



CNS-MLS series

Magnetic navigation sensor

Manual

Thank you for using our products.

This manual explains the usage and safety precautions of the product.

* Read this manual carefully and pay attention to safety during use.

* Keep this manual in a suitable place for easy reference.

Guangdong Hinson Technology Co., Ltd

Version Notice

Document Version	Add or remove information
V1.1	Added some PDO default mapping instructions for CAN OPEN
V1.2	Added instructions for going straight on the 03 fork road

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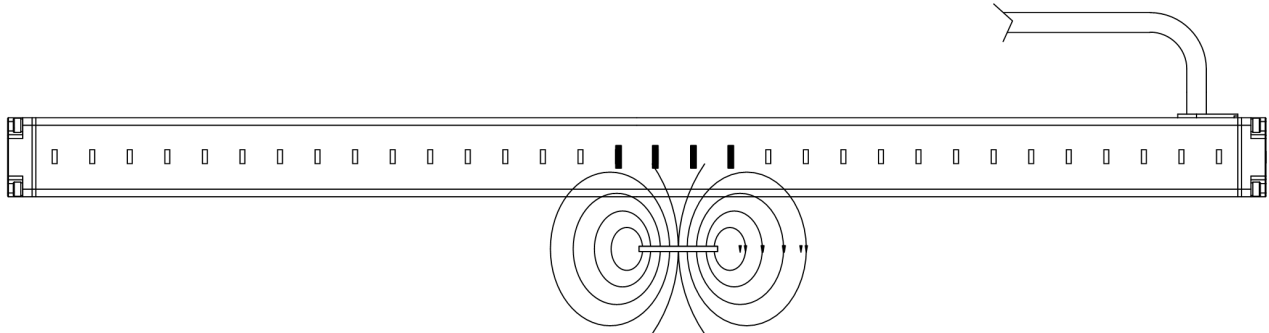
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1 FUNCTION

1.1 DETECTION PRINCIPLE

By detecting the magnetic field signal strength, this magnetic stripe is compared to the sensor position.



Picture (1.1)

1.2 MAIN PERFORMANCE

Basic features	
Detection height	0-50mm (When the surface magnetic strength is 90 Gaussian magnetic strips)
Detection range	150-630mm
Detection accuracy	1mm
Number of measurement points	16-64
Measurement point spacing	10mm
Detection signal	N pole magnetic field signal or S pole magnetic field signal
Performance	
Response time	5ms
Basic error	1mm
Magnetic field strength range	1.5 Gauss-165 Gauss
Number of magnetic strip detections	3 lines
Position output	Support
Digital signal output	Support
Intensity signal output	Support
Fork selection function	Support
Interface	
RS232 port	1
RS485 port	1 (supports Modbus)
CAN BUS port	1 (supports CAN OPEN)

Electrical performance	
Working voltage	DC10 - 36V
Current consumption	Typical value of less than 20mA
Physical property	
Shell material	Aluminum alloy
Working enviroment	
Background magnetic field	Less than 1 Gaussian
Working enviroment	-10℃ - 50℃

2 PREPARATION

2.1 PACKING LIST

Please confirm whether the product name and product model on the outer label of the product packaging box are consistent with the purchase of the product;

Please confirm that the product name and model are determined through the external label of the product;

Please confirm whether the items of the following parts are complete after opening the box, please contact the supplier if you are not complete;

Product	Quantity
CNS-MLS	1PCS

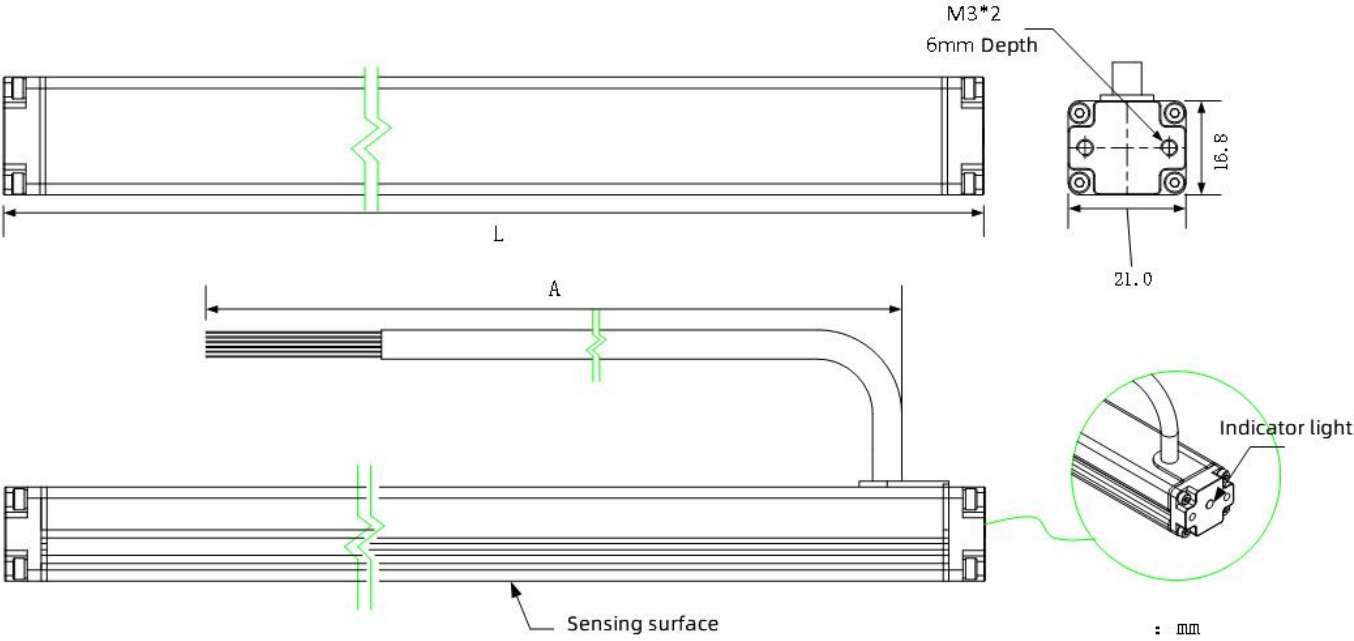
2.2 DEBUGGING TOOL

Auxiliary debug needs to use the following software and hardware:

	Need software and hardware
Parameter configuration	Software HINSON configuration software 1.3.9 or above
RS232 Free Agreement Control	USB to RS232 serial line, Recommended brand model: Superior-y105 Serial debugging assistant software
CAN BUS Free Agreement Control	USB to CAN analyzer
Navigation magnetic strip	Width 30mm*thickness 1.2mm,

