

Magnetostrictive Displacement Sensor

M Series Product manual

Honorary Qualification



MH Displacement Sensor

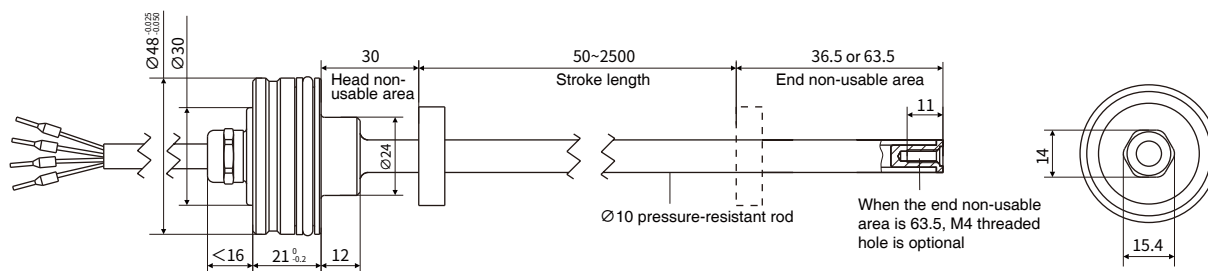


Technical characteristics

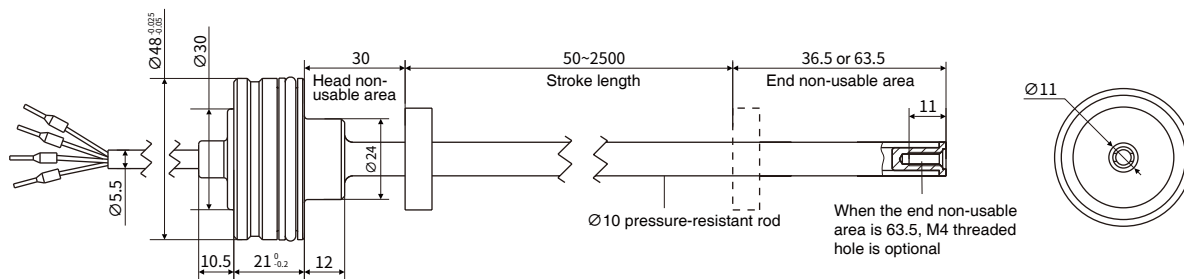
- Specially designed for construction machinery
- High vibration resistance and impact resistance
- Low power consumption design effectively reduces system heating
- Multiple outgoing modes, suitable for different sizes of cylinder
- Linear measurement, absolute position output
- Adapt to harsh environment, 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

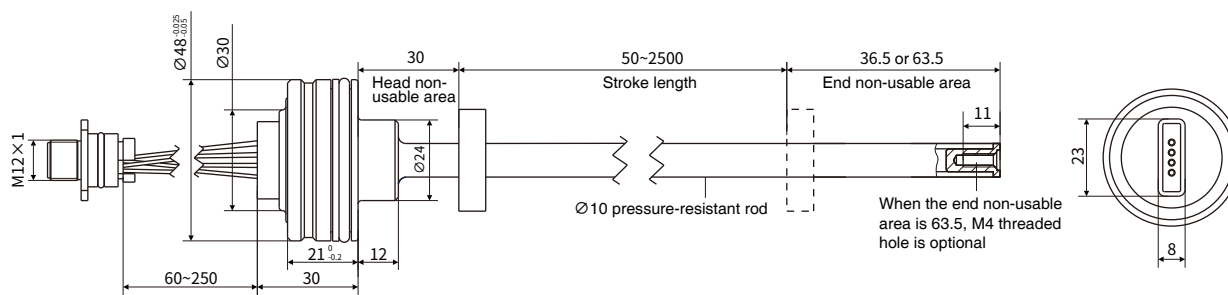
External dimensions of cable outlet (fastening mode DM)



External dimensions of cable outlet (fastening method QM)

