 10mm
SC	Pressure-resistant rod, 10mm diameter; M4 thread at the end
SF	Pressure-resistant rod, diameter 7mm

10 - 13 Connection form

PA	3 wires, M12 IP69K, 4 pins（1-3-2）
PA06	60mm，minimum length of wiring harness
PA25	250mm，maximum length of wiring harness
PB	3 wires, M12 IP69K, 4 pins（2-3-4）
PB06	60mm，minimum length of wiring harness
PB25	250mm，maximum length of wiring harness
PC	3 wires, M12 IP69K, 4 pins（1-3-4）
PC06	60mm，minimum length of wiring harness
PC25	250mm，maximum length of wiring harness
PT	3 scattered, brown-white-green
PT06	60mm，minimum length of wiring harness
PT25	250mm，maximum length of wiring harness
DM	3-pin cable outlet
DM01	1m cable
DMR1	0.1m cable, ordering method within 1 m
QM	3-pin cable outlet (internal thread fastening)
QM01	1m cable
QMR1	0.1m cable, ordering method within 1 m

14 - 16 Signal output mode

A01	Current output，4~20mA
A11	Current output，20~4mA
V01	Voltage output，0.5~4.5V
V11	Voltage output，4.5~0.5V
V02	Voltage output，0.25~4.75V
V12	Voltage output，4.75~0.25V
V03	Voltage output，0~10V
V13	Voltage output，10~0V

17- 18 Non-usable area at head and end, customizable

M0	30mm+36.5mm
M1	30mm+63.5mm

19-20 Country

Refer to the country list，page 45.

Selection example

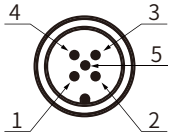
For example：MH-M0300-SA-PA08-A01-M0-CN

Indicates: MH series flange diameter 48mm, stroke length of 300mm, pressure-resistant rod with diameter of 10mm, M12 4-pin male connector, current output of 4~20mA, non-usable area at head and end of 30mm + 36.5 mm.

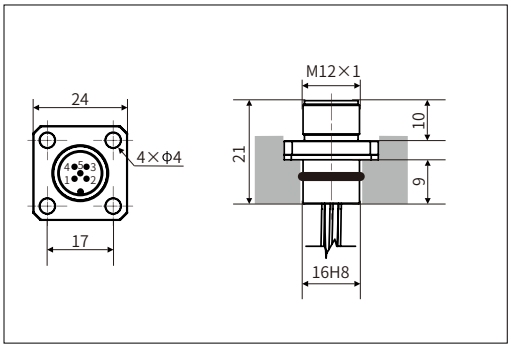
MH-CANopen Output

Electrical connections

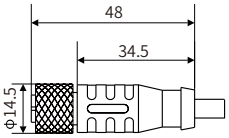
• CAN（connector）

M12-5 Pin Definition	No.	PC
	1	Do not connect
	2	Power supply
	3	Ground
	4	CAN High
	5	CAN Low

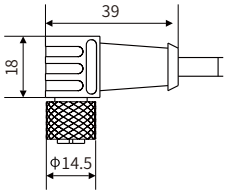
• M12-5 pin socket



• CANopen（line color definition of female connector）

M12-5 pin female connector	Line color	
	Definition	PC
	Power supply	Brown
	Ground	White
	CAN High	Yellow
	CAN Low	Green

• CANopen（line color definition of right angle female connector)

M12-5pin right angle female connector	Line color	
	Definition	PC
	Power supply	Brown
	Ground	White
	CAN High	Yellow
	CAN Low	Green

• CAN（cable outlet）

Cable code：511816	Definition	Line color
	Power supply	Brown
	Ground	White
	CAN High	Yellow
	CAN Low	Green

Product Parameters-CANopen Output

• Input

Measurement data	Position (vernier magnet)
Stroke length	50~2500 mm

• Output

Interface	CAN bus ISODIS11898, CANopen conforms to CIA DS-301V3.0, sensor specification DS-406V3.1
Transmission speed	maximum 1Mbit/s
Resolution	±0.1mm
Nonlinearity	±0.1mm（≤250mm）or 0.04%F.S（>250mm）
Repetition accuracy	±0.1mm
Update time	2ms

• Operating conditions

Magnet velocity	Arbitrary
Protection level	IP67
Operating temperature	-40℃ ~ +105℃
Humidity/dew point	Humidity 90%, no condensation
Temperature drift coefficient	<30ppm/℃
Shock index	GB/T2423.5 100g（11ms）
Vibration index	GB/T2423.10 25g/10~2000Hz
EMC test	GB/T17626.2 Electrostatic Discharge Anti-interference, Grade 3, Class A GB/T17626.3 Radio Frequency Electromagnetic Field Radiation Anti-interference, Grade 3, Class A GB/T17626.4 Electric Fast Transient Group Anti-interference, Grade 3, Class B GB/T17626.6 Radio Frequency Field Induced Conducted Disturbance Anti-interference, Grade 3, Class A GB/T17626.8 Power Frequency Magnetic Field Anti-interference, Grade 4, Class A

• Electrical connections

Input voltage	9~ 32Vdc
Power consumption	<1W
Polarity protection	maximum-30Vdc
Overvoltage protection	maximum36Vdc
Insulation resistance	>10MΩ
Insulation strength	500V
Outgoing mode	Cable outlet or connector

• Construction and materials

Electronic compartment	304Lstainless steel
Measuring rod	304Lstainless steel
Operating pressure grade	Rated pressure Pn: 35MPa maximum pressure Pmax: 45MPa for stell rod with diameter of 10mm
Assembly	Any direction
Position magnet	Various ring magnets

Selection Guide-CANopen Output

M	H	–	M					–	S		–					–	C	1				–	M		–		
01	02		03	04	05	06	07		08	09		10	11	12	13		14	15	16	17	18		19	20		21	22

01 - 02	Sensor shell form
M H	Flange shell Φ48mm

03 - 07	Measuring range
	0050~2500mm，step length 1mm

08 - 09	Mounting thread form
S A	Pressure-resistant rod, diameter 10mm
S C	Pressure-resistant rod, diameter 10mm; Thread with M4 at end
S F	Pressure-resistant rod, diameter 7mm

10 - 13	Connection form
P C	4 wiring harness, M12 IP69K, 5 pins (2-3-4-5)
P C 0 6	60mm，minimum length of wiring harness
P C 2 5	250mm，maximum length of wiring harness
D M	CAN special cable outlet
D M 0 1	1m cable
D M R 1	0.1m cable, ordering method within 1 m

14 - 18	Signal output mode

14 - 15	Output form
C 1	CANopen

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

18	Number of magnet rings
1	Single magnet ring

19 - 20	Non-usable area at head and end, customizable
M 0	30mm+36.5mm
M 1	30mm+63.5mm

21-22	Country
	Refer to the country list，page 45.

Selection example

For example：MH-M0300-SA-DM50-C1411-M1-CN

Indicates: MH rod series flange diameter 48mm, stroke length 300mm, pressure-resistant rod with diameter 10mm, straight cable form, CANopen output, baud 250kbit/s, resolution 0.1 mm, single magnet ring, head and end non-usable area 30 +63.5.

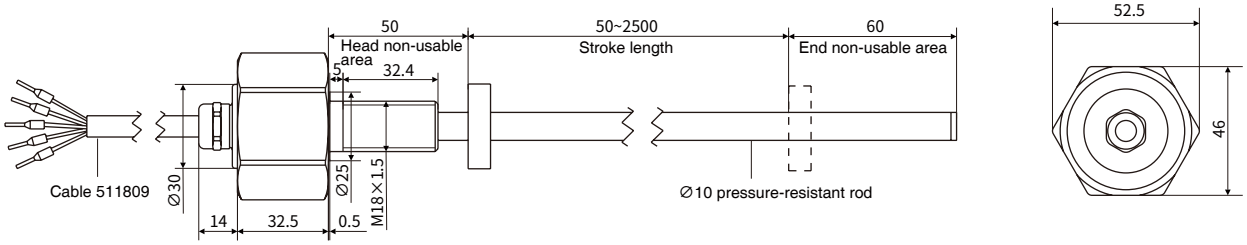
MHA Displacement Sensor

Technical characteristics

- Non-contact measurement
- Linear measurement, absolute position output
- Adapt to harsh environment, IP67 protection level
- Multiple signal (analog and digital signal) output modes
- Specially designed for construction machinery
- High vibration resistance and impact resistance
- Low power consumption design effectively reduces system heating
- Quick assembly through external threads