3 PHYSICAL PARAMETER

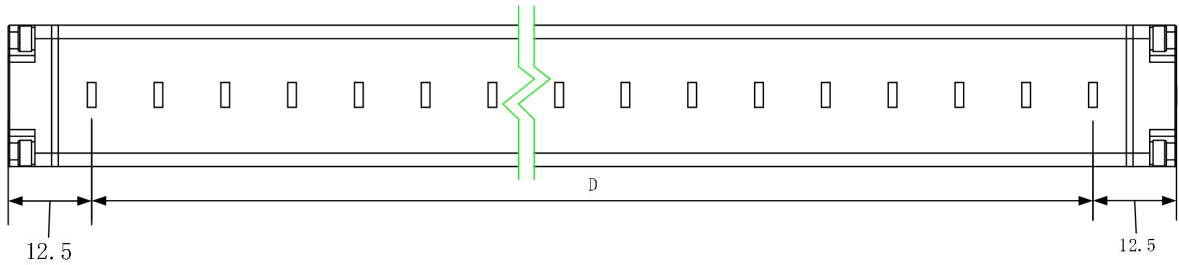
3.1 SIZE PARAMETERS



Picture (3.1)

Model	Length
CNS-MLS-160N	175mm
CNS-MLS-320N	335mm
CNS-MLS-480N	495mm
CNS-MLS-640N	655mm

3.2 DETECTION RANGE



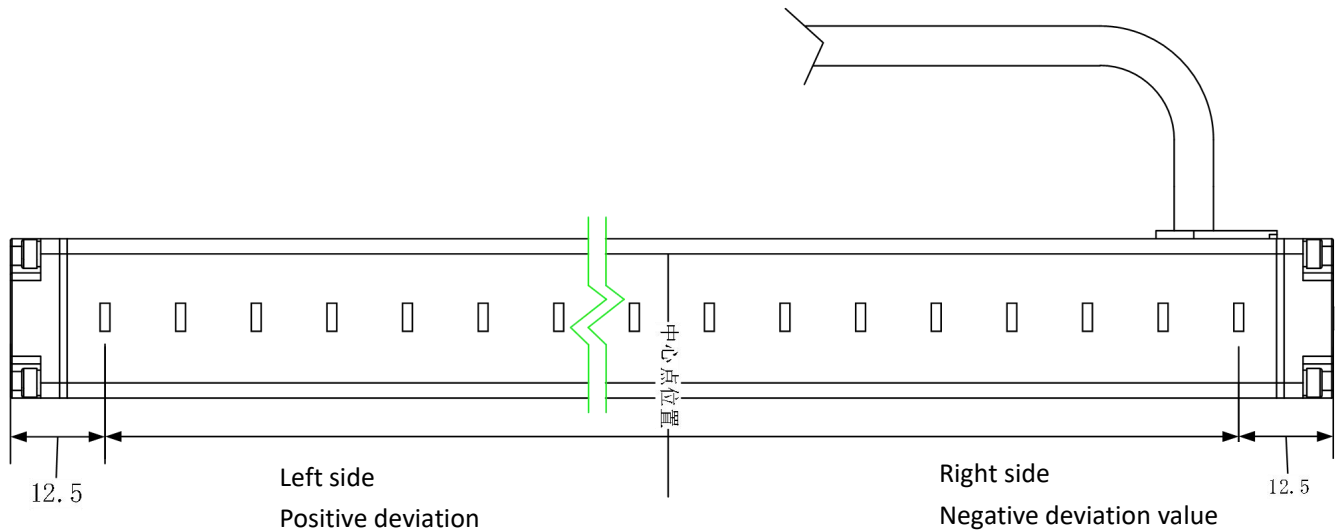
Picture (3.2)

Model	Detection length
CNS-MLS-160N	150mm
CNS-MLS-320N	300mm
CNS-MLS-480N	450mm

CNS-MLS-640N

630mm

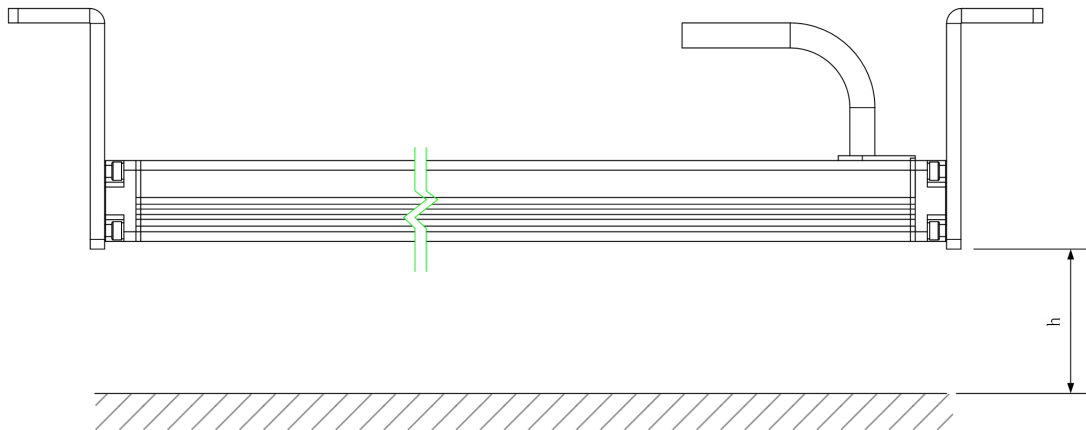
3.3 DETECTION NOTE



Picture (3.3)

The 1mm detection repeatability of the sensor is based on a certain magnetic field strength. When the strength value is below 70, the repeatability of the detection is no longer guaranteed, but the magnetic stripe can be detected. The magnetic field strength is obtained using the configuration software or by sending data.

3.4 INSTALLATION

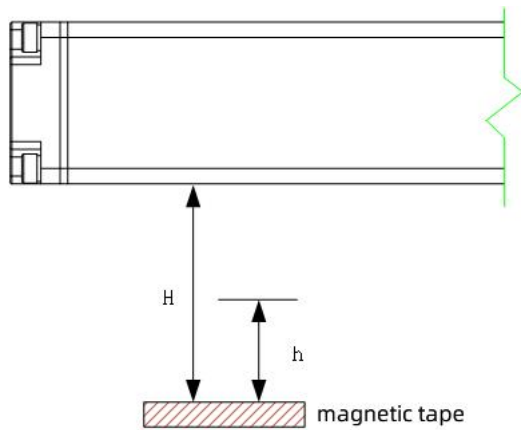


Picture (3.4)

- 1) The sensor should be installed vertically to the ground;

Installation height

Test and determine the installation height according to different magnetic strips;



$$h = \frac{1}{2}H$$

H: Maximum detection height of magnetic stripe;
h: Sensor installation height;

Picture (3.5)

Hint

The installation height needs to take into account the change in the sensor installation position to ensure that the sensor's movement range is within the maximum detection height range.

