

Magnetostrictive Displacement Sensor

M Series Product manual

Honorary Qualification



MI Displacement Sensor

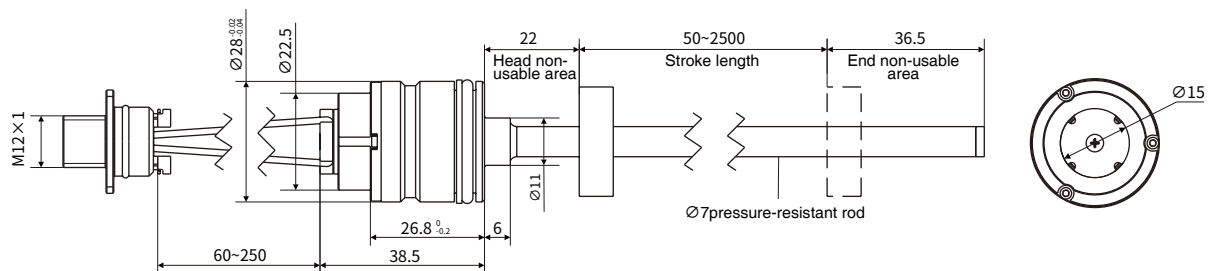


Technical characteristics

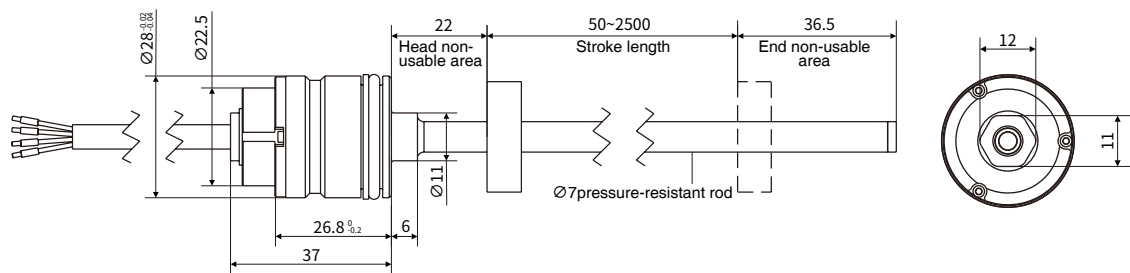
- Specially designed for construction machinery
- High vibration resistance and impact resistance
- Low power consumption design effectively reduces system heating
- Multiple signal (analog and digital signal) output modes
- Linear measurement, absolute position output
- Compact structure, suitable for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

Structural Shape

Connector external dimensions

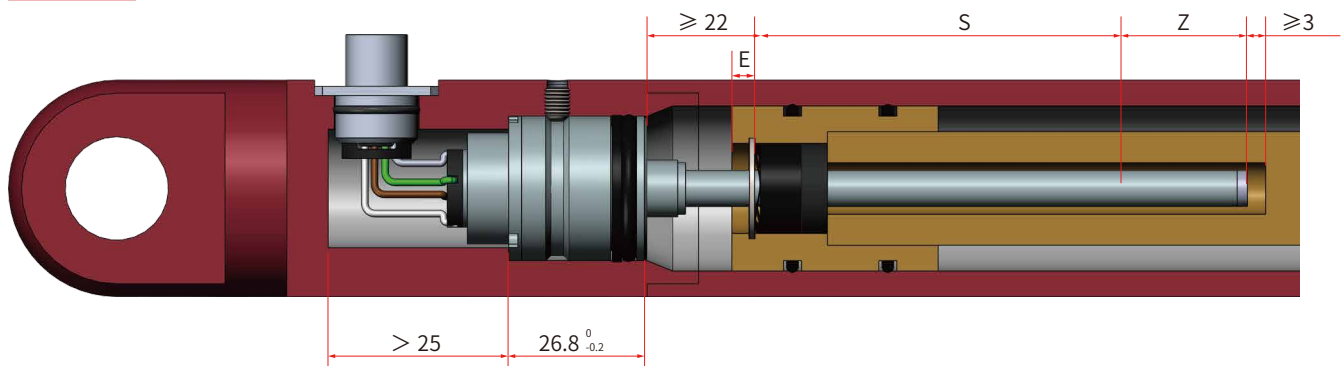


External dimensions of cable outlet



▶ Assembly mode

Example

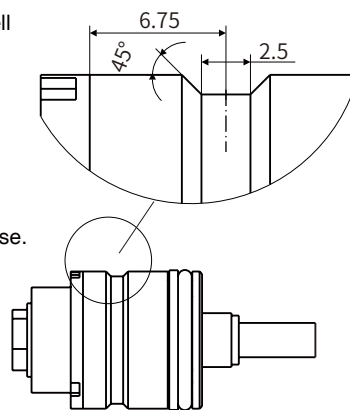


The assembly method depends entirely on the design of the hydraulic cylinder. The commonly used assembly method is to install from the rod end of the hydraulic cylinder, or to install from the cylinder head end of the hydraulic cylinder. In both assembly methods, O-ring and auxiliary gasket are used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