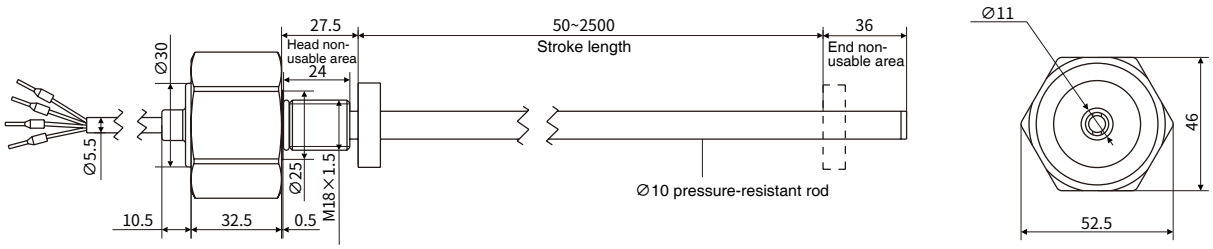
Structural Shape

External dimensions of cable outlet (fastening mode DE)

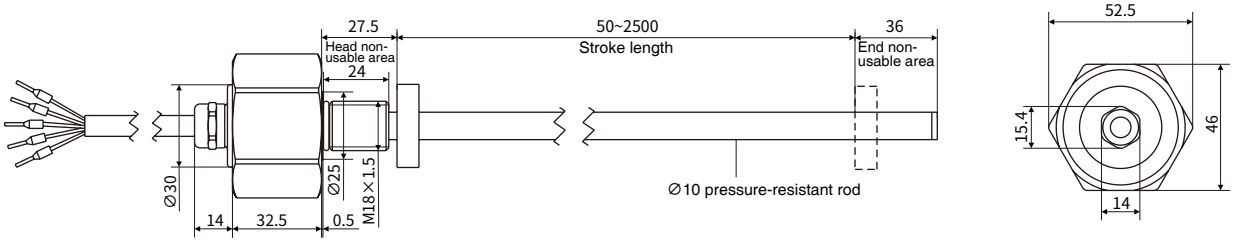


Custom flange：TEC-0204-G3-SC1962_V1.0

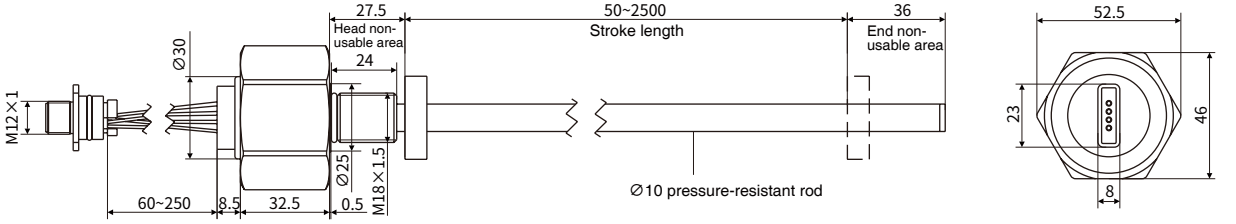
External dimensions of cable outlet (fastening method QM)



External dimensions of cable outlet (fastening mode DM)

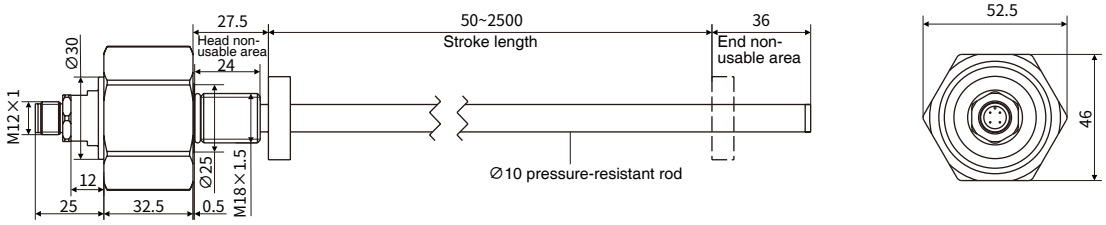


Connector external dimensions (standard type)



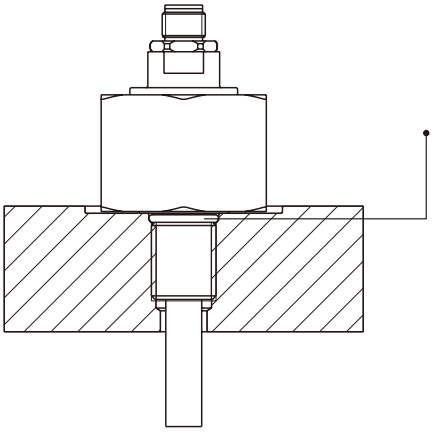
Structural Shape

Connector external dimensions (customized type)



Assembly mode

To seal the flange contact surface by assembling 15.4x2.1 mmO rings in the cut, threaded holes conforming to ISO6149-1 standard must be provided.

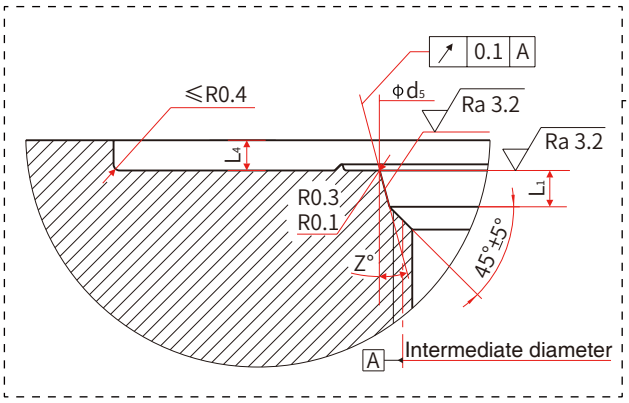


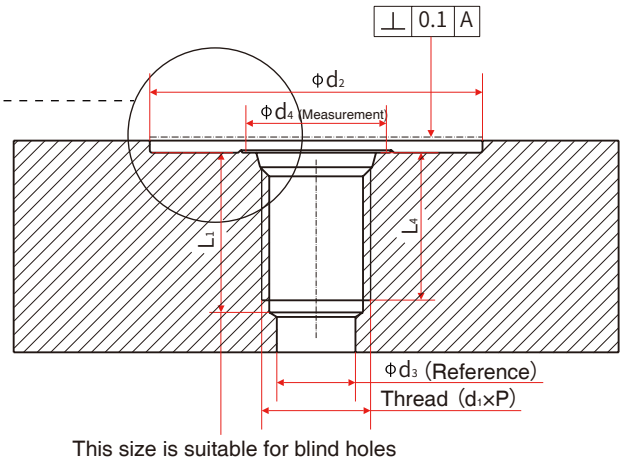
- Seal by O-ring in flange cut

Note::
1.The fastening torque is50Nm;
2.The flange contact surface must be located on the Cylinder assembly surface as a whole;
3.The positioning magnet should not contact with the sensor measuring rod;
4.Do not exceed the peak pressure of equipment;
5.Protect the stell rod from wear.

Threaded holes conforming to ISO6149-1 (for pressure-resistant rods with a diameter of 10mm) unit: mm

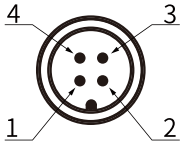
Thread (d1 ×P)	d_2	d_3	d_4	d_5	L_1	L_2	L_3	L_4	Z^0
M18×1.5	55	13	24.5	19.8	2.4	28.5	2	14.5	15°



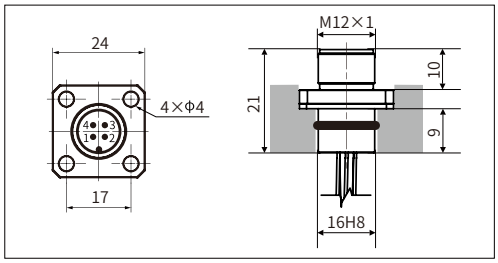


Electrical connections

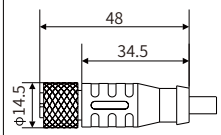
Analog (connector)

M12-4Pin Definition	No.	PA	PB	PC
	1	Power supply	Do not connect	Power supply
	2	Signal	Power supply	Do not connect
	3	Ground	Ground	Ground
	4	Do not connect	Signal	Signal

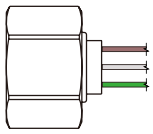
M12-4 pin socket



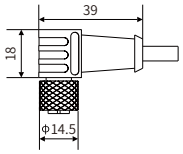
Analog output (line color definition of female connector)

M12-5 pin female connector		Line color		
	Definition	PA	PB	PC
	Power supply	Brown	White	Brown
	Ground	Blue	Blue	Blue
	Signal	White	Black	Black