Installation environment requirements

Installation conditions	The mounting plate must be made of non-magnetic material The background magnetic field strength should be less than 1 gauss
Usage environment	Ambient operating temperature: -10-50℃ Ambient operating humidity: below 80%RH (no frost or dew)
Usage gas environment	Do not use in corrosive, flammable gas and dust environments

4 CONNECTIONS

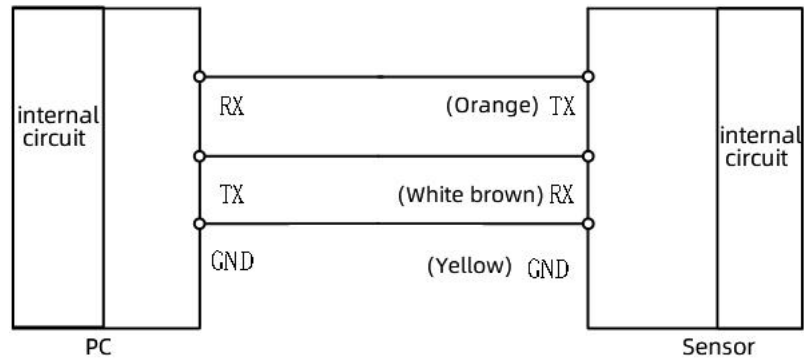
4.1 LINE DEFINITION

Communication port supports RS232, RS485 and CAN BUS

Color	Model Type	Signal	Function description
Brown	Power Supply	DC24V	Positive power supply, 10-32V
Blue	Power Supply	DC0V	Negative power supply
White-brown	RS232	RX	RS232-RX port
Orange		TX	RS232-TX port
Yellow		GND	RS232-GND port
Green	RS485	A	RS485-A port
Purple		B	RS485-B port
Gray		GND	RS485-GND port
White	CAN BUS	CAN-H	CAN H position
White-green		CAN-L	CAN L position
White-blue		CAN-D	CAN-GND

4.2 COMMUNICATION PORT

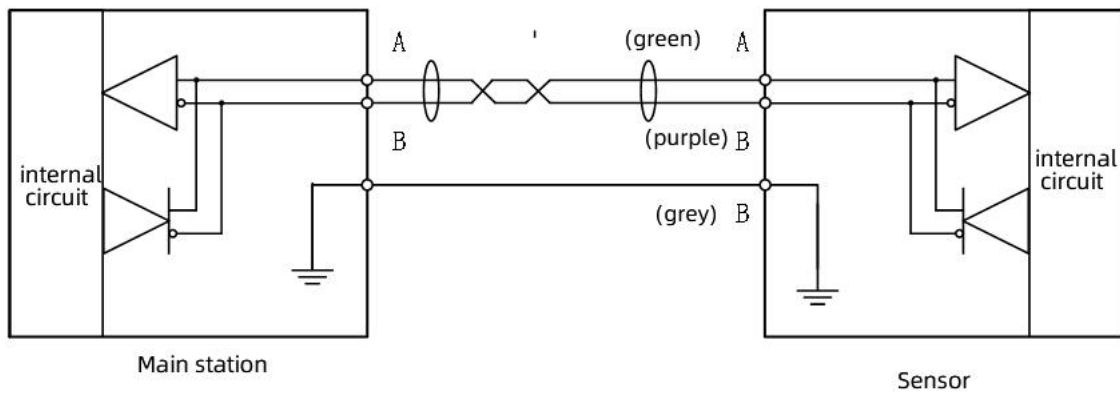
RS232 connection



Picture (4.1)

- 1) The host computer RX and TX need to be cross-connected with the sensor;
- 2) The sensor GND is on the same line as the negative pole of the power supply;

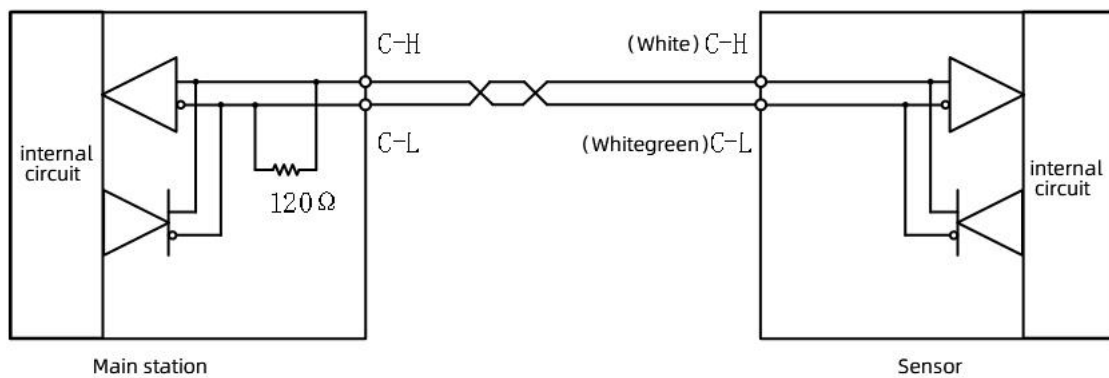
RS485 connection



Picture (4.2)

- 1) Cross-connection is required when connecting to Omron and Siemens PLC;
- 2) The sensor GND is connected to the negative pole of the power supply;

CAN BUS connection



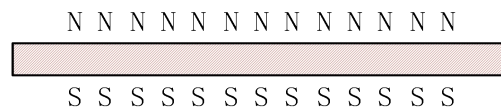
Picture (4.3)

The master station must be equipped with a 120 ohm terminal resistor;

5 MAGNETIC TAPE

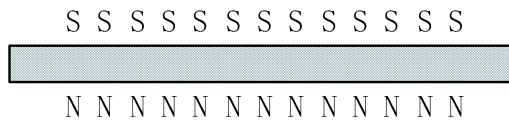
5.1 MAGNETIC STRIPE SPECIFICATION

Model	CNS-MS-30N
Specifications	1.2mm*30mm*50m
Surface polarity	N-pole
Installation method	Surface pasting



Magnetic field distribution

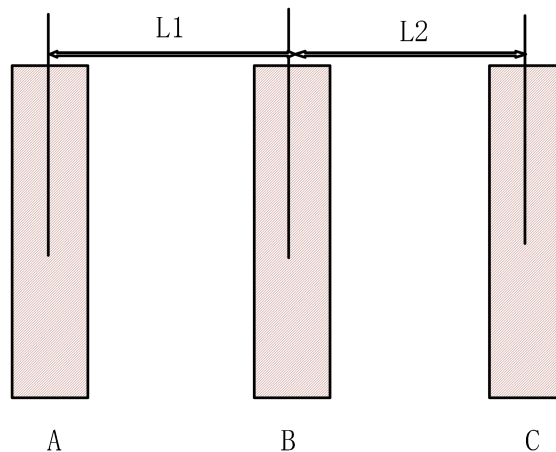
Model	CNS-MS-30S
Specifications	1.2mm*30mm*50m
Surface polarity	S-pole
Installation method	Surface pasting