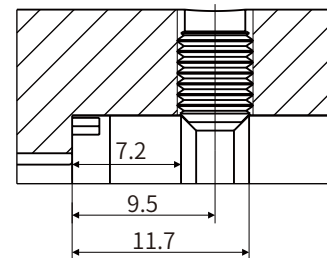
- Note:
1. The position magnet should not contact the steel rod;
 2. Drilling depth of piston rod $\geq E+Z+3\text{mm}$;
 3. Piston rod hole diameter

Steel rod	$\varnothing 7$
Aperture size	$\geq \varnothing 10$

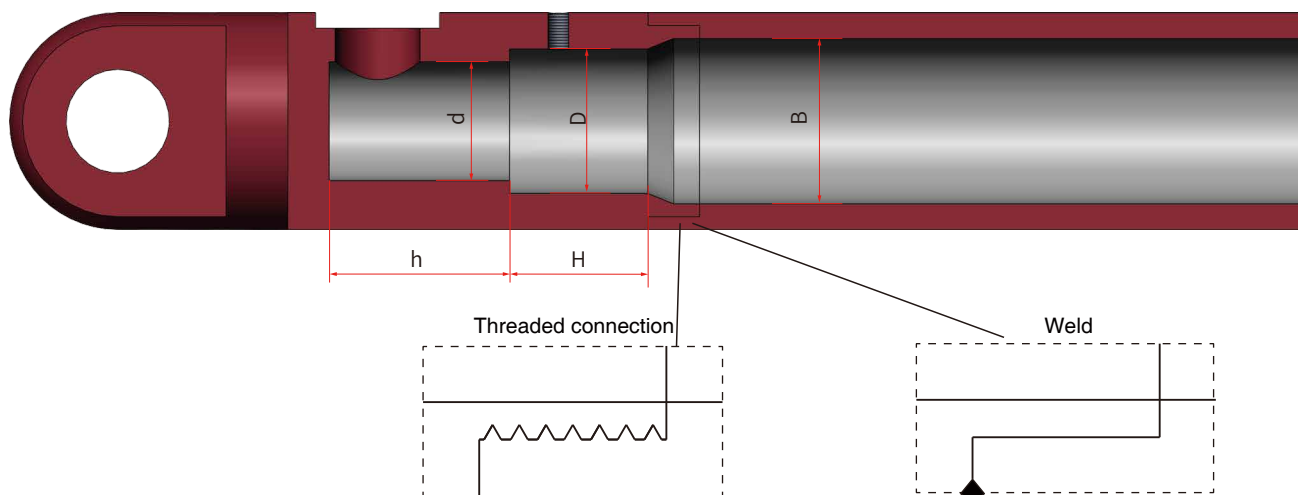
4. Do not exceed the operating pressure during use.