Analog output (scattered output)

Scattered output	PT	
	Definition	Line color
	Power supply	Brown
	Ground	White
	Signal	Green

Analog output (line color definition of right angle female connector)

M12-5pin right angle female connector		Line color		
	Definition	PA	PB	PC
	Power supply	Brown	White	Brown
	Ground	Blue	Blue	Blue
	Signal	White	Black	Black

Analog output (cable outlet)

Cable code:511806	Definition	Line color
	Power supply	Brown
	Ground	White
	Signal	Green
Cable code:511809	Definition	Line color
	Power supply	Brown
	Ground	White
	Signal	Blue

Product Parameters-Analog Output

• Input

Measurement data	Position (Vernier magnet)
Stroke length	50~2500 mm

• Output

Current	4 ~ 20mA（load resistance≤250Ω）
Voltage	0.5 ~ 4.5Vdc or 0.25~4.75Vdc（load resistance≥10KΩ）
Resolution	±0.1mm（range＜500mm） range÷4096（range＞500mm）
Nonlinearity	±0.1mm（≤250mm）or 0.04%F.S（＞250mm）
Repetition accuracy	±0.1mm
Update time	2ms

• Operating conditions

Magnet velocity	Arbitrary
Protection level	IP67
Operating temperature	-40℃ ~ +105℃
Humidity/dew point	Humidity 90%, no condensation
Temperature drift coefficient	<30ppm/℃
Shock index	GB/T2423.5 100g（11ms）
Vibration index	GB/T2423.10 25g/10~2000Hz
EMC test	GB/T17626.2 Electrostatic Discharge Anti-interference, Grade 3, Class A GB/T17626.3 Radio Frequency Electromagnetic Field Radiation Anti-interference, Grade 3, Class A GB/T17626.4 Electric Fast Transient Pulse Group Anti-interference, Grade 3, Class B GB/T17626.5 Surge (Impact) Anti-interference, Grade 3, Class B GB/T17626.6 Radio Frequency Field Induced Conducted Disturbance Anti-interference, Grade 3, Class A GB/T17626.8 Power Frequency Magnetic Field Anti-interference, Grade 4, Class A

• Electrical connections

Input voltage	9~ 32Vdc
Power consumption	<1W
Polarity protection	Maximum-30Vdc
Overvoltage protection	Maximum36Vdc
Insulation resistance	＞10MΩ
Insulation strength	500V
Outgoing mode	Cable outlet or connector

• Construction and materials

Electronic compartment	304Lstainless steel
Measuring rod	304Lstainless steel
Operating pressure grade	Rated pressure Pn: 35MPa maximum pressure Pmax: 45MPa for stell rod with diameter of 10mm
Assembly	Any direction
Position magnet	Various ring magnets

Selection Guide-Analog Output

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

01 - 03	Sensor shell form
MHA	Hexagon flange shell

04 - 08	Measuring range
	0050~2500 mm，step length 1mm

09 - 10	Mounting thread form
SA	Standard flange, pressure-resistant rod, diameter 10mm
SB	Custom flange: TEC-0204-G3-SC1962_V1.0, pressure-resistant rod, diameter 10mm

11 - 14	Connection form
PA00	Custom, M12 IP69K, 4 pins（1-3-2）
PA	3 wires, M12 IP69K, 4 pins（1-3-2）
PA06	60mm，minimum length of wiring harness
PA25	250mm，maximum length of wiring harness
PB00	Custom, M12 IP69K, 4 pins（2-3-4）
PB	3 wires, M12 IP69K, 4 pins（2-3-4）
PB06	60mm，minimum length of wiring harness
PB25	250mm，maximum length of wiring harness
PC00	Custom, M12 IP69K, 4 pins（1-3-4）
PC	3 wires, M12 IP69K, 4 pins（1-3-4）
PC06	60mm， minimum length of wiring harness
PC25	250mm，maximum length of wiring harness
PT	3 scattered, brown-white-green
PT06	60mm，minimum length of wiring harness
PT25	250mm，maximum length of wiring harness
QM	3-pin cable outlet (internal thread fastening)
QM01	1m cable
QMR1	0.1m cable, ordering method within 1 m
DE	3-pin cable outlet (511809 cable is used)
DE01	1m cable
DER1	0.1m cable, ordering method within 1 m
DM	3-pin cable outlet
DM06	1m cable
DM25	0.1m cable, ordering method within 1 m

15 - 17	Signal output mode
A01	Current output，4~20mA
A11	Current output，20~4mA
V01	Voltage output，0.5~4.5V
V11	Voltage output，4.5~0.5V
V02	Voltage output，0.25~4.75V
V12	Voltage output，4.75~0.25V
V03	Voltage output，0~10V
V13	Voltage output，10~0V

18- 19	Non-usable area at head and end, customizable
M2	27.5mm+36mm
M3	50mm+60mm

20-21	Country
	Refer to the country list，page 45.

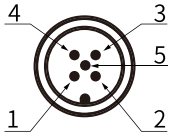
Selection example

For example：MHA-M0300-SA-PA08-A01-M2-CN

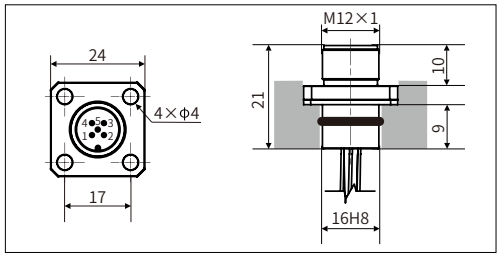
Indicates: MHA structure hexagonal flange shell, 300mm stroke length, 10mm diameter pressure-resistant rod, M12 connector 4-pin male connector, current output of 4~20mA, non-usable area at head and end of 27.5 +36.

Electrical connections

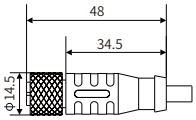
- CAN（connector）

M12-5 Pin Definition	No.	PC
	1	Do not connect
	2	Power supply
	3	Ground
	4	CAN High
	5	CAN Low

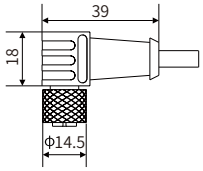
- M12-5 pin socket



- CAN（line color definition of female connector）

M12-5 pin female connector	Line color	
	Definition	PC
	Power supply	Brown
	Ground	White
	CAN High	Yellow
	CAN Low	Green

- CAN（line color definition of right angle female connector）

M12-5pin right angle female connector	Line color	
	Definition	PC
	Power supply	Brown
	Ground	White
	CAN High	Yellow
	CAN Low	Green

- CAN（cable outlet）

Cable code:511816	Definition	Line color
	Power supply	Brown
	Ground	White
	CAN High	Yellow
	CAN Low	Green

Product Parameters-CANopen Output

• Input

Measurement data	Position (vernier magnet)
Stroke length	50~2500 mm

• Output

Interface	CANbus ISO DIS 11898, CANopen complies with CIA DS-301V3.0, Sensor Specification DS-406V3.1
Transmission speed	maximum 1Mbit/s
Resolution	±0.1mm
Nonlinearity	±0.1mm (≤250mm) or 0.04%F.S (>250mm)
Repetition accuracy	±0.1mm
Update time	2ms

• Operating conditions

Magnet velocity	Arbitrary
Protection level	IP67
Operating temperature	-40°C ~ +105°C
Humidity/dew point	Humidity 90%, no condensation
Temperature drift coefficient	<30ppm/℃
Shock index	GB/T2423.5 100g(11ms)
Vibration index	GB/T2423.10 25g/10~2000Hz
EMC test	GB/T17626.2 Electrostatic Discharge Anti-interference, Grade 3, Class A GB/T17626.3 Radio Frequency Electromagnetic Field Radiation Anti-interference, Grade 3, Class A GB/T17626.4 Electric Fast Transient Group Anti-interference, Grade 3, Class B GB/T17626.6 Radio Frequency Field Induced Conducted Disturbance Anti-interference, Grade 3, Class A GB/T17626.8 Power Frequency Magnetic Field Anti-interference, Grade 4, Class A

• Electrical connections

Input voltage	9~ 32Vdc
Power consumption	<1W
Polarity protection	maximum-30Vdc
Overvoltage protection	maximum36Vdc
Insulation resistance	>10MΩ
Insulation strength	500V
Outgoing mode	Cable outlet or connector

• Construction and materials

Electronic compartment	304Lstainless steel
Measuring rod	304Lstainless steel
Operating pressure grade	Rated pressure Pn: 35MPa maximum pressure Pmax: 45MPa for stell rod with diameter of 10mm
Assembly	Any direction
Position magnet	Various ring magnets

Selection Guide-CANopen Output

M	H	A	–	M					–	S		–				–	C	1				–	M		–		
01	02	03		04	05	06	07	08		09	10		11	12	13	14	15	16	17	18	19		20	21		22	23

01 - 03	Sensor shell form
M H A	Hexagon flange shell

04 - 08	Measuring range
	0050~2500mm，step length 1mm

09 - 10	Mounting thread form
S A	Pressure-resistant rod, diameter 10mm

11 - 14	Connection form
P C 0 0	Custom, M12 IP69K, 5 pins（2-3-4-5）
P C	4 wiring harness, M12 IP69K, 5 pins（2-3-4-5）
P C 0 6	60mm，minimum length of wiring harness
P C 2 5	250mm，maximum length of wiring harness
D M	CAN special cable outlet
D M 0 1	1m cable
D M R 1	0.1m cable, ordering method within 1 m

15 - 19	Signal output mode
15 - 16	Output form
C 1	CANopen
17	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		

18	Resolution
1	0.1mm
19	Number of magnet rings
1	Single magnet ring

20 - 21	Non-usable area at head and end, customizable
M 2	27.5mm+36mm

22-23	Country
	Refer to the country list，page 45.