Magnetic field distribution

5.2 MAGNETIC STRIPE ARRANGEMENT

Parallel magnetic stripe

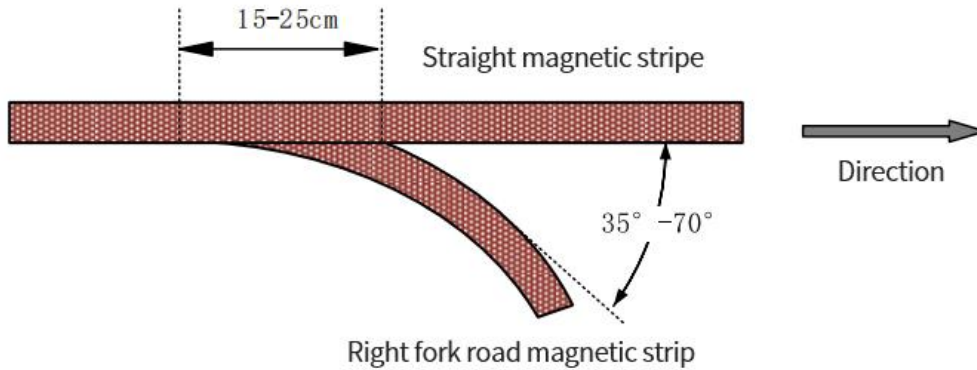


Magnetic stripe spacing is greater than 50mm

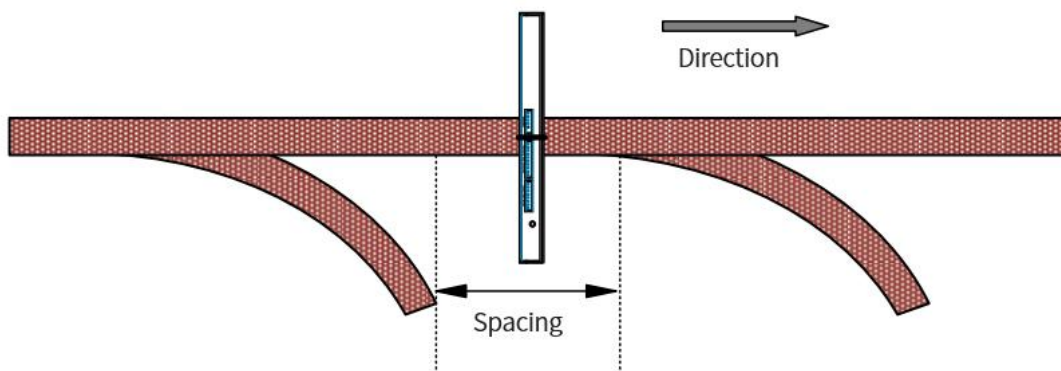
Fork magnetic strip

To ensure reliable and stable selection of AGV fork, the following parameters shall be referred to when pasting the fork magnetic strip.

Single fork road



Bifurcated road



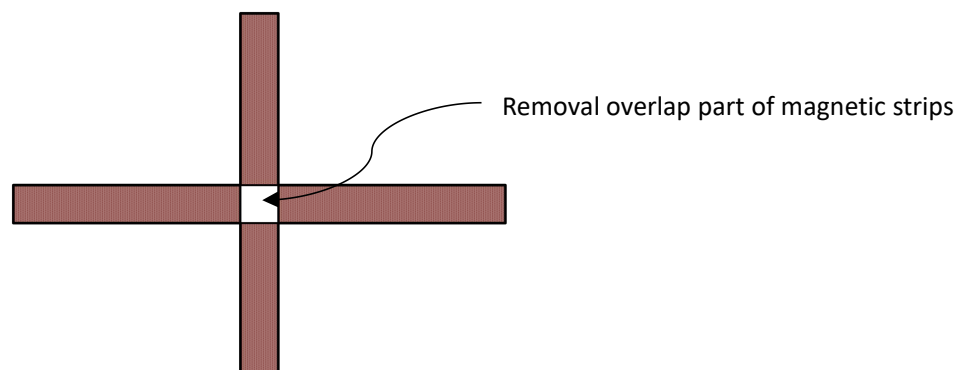
The distance between the adjacent fork road is greater than the sensor detection range. Avoid errors in the fork.

NOTE

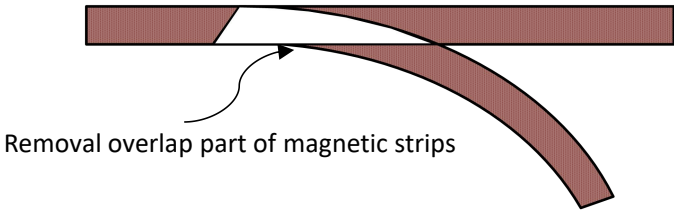
It is recommended that the AGV running speed is controlled within 0.5m/s when the fork is selected. The above conditions are not limited conditions. The specific reference

Overlap position processing

crossroads

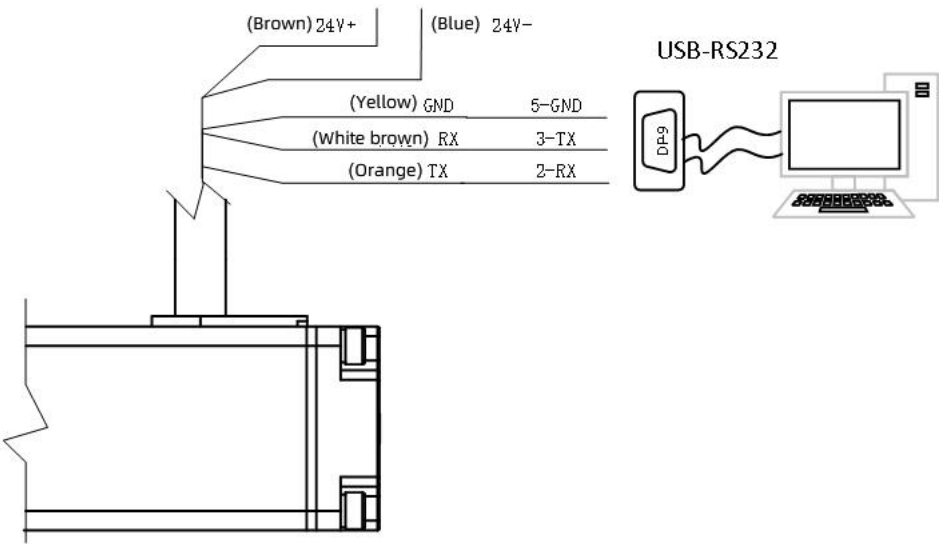


Fork



6 SETUP AND FEATURES

6.1 CONNECTION



Picture (6.1)

1) RS232 is standard $\pm 15V$ level;

6.2 COMMUNICATION SPECIFICATIONS

Communication method	Peer to peer
Communication rate	115200bps
Data bit	8 bit
Check Digit	No verification
Stop bit	1 bit

6.3 CONFIGURATION SOFTWARE

Use Hinson configuration software V1..4 and select CNS-MLS-XXXN model.