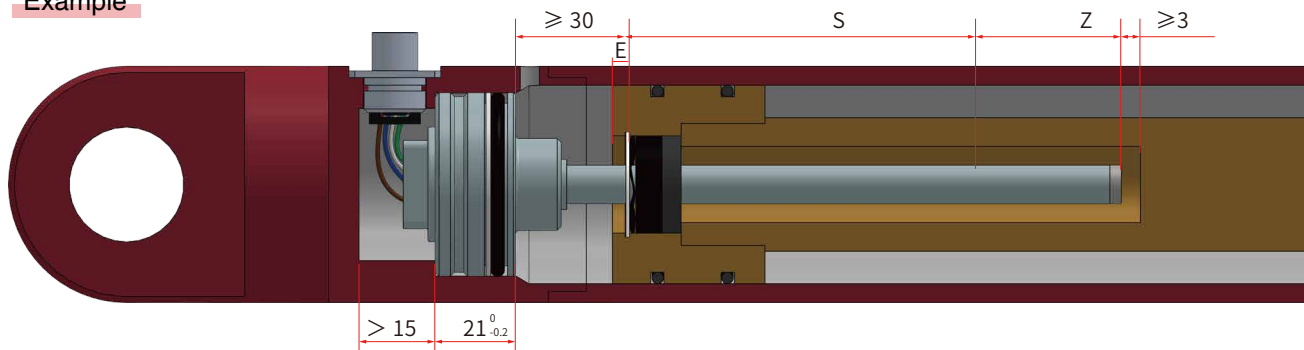


Head non-usable area



▶ Assembly mode

Example

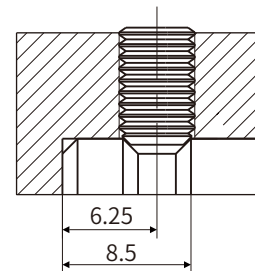
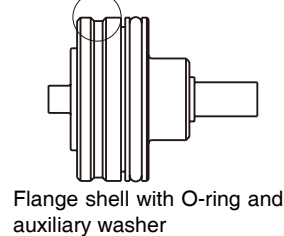
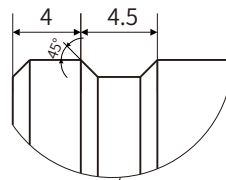


The assembly method depends on the design of the hydraulic cylinder. The commonly used assembly method is to assembly from the rod end of the hydraulic cylinder, or to assembly from the cylinder head end of the hydraulic cylinder. In both assembly methods, O-ring and auxiliary gasket are used for air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

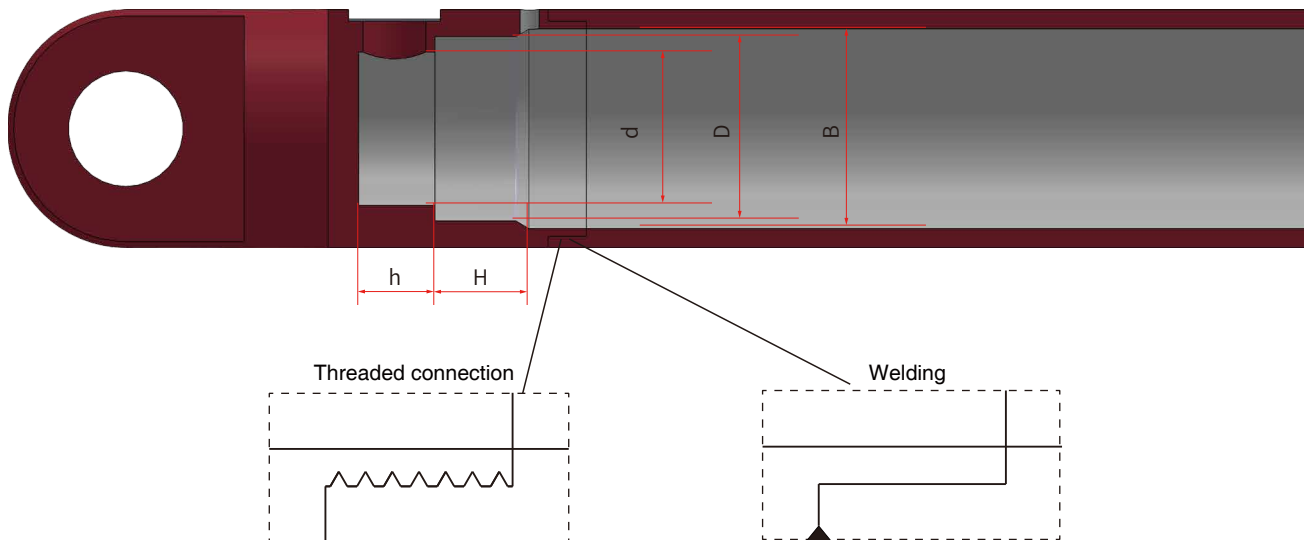
- Note: 1. The position magnet should not contact the steel rod;
 2. Drilling depth of piston rod $\geq E+Z+3\text{mm}$;
 3. Piston rod hole diameter