● Selection example

For example：MHA-M0300-SA-DM50-C1411-M2

Indicates: MHA structure hexagonal flange shell, 300mm stroke length, 10mm diameter withstand voltage round pipe, cable outlet form, CANopen output, baud 250kbit/s, resolution 0.1 mm, single magnet ring, head and end non-usable area 27.5 +36.

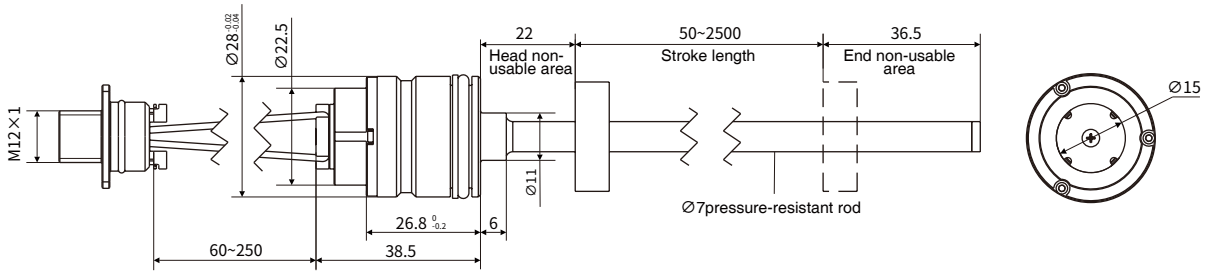
MI Displacement Sensor

Technical characteristics

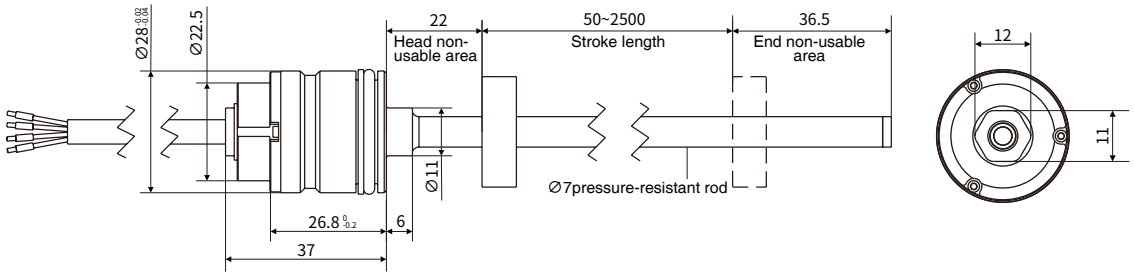
- Specially designed for construction machinery
- High vibration resistance and impact resistance
- Low power consumption design effectively reduces system heating
- Multiple signal (analog and digital signal) output modes
- Linear measurement, absolute position output
- Compact structure, suitable for small Cylinder
- Adapt to harsh environment, IP67 protection level
- Assembled in cylinder, free from environmental and e lectromagnetic interference, non-contact measurement

Structural Shape

Connector external dimensions

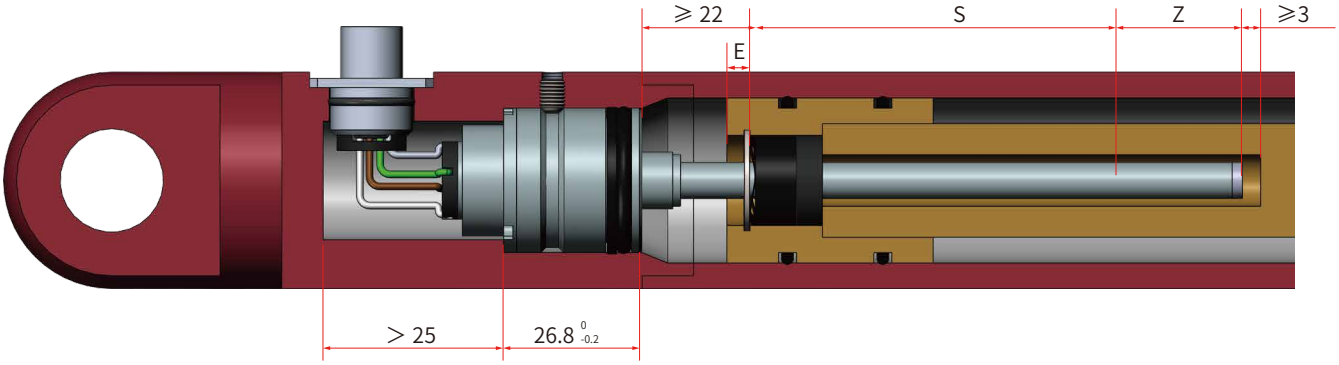


External dimensions of cable outlet



Assembly mode

Example



The assembly method depends entirely on the design of the hydraulic cylinder. The commonly used assembly method is to install from the rod end of the hydraulic cylinder, or to install from the cylinder head end of the hydraulic cylinder. In both assembly methods, O-ring and auxiliary gasket are used for air sealing.

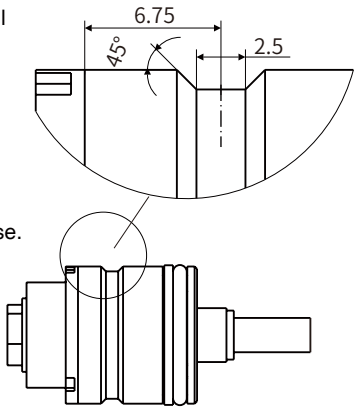
Note：1.The position magnet should not contact the stell rod；

2.Drilling depth of piston rod≥E+Z+3mm；

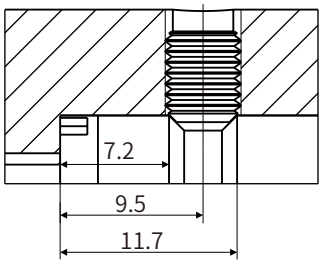
3.Piston rod hole diameter

Stell rod	∅7
Aperture size	⩾∅10

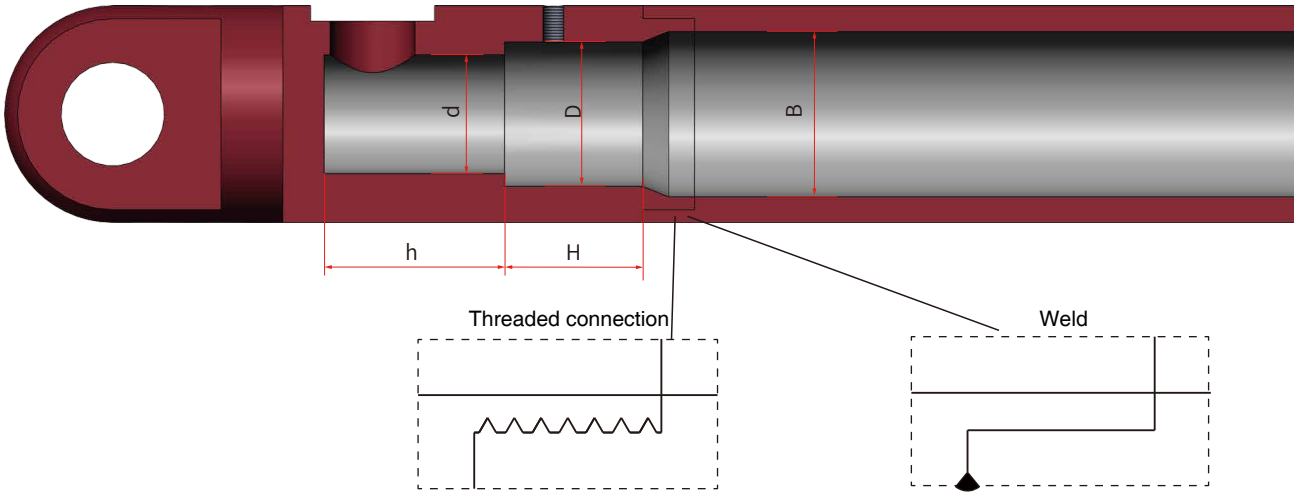
4.Do not exceed the operating pressure during use.