6.4 PARAMETERS

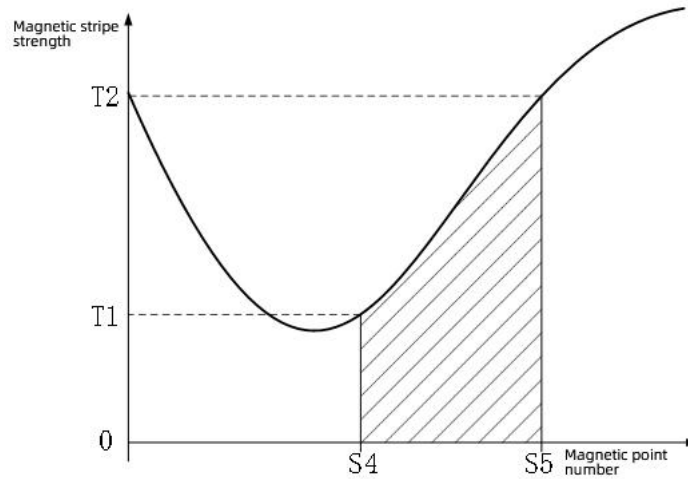
Parameter name	Parameter	Default Parameters
Magnetic stripe difference	0-70%	35%
Center point position	65-105mm	85mm
Sensor sensitivity	0-9	4
Sensor communication address	Parameter range: 1 ~ 127	127
Sensor control type	RS232-HS protocol RS485-HS protocol RS485-MODBUS protocol CAN-HS protocol CAN OPEN protocol	CAN OPEN protocol
CAN broadcast time	0-0.5s, (01': no broadcast)	0.005s
CAN bus baud rate	125 Kbps, 250 Kbps, 500 Kbps, 1000 Kbps	1000Kbps
RS485 baud rate	9600bps,19200bps,38400bps,57600bps,115200bps	
RS485 parity check	No parity, odd parity, even parity	
RS485 stop bit	1Bit, 1.5Bit, 2Bit	
Sensing magnetic field polarity	N pole, S pole, N S pole	N pole
Minimum number of sensing points	1-3	1
Maximum number of sensing points	5-8	5

1. Magnetic stripe difference

Used to distinguish the similarity of magnetic field signals of adjacent magnetic stripes.

When set to 0, one point signal of two magnetic stripes must be less than the set sensitivity value to distinguish the two magnetic stripes.

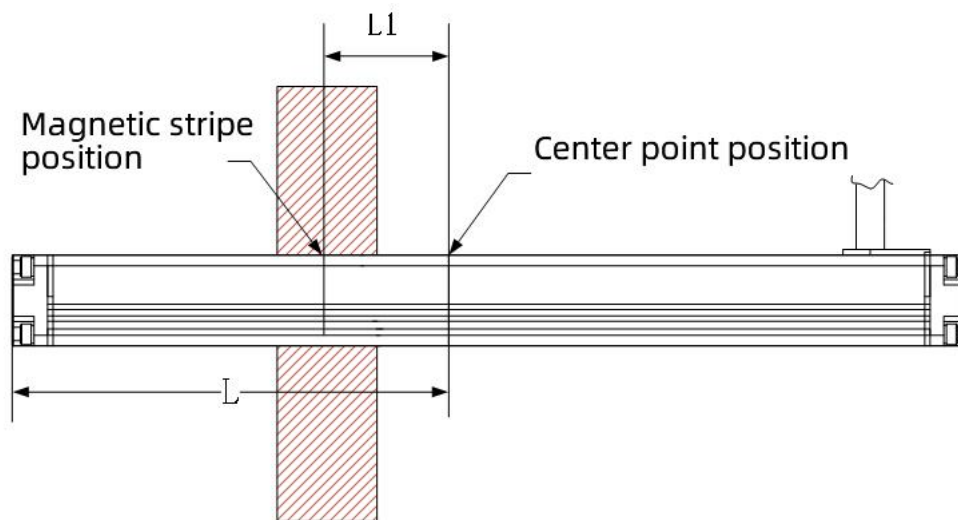
When set to 1-70, when the similarity of magnetic field strength signals detected by adjacent magnetic points is greater than the set value, the two magnetic stripes are distinguished.



Picture (6.2)

2. Center point location

Center point position L, the value of the position L1 where the sensor detects the magnetic stripe is calculated based on the center point position.



Picture (6.3)

3. Sensitivity adjustment

Used to control the minimum strength threshold of the magnetic stripe. The magnetic stripe signal is considered valid only when it is greater than the set threshold. If it is less than the set threshold strength, the point is ignored.

The corresponding relationship between the strength value and the corresponding sensitivity.

Sensitivity	Magnetic field strength value
0	> 90
1	> 80
2	> 75
3	> 70
4	> 65
5	> 60
6	> 55
7	> 50
8	> 45
9	> 40

4. CAN bus communication address

Set the CAN BUS communication address;

When in CAN-HS protocol working mode, it is the node address;

When in CAN OPEN protocol working mode, it is the Node-ID of the CAN OPEN node;

5. CAN broadcast time

In CAN-HS protocol mode, set the time interval for the sensor to automatically send data, 0 means no broadcast;

6. Communication methods and protocols

Set the receiving port and protocol for control instructions such as sensor fork selection. The configuration software is not restricted by this when reading parameters via RS232.

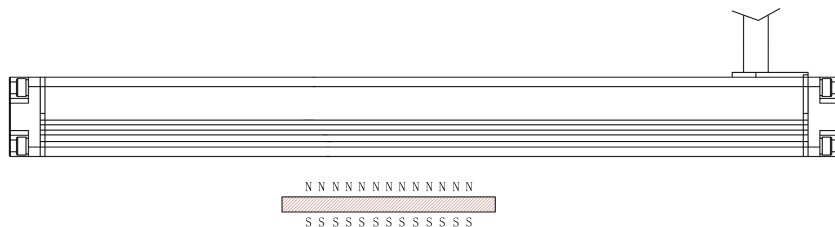
7. CAN bus communication baud rate

Set the CAN BUS communication baud rate. In applications such as AGV equipment where the communication distance is not long, try to use the maximum baud rate for communication.

8. Induction polarity

Sensing N-polarity magnetic strip;

The sensor only detects N-polar magnetic field signals;



Picture (6.4)

The N-pole magnetic field surface of the navigation magnetic strip is close to the sensor sensing surface

Sensing S-polarity magnetic stripe

The sensor only detects S-polarity magnetic field signals;



Picture (6.5)

The S-pole magnetic field of the navigation magnetic strip is close to the sensor sensing surface

Sensing N, S polarity

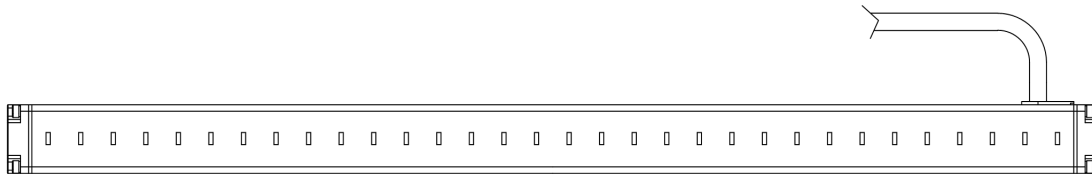
The sensor detects both S and N polarity signals;

Note: In the magnetic navigation mode, the sensor must be set to sense only the S pole or the N pole according to the navigation magnetic stripe, and cannot be set to sense the N and S poles.

9. Minimum number of sensing points

This parameter means that the magnetic stripe position detection is only performed when the magnetic field signal detected by the magnetic point is greater than the set value. This parameter is mainly used for magnetic field interference filtering. The magnetic field strength threshold of the magnetic point is controlled by the sensitivity value.

For example: Take MLS-320N as an example



Picture (6.6)

As shown in the above figure, in the detection state,

Minimum number of sensing points: When set to 1 or 2. S8 and S9 both detect magnetic stripe signals, the magnetic stripe position is calculated using the S8 and S9 position magnetic field signals;

Minimum number of sensing points: When set to 3. Only S8 and S9 detect signals, which is less than the set value of 3, the sensor considers that no valid magnetic stripe signal is detected and does not output.