Pressure-resistant rod	$\varnothing 10$
Aperture size	$\geq \varnothing 13$

4. Do not exceed the operating pressure during use.



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

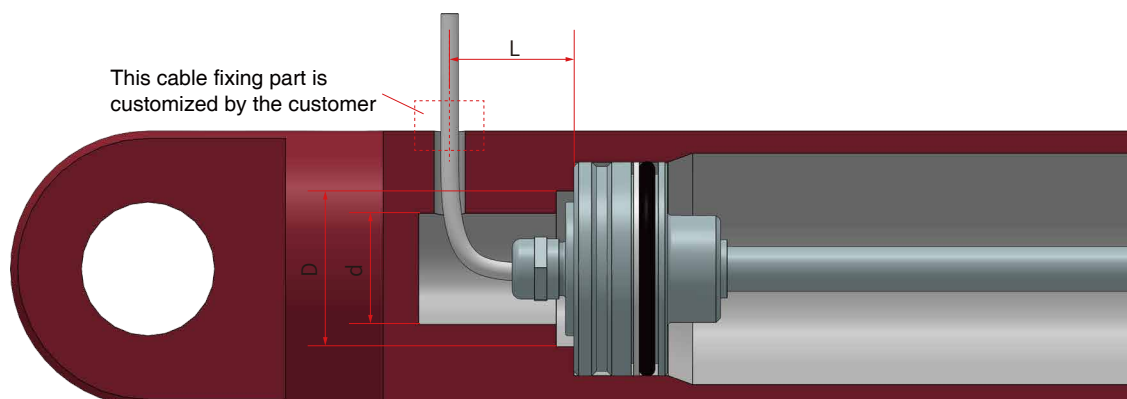


Unit: mm

Model	B Minimum diameter of hydraulic cylinder	D Minimum diameter	H Depth	d Minimum diameter	h Depth
MH	52	48H8 (thread) 48G7 (welding)	$21^{+0.2}$	$> 32.5 < 40$	> 15

▶ Assembly mode

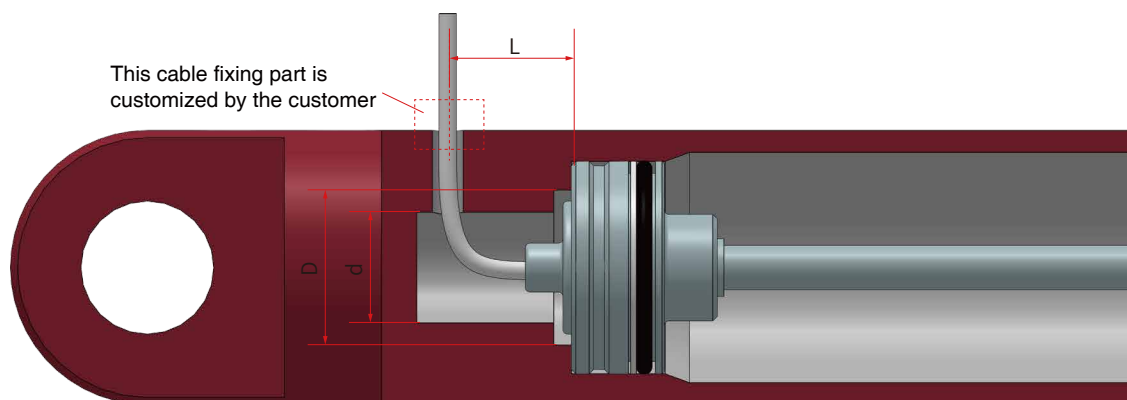
Assembly dimensions of outgoing mode-cable outlet (DM)