Flange shell with O-ring and auxiliary washer



Use M5 internal hexagon flat-end setting screws for fixation with a maximum torque of 0.5 N/m

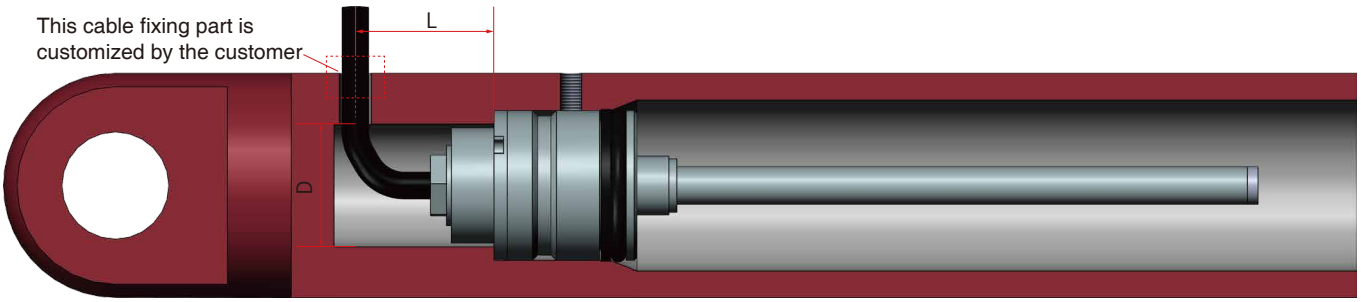


Unit：mm

Model	B Minimum diameter of hydraulic cylinder	D Minimum diameter	H Depth	d Minimum diameter	h Depth
MI	≥32	28H8（Thread） 28G7（Welding）	$26.8^{+0.2}$	23.5	＜25

Assembly mode

Assembly dimensions of outgoing mode



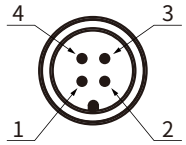
D	L
＞23.5 ＜20	＞ 20

Note: Other dimensions are the same as those of connector cable outlet

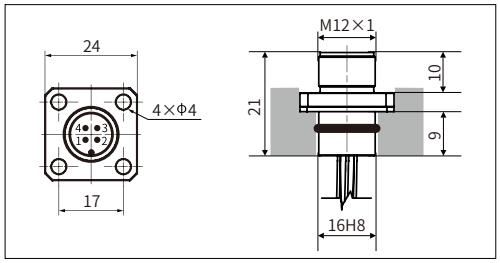
MI-Analog Output

Electrical connections

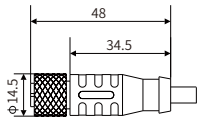
Analog (connector)

M12-4Pin Definition	No.	PA	PB	PC
	1	Power supply	Do not connect	Power supply
	2	Signal	Power supply	Do not connect
	3	Ground	Ground	Ground
	4	Do not connect	Signal	Signal

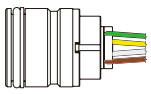
M12-4 pin socket



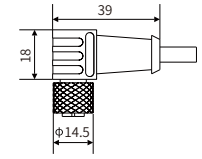
Analog output (line color definition of female connector)

M12-5pin female connector		Line color		
	Definition	PA	PB	PC
	Power supply	Brown	White	Brown
	Ground	Blue	Blue	Blue
	Signal	White	Black	Black

Scattered output

Scattered output	PT	
	Definition	Line color
	Power supply	Brown
	Ground	White
	Signal	Green

Analog output (line color definition of right angle female connector)

M12-5pin right angle female connector		Line color		
	Definition	PA	PB	PC
	Power supply	Brown	White	Brown
	Ground	Blue	Blue	Blue
	Signal	White	Black	Black

Special cable

Cable code:511815	Definition	Line color
	Power supply	Brown
	Ground	White
	Signal	Green

Product Parameters-Analog Output

• Input

Measurement data	Position (vernier magnet)
Stroke length	50~2500 mm

• Output

Current	4 ~ 20mA (load resistance≤250Ω)
Voltage	0.5 ~ 4.5Vdc or 0.25~4.75Vdc (load resistance≥10KΩ)
Resolution	±0.1mm (range＜500mm) range÷4096 (range＞500mm)
Nonlinearity	±0.1mm (≤250mm) or 0.04%F.S (＞250mm)
Repetition accuracy	±0.1mm
Update time	2ms

• Operating conditions

Magnet velocity	Arbitrary
Protection level	IP67
Operating temperature	-40°C ~ +105°C
Humidity/dew point	Humidity 90%, no condensation
Temperature drift coefficient	<30ppm/°C
Shock index	GB/T2423.5 100g (11ms)
Vibration index	GB/T2423.10 15g/10~2000Hz
EMC test	GB/T17626.2 Electrostatic Discharge Anti-interference Degree, Grade 3, Class A GB/T17626.3 Radio Frequency Electromagnetic Field Radiation Anti-interference Degree, Grade 3, Class A GB/T17626.6 Radio Frequency Field Induced Conducted Disturbance Anti-interference Degree, Grade 3, Class A GB/T17626.8 Power Frequency Magnetic Field Anti-interference Degree, Grade 4, Class A

• Electrical connections

Input voltage	8 ~ 32Vdc
Power consumption	<1W
Polarity protection	Maximum-30Vdc
Overvoltage protection	Maximum36Vdc
Insulation resistance	＞10MΩ
Insulation strength	500V
Outgoing mode	Cable outlet or connector

• Construction and materials

Electronic compartment	304L stainless steel
Measuring rod	304L stainless steel
Operating pressure grade	Rated pressure Pn: 30MPa maximum pressure Pmax: 40MPa for stell rod with diameter of 7mm
Assembly	Any direction
Position magnet	Various ring magnets

Selection Guide-Analog Output

M	I	–	M					–	S		–					–				–	M		–		
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
MI	Flange shell Φ28mm

03 - 07	Measuring range
	0050~2500 mm，step length 1mm

08 - 09	Mounting thread form
SF	Pressure-resistant rod, diameter 7mm

10 - 13	Connection form
PA	3 wires, M12 IP69K, 4 pins (1-3-2)
PA06	60mm，minimum length of wiring harness
PA25	250mm，maximum length of wiring harness
PB	3wires, M12 IP69K, 4 pins (2-3-4)
PB06	60mm，minimum length of wiring harness
PB25	250mm，maximum length of wiring harness
PC	3 wires, M12 IP69K, 4 pins (1-3-4)
PC06	60mm，minimum length of wiring harness
PC25	250mm，maximum length of wiring harness
PT	3 scattered, brown-white-green
PT06	60mm，minimum length of wiring harness
PT25	250mm，maximum length of wiring harness
TI	3-pin cable outlet
TI01	1m cable
TIR1	0.1m cable, ordering method within 1 m

14 - 16	Signal output mode
A01	Current output，4~20mA
A11	Current output，20~4mA
V01	Voltage output，0.5~4.5V
V11	Voltage output，4.5~0.5V
V02	Voltage output，0.25~4.75V
V12	Voltage output，4.75~0.25V

17- 18	Non-usable area at head and end, customizable
M6	22mm+36.5mm
M7	22mm+63.5mm

19-20	Country
	Refer to the country list，page 45.

● Selection example

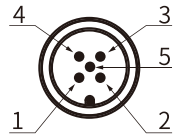
For example：MI-M0300-SF-PA06-A01-M6-CN

Indicates: MI series flange diameter 28mm, 300mm stroke length, 7mm diameter pressure-resistant rod, 60mm, minimum length of wiring harness, current output of 4~20mA, non-usable area at head and end of 22 +36.5.