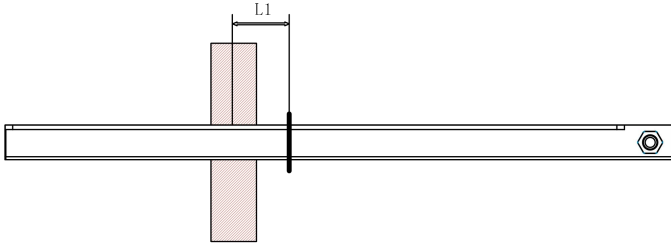
10. Maximum number of sensing points

The number of signal points that can be sensed when the magnetic strip is at the specified height of 30mm.

7 FUNCTION

7.1.1 Get multiple magnetic stripe positions

Single magnetic stripe detection

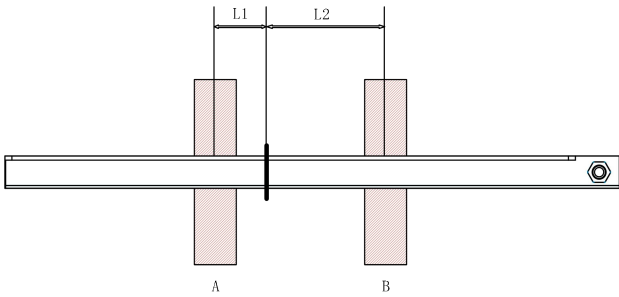


Picture (6.7)

The display shows the middle magnetic stripe position L1, which is the current magnetic stripe magnetic field center and sensor center position value.

When two magnetic stripes are detected

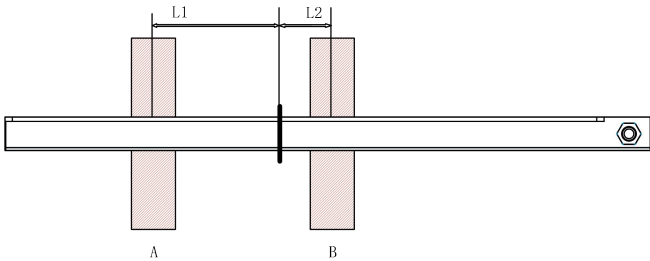
Situation 1



Picture (6.8)

$L1 < L2$	Magnetic stripe A is the middle magnetic stripe, and magnetic stripe B is the right magnetic stripe
--------------------------------	--

Situation 2

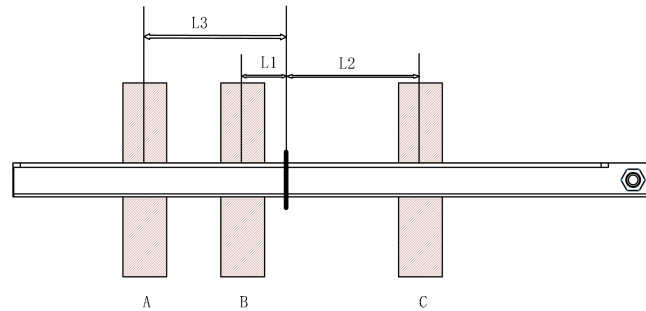


Picture (6.9)

$L1 > L2$	Magnetic stripe A is on the left, and magnetic stripe B is in the middle
--------------------------------	---

When three magnetic stripes are detected

Situation 1

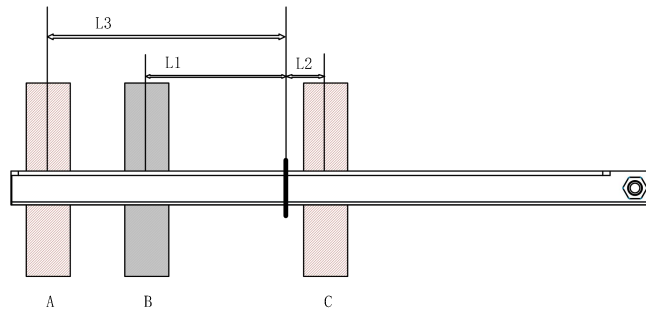


Picture (6.10)

$$L1 < L2$$

Magnetic stripe A is the left magnetic stripe, magnetic stripe B is the middle magnetic stripe, and magnetic stripe C is the right magnetic stripe.

Situation 2



Picture (6.11)

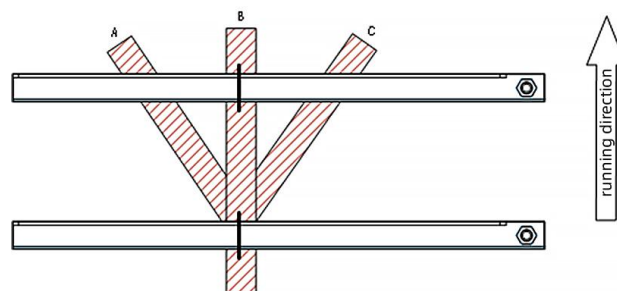
$$L3 > L1 > L2$$

Magnetic stripe A is the left magnetic stripe, magnetic stripe B is ignored, and magnetic stripe C is the middle magnetic stripe

7.1.2 Selection of magnetic strip for turnout

The state of going straight and not selecting

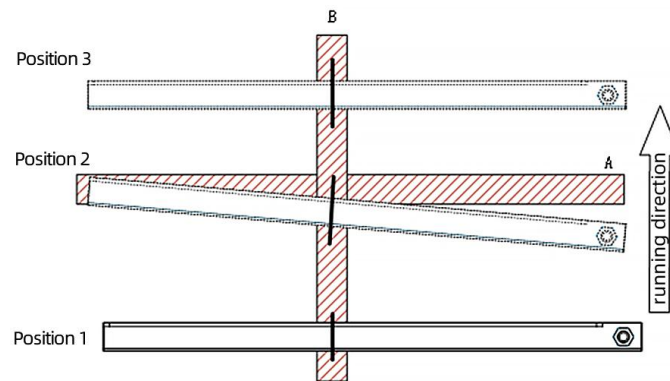
Sancitiao Road Crossing



Picture (6.12)

Select the middle B magnetic strip to run;

Cross magnetic stripe intersection



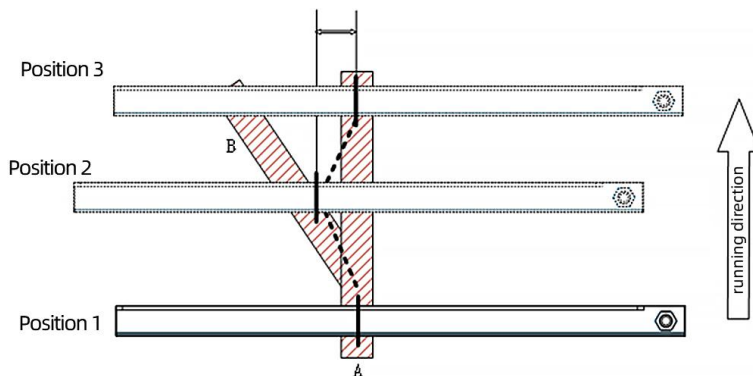
Picture (6.13)

Position 1: Select the magnetic stripe B signal output;