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

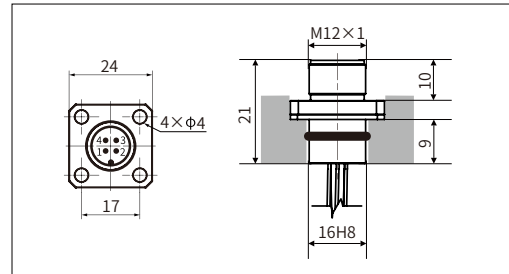
Note: Other dimensions are the same as those of connector outlet

Electrical connections

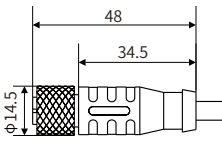
• Analog (connector)

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

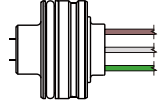
• M12-4 pin socket



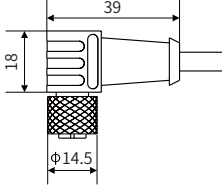
• Analog output (line color definition of female connector)

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 $\leq 250\Omega$)
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 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	$< 1\text{W}$
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	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

MH - 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 H	Flange shell Φ48mm
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03 - 07 Measuring range

0050~2500 mm, step length 1mm

08 - 09 Mounting thread form

S A	Pressure-resistant rod, diameter 10mm
S C	Pressure-resistant rod, 10mm diameter; M4 thread at the end
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 	3 wires, 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

D M 	3-pin cable outlet
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D M 0 1	1m cable
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D M R 1	0.1m cable, ordering method within 1 m
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Q M 	3-pin cable outlet (internal thread fastening)
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Q M 0 1	1m cable
---	----------

Q M R 1	0.1m cable, ordering method within 1 m
---	--

14 - 16 Signal output mode

A 0 1	Current output, 4~20mA
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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
---	----------------------------

V 0 3	Voltage output, 0~10V
---	-----------------------

V 1 3	Voltage output, 10~0V
---	-----------------------

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

M 0	30mm+36.5mm
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M 1	30mm+63.5mm
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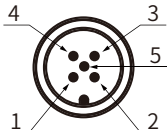
● Selection example

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

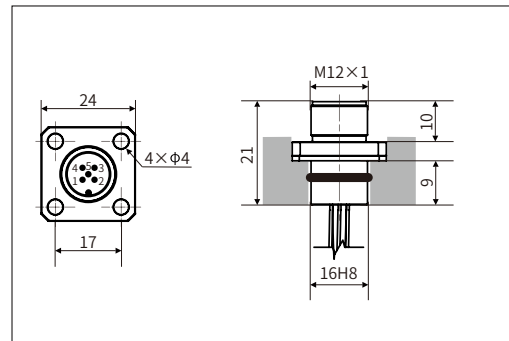
Indicates: MH flange diameter 48mm, stroke length of 300mm, pressure-resistant rod with diameter of 10mm, M12 4-pin male connector, current output of 4~20mA, non-usable area at head and end of 30mm + 36.5 mm.

Electrical connections

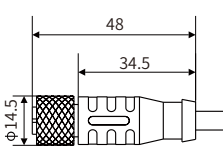
• CAN (connector)

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

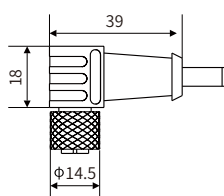
• M12-5 pin socket



• 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

MH - 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		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																							

● Selection example

For example: MH-M0300-SA-DM05-C1411-M1

Indicates: MH 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 30mm +63.5mm.