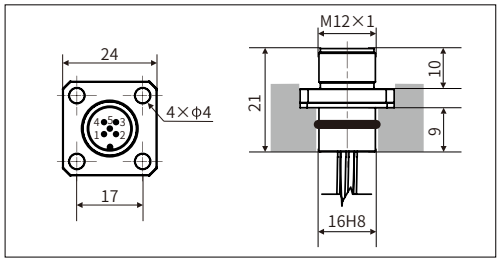
MI-CANopen Output

Electrical connections

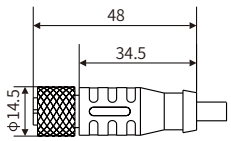
• CAN （connector）

M12-5Pin Definition	No.	PC
	1	Do not connect
	2	Power supply
	3	Ground
	4	CAN High
	5	CAN Low

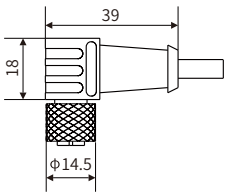
• M12-5 pin socket



• CAN （line color definition of female connector）

M12-5pin female connector	Line color	
	Definition	PC
	Power supply	Brown
	Ground	White
	CAN High	Yellow
	CAN Low	Green

• CAN （line color definition of right angle female connector）

M12-5pin right angle female connector	Line color	
	Definition	PC
	Power supply	Brown
	Ground	White
	CAN High	Yellow
	CAN Low	Green

• CAN （cable outlet）

Cable code：511816	Definition	Line color
	Power supply	Brown
	Ground	White
	CAN High	Yellow
	CAN Low	Green

Product parameters-CANopen Output

• Input

Measurement data	Position (Vernier magnet)
Stroke length	50~2500 mm

• Output

Interface	CAN bus ISO DIS 11898, CANopen complies with CIA DS-301V3.0, Sensor Specification DS-406V3.1
Transmission speed	maximum1Mbit/s
Resolution	±0.1mm
Nonlinearity	±0.1mm（≤250mm）or 0.04%F.S（>250mm）
Repetition accuracy	±0.1mm
Update time	2ms

• Operating conditions

Magnet velocity	Arbitrary
Protection level	IP67
Operating temperature	-40℃ ~ +105℃
Humidity/dew point	Humidity 90%, no condensation
Temperature drift coefficient	<30ppm/℃
Shock index	GB/T2423.5 100g（11ms）
Vibration index	GB/T2423.10 15g/10~2000Hz
EMC test	GB/T17626.2 Electrostatic Discharge Anti-interference Degree, Grade 3, Class A GB/T17626.3 Radio Frequency Electromagnetic Field Radiation Anti-interference Degree, Grade 3, Class A GB/T17626.6 Radio Frequency Field Induced Conducted Disturbance Anti-interference Degree, Grade 3, Class A GB/T17626.8 Power Frequency Magnetic Field Anti-interference Degree, Grade 4, Class A

• Electrical connections

Input voltage	8~ 32Vdc
Power consumption	<1W
Polarity protection	maximum -30Vdc
Overvoltage protection	maximum 36Vdc
Insulation resistance	＞10MΩ
Insulation strength	500V
Outgoing mode	Cable outlet or connector

• Construction and materials

Electronic compartment	304L stainless steel
Measuring rod	304L stainless steel
Operating pressure grade	Rated pressure Pn: 30MPa maximum pressure Pmax: 40MPa for stell rod with diameter of 7mm
Assembly	Any direction
Position magnet	Various ring magnets

Selection Guide-CANopen Output

M	I	–	M					–	S		–					–	C	1				–	M		–		
01	02		03	04	05	06	07		08	09		10	11	12	13		14	15	16	17	18		19	20		21	22

01 - 02 Sensor shell form

M I	Flange shell Φ 28mm

03 - 07 Measuring range

0050~2500 mm，step length 1mm

08 - 09 Mounting thread form

S F	Pressure-resistant rod, diameter 7mm

10 - 13 Connection form

P C	4 wiring harness, M12 IP69K, 5 pins (2-3-4-5)
P C 0 6	60mm，minimum length of wiring harness
P C 2 5	250mm，maximum length of wiring harness
T M	CAN special cable outlet
T M 0 1	1m cable
T M R 1	0.1m cable, ordering method within 1 m

15 - 19 Signal output mode

15 - 16 Output form

C 1	CANopen

17 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		

18 Resolution

1	0.1mm

19 Number of magnet rings

1	Single magnet ring

17- 18 Non-usable area at head and end, customizable

M 6	22mm+36.5mm
M 7	22mm+63.5mm

21-22 Country

Refer to the country list，page 45.

• Selection example

For example：MI-M0300-SF-TI50-C1411-M6-CN

Indicates: MI rod series flange diameter 28mm, stroke length 300mm, pressure-resistant rod with diameter 7mm, cable outlet form, CANopen output, baud 250kbit/s, resolution 0.1 mm, single magnet ring, non-usable area at head and end 22 +36.5.

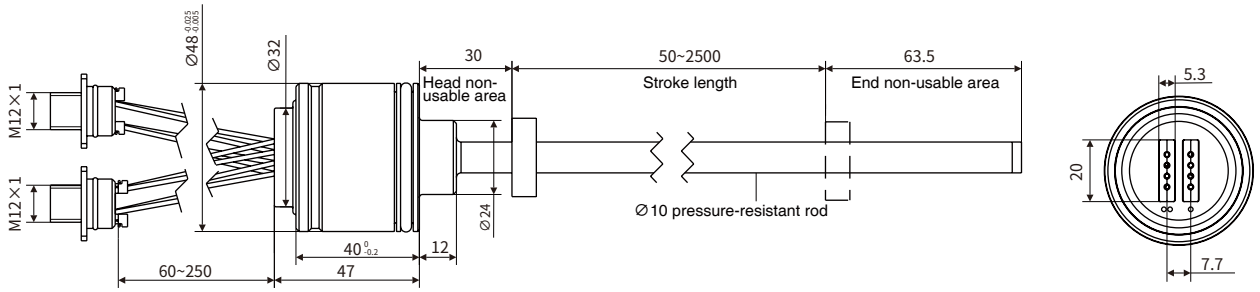
MT Displacement Sensor

Technical characteristics

- Specially designed for construction machinery
- High vibration resistance and impact resistance
- Low power consumption design effectively reduces system heating
- Multiple signal (analog and digital signal) output modes
- Linear measurement, absolute position output
- Adapt to harsh environment, IP67 protection level
- Assembled in Cylinder, free from environmental and electromagnetic interference, non-contact measurement
- Redundant sensor system to improve the safety and s tability of construction machinery

Structural shape

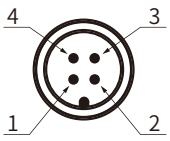
Connector external dimensions



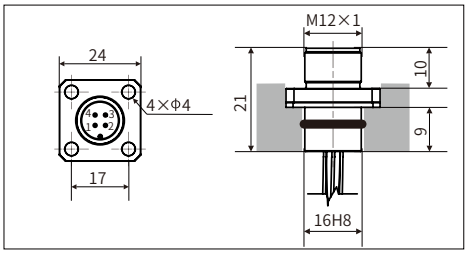
MT-Analog Output

Electrical connections

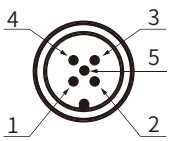
- Channel 1 analog (connector)

M12-4 Pin Definition	No.	PD
	1	Power supply
	2	Do not connect
	3	Ground
	4	Signal

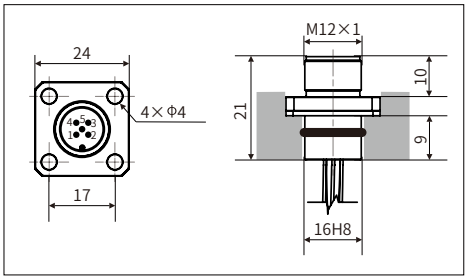
- M12-4pin socket



- Channel 2 analog (connector)

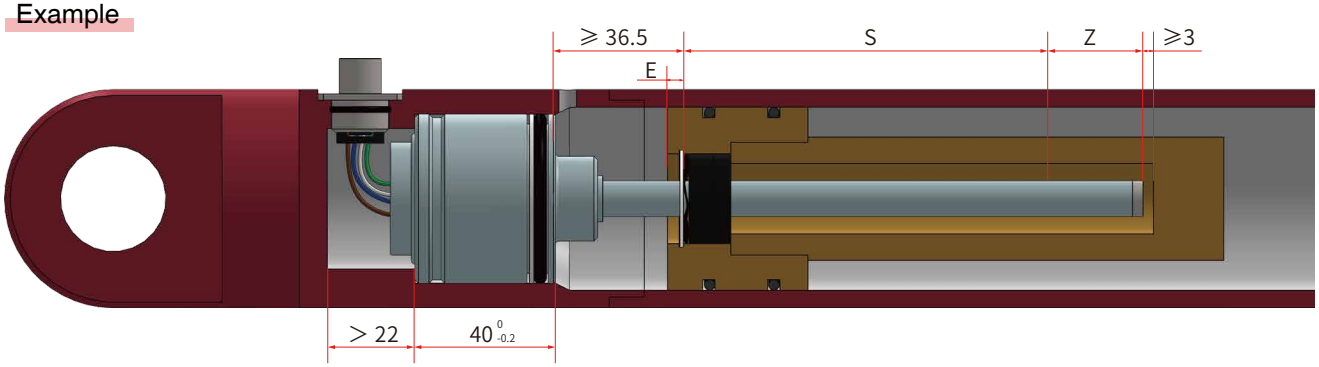
M12-5 Pin Definition	No.	PD
	1	Power supply
	2	Signal
	3	Ground
	4	Do not connect
	5	Do not connect