Position 2: Due to the sensor position and magnetic stripe signal distribution at the cross edge, there will be a certain magnetic stripe signal offset and swing;

Position 3: In the straight state, the B magnetic stripe signal is preferred;

Magnetic stripe intersection



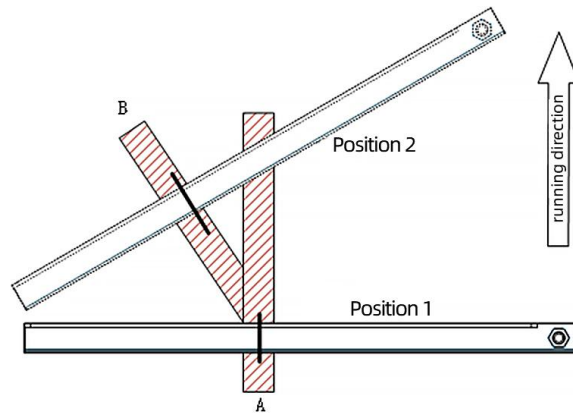
Picture (6.14)

When passing through the fork magnetic strip intersection, the center of the sensor will shift to a certain position due to the offset of the magnetic field center. It will partially shift at position 2, and then shift to the middle to select magnetic strip B and move to position 3.

Hint

1) Use the reverse fork command to avoid this navigation center offset problem.

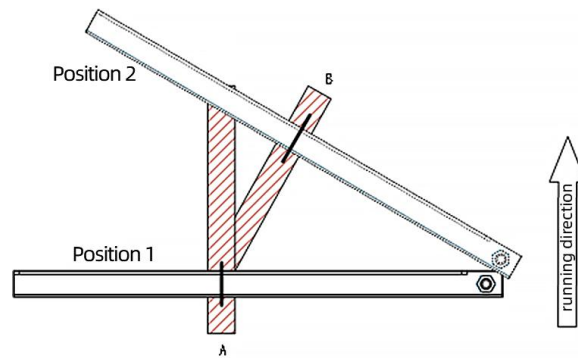
Left fork selection state



Picture (6.15)

When in position 1, upon receiving the left fork selection command, the sensor will select the left magnetic stripe signal and shield the right magnetic stripe signal;

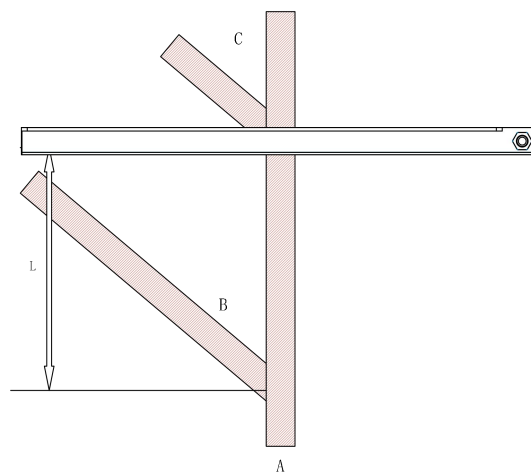
Right fork selection state



Picture (6.16)

When in position 1, upon receiving the right fork selection command, the sensor will select the right magnetic stripe signal and shield the left magnetic stripe signal;

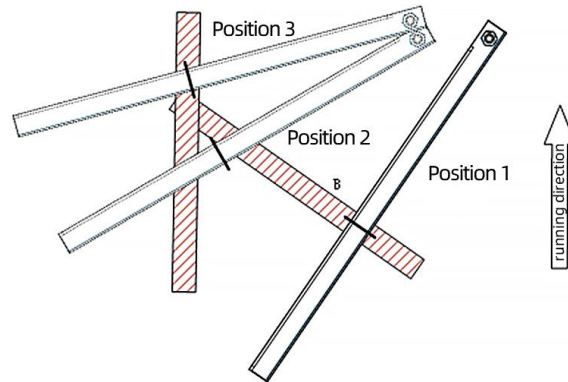
Double intersection in the same direction



Picture (6.17)

Notice

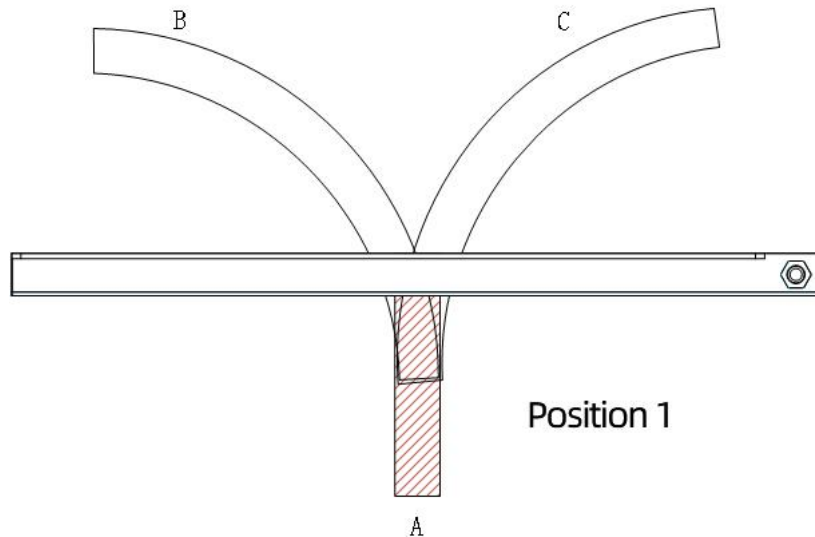
The distance between magnetic stripe B and magnetic stripe C is larger than the position of the magnetic navigation sensor to avoid misjudgment of forks in the road.

Merge intersection

Picture (6.18)

Notice

- 1) When the left side of the intersection is merging, it is forbidden to use the left fork;
- 2) When the right side of the intersection is merging, it is forbidden to use the right fork;

Fork in the road

Picture (6.19)

Notice

In the case of a double arc intersection, the magnetic strip selection must be specified, and the straight-ahead no-selection instruction is prohibited;

7.1.3 Sensor magnetic field strength

Points S1-S36 detect the current magnetic field strength signal and output the corresponding value.

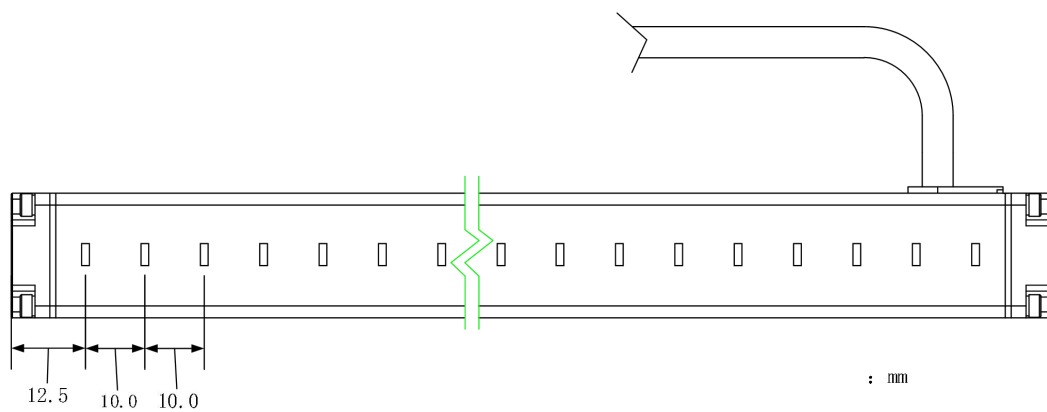
N polarity output is a negative strength value, the smaller the value, the greater the strength;

S polarity output is a positive strength value, the larger the value, the greater the strength;

7.1.4 Sensor digital signal status

The induction magnetic stripe signal outputs a digital signal through the sensitivity value set by the parameters, and the point spacing is 10mm.