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

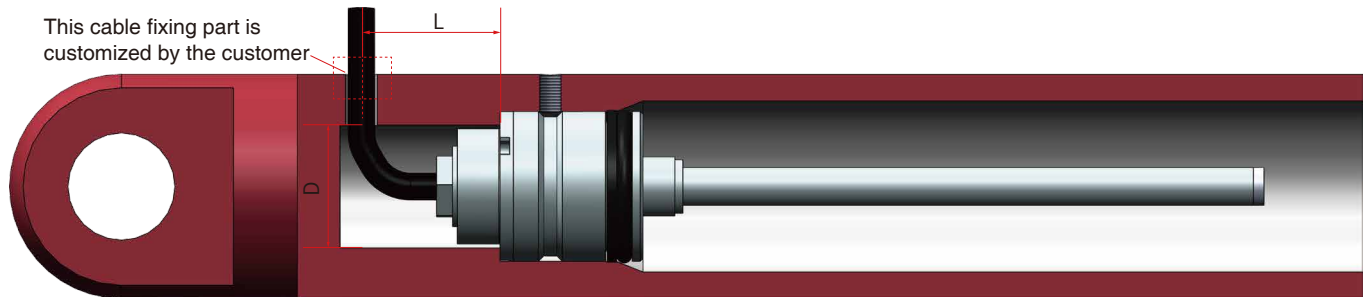


Unit: mm

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

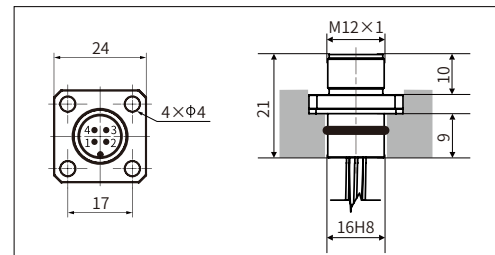
MI-Analog Output

▶ 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 $\leq 250\Omega$)
Voltage	0.5 ~ 4.5Vdc or 0.25~4.75Vdc (load resistance $\geq 10K\Omega$)
Resolution	$\pm 0.1\text{mm}$ (range $< 500\text{mm}$) range $\div 4096$ (range $> 500\text{mm}$)
Nonlinearity	$\pm 0.1\text{mm}$ ($\leq 250\text{mm}$) or 0.04%F.S ($> 250\text{mm}$)
Repetition accuracy	$\pm 0.1\text{mm}$
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	$< 30\text{ppm}/^\circ\text{C}$
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	$< 1\text{W}$
Polarity protection	Maximum-30Vdc
Overvoltage protection	Maximum36Vdc
Insulation resistance	$> 10M\Omega$
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

MI - M - S - - - M

01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18

01 - 02				Sensor shell form															
M	I	Flange shell Φ28mm																	
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	A			3 wires, M12 IP69K, 4 pins (1-3-2)															
P	A	0	6	60mm , minimum length of wiring harness															
P	A	2	5	250mm , maximum length of wiring harness															
P	B			3wires, M12 IP69K, 4 pins (2-3-4)															
P	B	0	6	60mm , minimum length of wiring harness															
P	B	2	5	250mm , maximum length of wiring harness															
P	C			3 wires, M12 IP69K, 4 pins (1-3-4)															
P	C	0	6	60mm , minimum length of wiring harness															
P	C	2	5	250mm , maximum length of wiring harness															
P	T			3 scattered, brown-white-green															
P	T	0	6	60mm , minimum length of wiring harness															
P	T	2	5	250mm , maximum length of wiring harness															
T	I			3-pin cable outlet															
T	I	0	1	1m cable															
T	I	R	1	0.1m cable, ordering method within 1 m															
14 - 16				Signal output mode															
A	0	1	Current output , 4~20mA																
A	1	1	Current output , 20~4mA																
V	0	1	Voltage output , 0.5~4.5V																
V	1	1	Voltage output , 4.5~0.5V																
V	0	2	Voltage output , 0.25~4.75V																
V	1	2	Voltage output , 4.75~0.25V																
17- 18				Non-usable area at head and end, customizable															
M	6	22mm+36.5mm																	
M	7	22mm+63.5mm																	

● Selection example

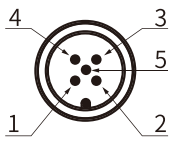
For example: MI-M0300-SF-PA06-A01-M6

Indicates: MI 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 mm+36.5mm.

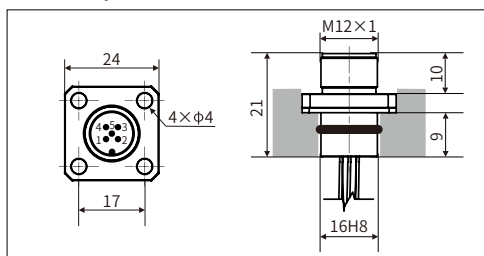
MI-CANopen Output

Electrical connections

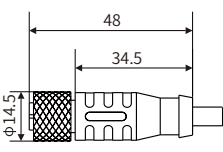
• CAN (connector)

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

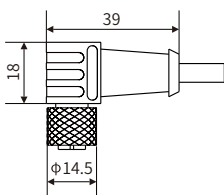
• M12-5 pin socket



• 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

MI - M - S - - C1 - 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													
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															

● Selection example

For example: MI-M0300-SF-TM05-C1411-M6

Indicates: MI 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 22mm +36.5mm.