- M12-5pin socket



Assembly mode

Example

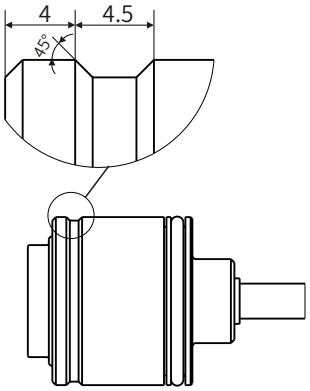


The assembly method depends entirely on the design of the hydraulic cylinder. The commonly used assembly method is to install from the rod end of the hydraulic cylinder, or to install from the cylinder head end of the hydraulic cylinder. In both assembly methods, O-ring and auxiliary gasket are used for air sealing.

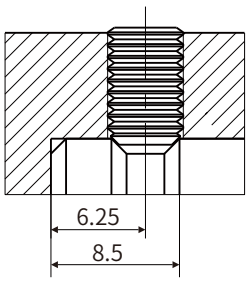
Note: 1.The position magnet should not contact the stell rod;
2.Drilling depth of piston rod ≥ E+Z+3mm;
3.Piston rod hole diameter

Stell rod	∅10
Aperture size	⩾∅13

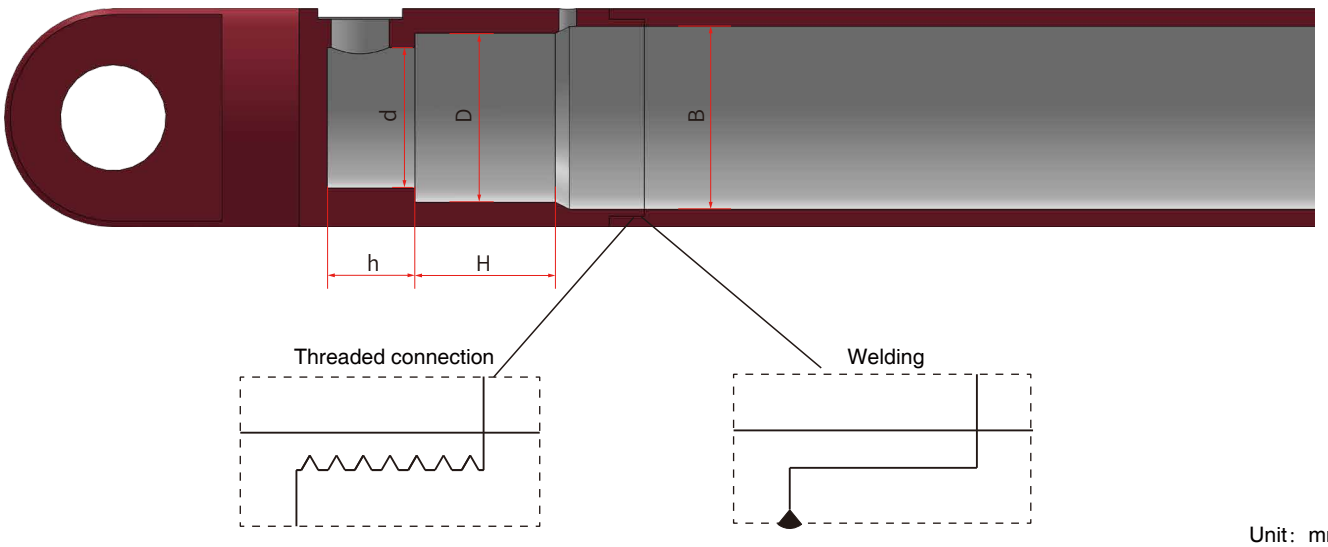
4.Do not exceed the operating pressure during use.



Flange shell with O-ring and auxiliary washer



Use M5 internal hexagon flat-end setting screws for fixation with a maximum torque of 0.5 N/m



Unit: mm

Model	B Minimum diameter of hydraulic cylinder	D Minimum diameter	H Depth	d Minimum diameter	h Depth
MT	52	48H8（thread） 48G7（welding）	$40^{+0.2}$	> 32.5 < 40	>22

Product parameters

• Input

Measurement data	Position (vernier magnet)
Stroke length	50~2500 mm

• Output

Current	4 ~ 20mA（load resistance≤250Ω）
Voltage	0.5 ~ 4.5Vdc or 0.25~4.75Vdc（load resistance≥10KΩ）
Resolution	±0.1mm（range＜500mm） range÷4096（range＞500mm）
Nonlinearity	±0.1mm（≤250mm）or 0.04%F.S（＞250mm）
Repetition accuracy	±0.1mm
Update time	2ms

• Operating conditions

Magnet velocity	Arbitrary
Protection level	Sensor shell IP67; M12 Connector System IP69K
Operating temperature	-40℃ ~ +105℃
Humidity/dew point	Humidity 90%, no condensation
Temperature drift coefficient	<30ppm/℃
Shock index	GB/T2423.5 100g（6ms）
Vibration index	GB/T2423.10 15g/10~2000Hz
EMC test	GB/T17626.2 Electrostatic Discharge Anti-interference, Grade 3, Class B GB/T17626.3 Radio Frequency Electromagnetic Field Radiation Anti-interference, Grade 3, Class A GB/T17626.4 Electric Fast Transient Group Anti-interference, Grade 3, Class B GB/T17626.5 Surge (Impact) Anti-interference, Grade 3, Class B GB/T17626.6 Radio Frequency Field Induced Conducted Disturbance Anti-interference, Grade 3, Class A GB/T17626.8 Power Frequency Magnetic Field Anti-interference, Grade 4, Class A

• Electrical connections

Input voltage	9~ 32Vdc
Power consumption	<1W
Polarity protection	maximum -30Vdc
Overvoltage protection	maximum 36Vdc
Insulation resistance	＞10MΩ
Insulation strength	500V
Outgoing mode	Cable outlet or connector

• Construction and materials

Electronic compartment	304L stainless steel
Measuring rod	304L stainless steel
Operating pressure grade	Rated pressure Pn: 35MPa maximum pressure Pmax: 45MPa for stell rod with diameter of 10mm
Assembly	Any direction
Position magnet	Various ring magnets

Selection Guide

M	T	–	M					–	S		–					–				–	M		–		
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
MT	Sensor shell Φ48mm

03 - 07	Measuring range
	0050~2500 mm，step length 1mm

08 - 09	Mounting thread form
SA	Pressure-resistant rod, diameter 10mm

10 - 13	Connection form
PD	Channel 1: 4 single leads, M12 IP69K, 4 pins (1-3-4)　Channel 2: 4 single leads, M12 IP69K, 5 pins (1-3-2)
PD06	60mm， minimum length of wiring harness
PD25	250mm，maximum length of wiring harness

14 - 16	Signal output mode
V20	Voltage output，0.25~4.75V，0.25~4.75V
V21	Voltage output，0.5~4.5V， 0.5~4.5V
V22	Voltage output，4.75~0.25V，4.75~0.25V
V23	Voltage output，4.5~0.5V，4.5~0.5V
V30	Voltage output，0.25~4.75V，4.75~0.25V
V31	Voltage output，0.5~4.5V，4.5~0.5V
A20	Current output，4~20mA，4~20mA
V21	Current output，20~4mA，20~4mA
A30	Current output，4~20mA，20~4mA

17- 18	Non-usable area at head and end, customizable
M1	30mm+63.5mm

19-20	Country
	Refer to the country list，page 45.

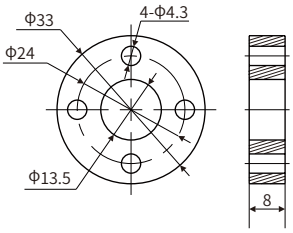
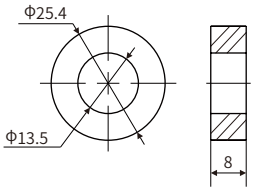
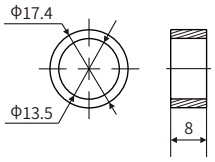
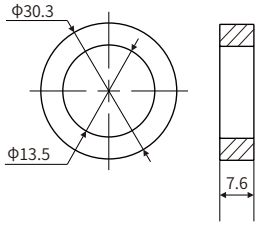
● Selection example

For example：MT-M0300-SA-PD08-A20-M1-CN

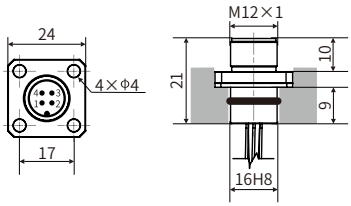
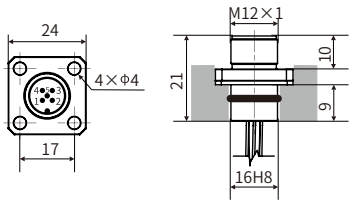
Indicates: MT series flange diameter 48mm, stroke length 300mm, pressure-resistant rod with diameter 10mm, two-way M12 connector, current output of 4~20mA, non-usable area at head and end of 30 +63.5.

浙达精益
ZHEDA JINGYI

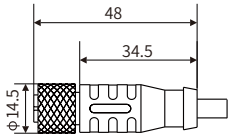
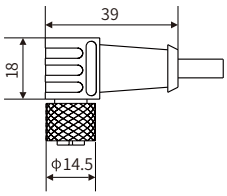
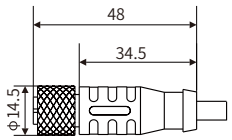
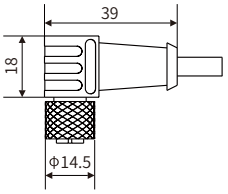
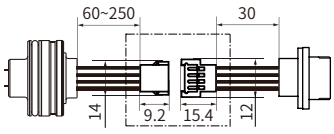
Magnet ring Selection

Accessory name/model	Dimensions	Description
 Magnet ring kit Order No.：288501		Magnetic isolation gasket: size same as magnet ring, thickness 5mm Screws：GB/T70.1，M4X18，material304 Spring gasket：GB/T 93，φ 4，material304 Includes: 1 magnet ring, 1 gasket, 4 screws with elastic gasket
 Magnet ring kit Order No.：288506		Magnetic isolation gasket: size same as magnet ring, thickness 5mm Retaining ring：GB/T893,264 Includes: 1 magnet ring, 2 gaskets, 1 retaining ring
 Magnet ring kit Order No.：288507		Magnetic isolation gasket: size same as magnet ring, thickness 5mm Retaining ring：GB/T 893，18 Includes: 1 magnet ring, 2 gaskets, 1 retaining ring
 Magnet ring kit Order No.：288509		Magnetic isolation gasket: size same as magnet ring, thickness 5mm Retaining ring：GB/T893，18 Includes: 1 magnet ring, 2 gaskets, 1 retaining ring

Cable selection

Accessory name/model	Dimensions	Description
 MH Analog Special Cable (M) Order No.：511806	3C×0.5SQ φ5.5±0.2mm	Conductor: 3-pin, brown/white/green Sheath color: grey Shielding layer: tinned copper woven mesh Sheath material: 105℃ polyvinyl chloride (PVC) Temperature：(-40~105℃)
 CAN StaticTPU Cable(C) Order No.：511816	2×2×24AWG φ6.3±0.1mm	Conductor: 4-pin, brown/white, yellow/green Sheath color: Purple Sheath Material: Polyurethane (TPU) characteristic impedance：110±15Ω Temperature：(-40~85℃)
 PUR Black Cable Order No.： 511809	5×0.25mm² φ5.6±0.2mm	Conductor: 5-pin, brown/white/blue/black/gray Sheath color: Black Shielding layer: tinned copper woven mesh Sheath material：PUR Temperature：(-40~80℃)
 TPU three-pin black cable(M) Order No.：511815	3C×0.2SQ φ5.1±0.2mm	Conductor: 3-pin, brown/white/green- Sheath color: Black Shielding layer: tinned copper woven mesh Sheath Material: Polyurethane (TPU) Temperature：(-40~80℃)
 MH 4-pin loose wire socket Order No.：600000		
 MH 5-pin loose wire socket Order No.：600001		

Cable selection

Accessory name/model	Dimensions	Description
 5-pin M12 female connector Order No.：521801-2/3/5/10/15	 5×0.25mm² φ5.6±0.2mm	Conductor: 5-pin, brown/white/blue/black/gray Sheath color: Black Shielding layer: tinned copper woven mesh Sheath material：PUR Temperature：(-40~80°C) Line length: 2m/3m/5m/10m/15m
 5-pin M12 right angle female connector Order No.： 521804-2/3/5/10/15	 5×0.25mm² φ5.6±0.2mm	Conductor: 5-pin, brown/white/blue/black/gray Sheath color: Black Shielding layer: tinned copper woven mesh Sheath material: PUR Temperature：(-40~80°C) Line length: 2m/3m/5m/10m/15m
 5-pin M12 female connector Order No.：521806-3/5/10	 2×2×0.22mm² φ7.6mm	Conductor: 4-pin, brown/white, yellow/green Sheath color: Purple Shielding layer: copper wire preparation Application characteristics: Impedance 120 Ω, special for CAN Temperature：(-30~80°C) Line length: 3m/5m/10m
 5-pin M12 right angle female connector Order No.：521805-3/5/10	 2×2×0.22mm² φ7.6mm	Conductor: 4-pin, brown/white, yellow/green Sheath color: Purple Shielding layer: copper wire preparation Application characteristics: Impedance 120 Ω, special for CAN Temperature：(-30~80°C) Line length: 3m/5m/10m
 MH adapter harness Order No.：522007		When the Cylinder threading hole is less than 16H8, This harness switching can be used,Plastic shell thickness: 2.8 mm

Industrial Application

Metallurgical industry

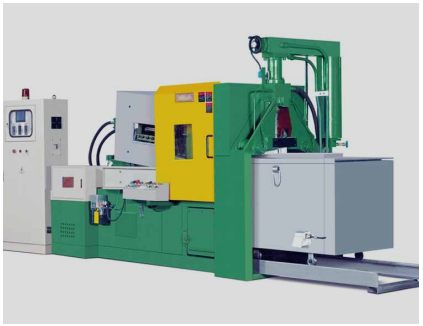
Port machinery

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 DIvoire (Ivory Coast) 象牙海岸
HR - Croatia (Hrvatska) 克罗地亚
CU - Cuba 古巴
CY - Cyprus 塞普路斯
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 米克罗尼西亚
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
NO - Norway 挪威

OM - Oman 阿曼

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
PY - Paraguay 巴拉圭
PE - Peru 秘鲁
PH - Philippines 菲律宾
PN - Pitcairn 皮特克恩岛
PL - Poland 波兰
PT - Portugal 葡萄牙
PR - Puerto Rico 波多黎各

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
WS - Samoa 西萨摩亚
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 斯罗文尼亚
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 圣皮艾尔和密克隆群岛
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
SZ - Swaziland 斯威士兰
SE - Sweden 瑞典
CH - Switzerland 瑞士
SY - Syria 叙利亚

TW - Taiwan 中国台湾省
TJ - Tajikistan 塔吉克斯坦
TZ - Tanzania 坦桑尼亚
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 土尔其
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

www.tecsensors.com

不求五百强 但求五百年

中 国 创 造 · 创 造 中 国

400-809-1101

杭州浙达精益机电技术股份有限公司

Hangzhou Zheda Jingyi Electromechanical Technology Corporation Limited

销售热线(Sales Hotline):+86(0)571-8720 3588 / 3968

技术支持(Technical Support):+86 152 6704 5861

传　真(Fax):+86(0)571-8971 9270　　邮　箱(E-mail)info.us@tecsensors.com

公司官网(Company Web): www.tecsensors.com

Headquarters Address (Add): Rooms 401~405, Building 18, Zhejiang Overseas High-level Talent Innovation Park, No.998 Wenyi West Road, Yuhang District, Hangzhou, Zhejiang Province

Address of Sensor Division (Add): No.8-1 Longquan Road, Cangqian Industrial Park, Yuhang District, Hangzhou City, Zhejiang Province

(New plant address: No. 4, Changsong Street, Cangqian Street, Yuhang District, Hangzhou City, Zhejiang Province)

邮　编(P.C.): 311121

R-202210(C3)