Model	Data Description
CNS-MLS-160N	Only S1-S16;
CNS-MLS-320N	Only S1-S32;
CNS-MLS-480N	Only S1-S48;
CNS-MLS-640N	S1-S64;



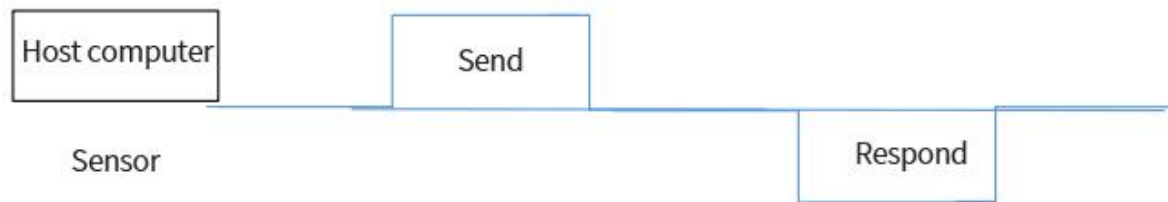
Picture (7-1)

8 COMMUNICATION PROTOCOL

8.1 RS232/RS485 FREE PROTOCOL

8.1.1 Communication mode

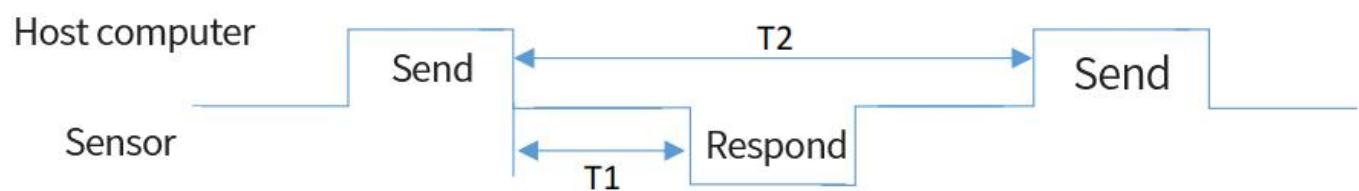
RS232/RS485 communication mode adopts single master station and single slave station mode;



8.1.2 Communication specifications

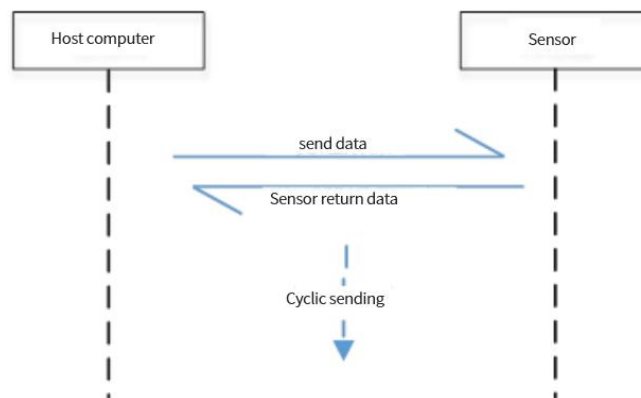
communication mode	Point to point
Communication rate	115200bps
Data bits	8 bit
Check bit	No check
Stop bit	1 bit

8.1.3 Communication timing



T1	Less than 2ms
T2	The recommended time is 5ms-40ms.

8.1.4 Communication content



The following communication contents are listed in hexadecimal mode, and the data transmission process is that the first byte is sent first.

◆ Send Data 1 - Get Magnetic Stripe Position

First byte	Data identifier	
Second byte		
Third byte		
Fourth byte		
Fifth byte		
Sixth byte	Check bit	Low
Seventh byte		High

■ Data identifier (5byte)

The identifier is fixed data: 0x52 0x4D 0x70 0x6F 0x73;

■ Check bit (2byte)

The data check bit adopts the CRC 16 check mode of Modbus low bit first. The calibration value is calculated by the calibration formula, and the specific calculation method is shown in the appendix.

◆ Response data 1-Response magnetic stripe position

First byte	Data identifier	
Senond byte		
Third byte		
Fourth byte		
Fifth byte		
Sixth byte	Invalid	
Seventh byte	Sensor status	
Eighth byte	Magnetic stripe induction state	
Ninth byte	Left magnetic stripe position	High
Tenth byte		Low
Eleventh byte	Middle magnetic stripe position	High
Twelfth byte		Low
Thirteenth byte	Right magnetic stripe position	High
Fourteenth byte		Low
Fifteenth byte	Check bit	Low
Sixteenth byte		High

■ Data identifier (5byte)

◆ The identifier is fixed data: 0x52 0x4d 0x70 0x6F 0x73

■ Invalid (1byte)

Invalid value: 0x00;

■ Sensor status (1byte)

The sensor status of 0X00 is normal.and non-zero value is the sensor error.

■ Magnetic stripe induction status (1byte)

The magnetic stripe status displays the data and position of the current magnetic stripe.the values of the magnetic stripe are shown in the following table.

Right magnetic stripe sensing	Middle magnetic stripe sensing	Left magnetic stripe sensing	Magnetic stripe not detected
4	2	1	0

In the state of multiple magnetic stripe.the return value is the accumulation of magnetic stripe values.

For example:

When two magnetic strips are detected.the magnetic strips are located in the middle and left of the sensor.the return value is $1+2=3$.

When two magnetic strips are detected.the magnetic strips are located in the middle and right of the sensor.the return value is $4+2=6$.

When three magnetic strips are detected, the magnetic strips are located in the middle, left and right position of the sensor. the return value is $4+2+1=7$

■ Left magnetic stripe position (2byte)

When the sensor detects more than 2 magnetic stripes, the magnetic stripe deviation distance value on the left side of the sensor is in the range of -315mm-0mm;

MLS-160N position range is -70mm-0;

MLS-320N position range is -150mm-0;

MLS-480N position range is -230mm-0;

MLS-640N position range is -630mm-0;

■ Middle magnetic stripe position (2 bytes)

When the sensor detects more than one magnetic stripe, the magnetic stripe deviation distance value at the center of the sensor;

MLS-160N position range is -70mm-70mm;

MLS-320N position range is -150mm-150mm;

MLS-480N position range is -230mm-230mm;

MLS-640N position range is -630mm-630mm;

■ Right magnetic stripe position (2 bytes)

When the sensor detects more than 2 magnetic stripes, the magnetic stripe deviation distance value on the right side of the sensor

MLS-160N position range is 0-70mm;

MLS-320N position range is 0-150mm;

MLS-480N position range is 0-230mm;

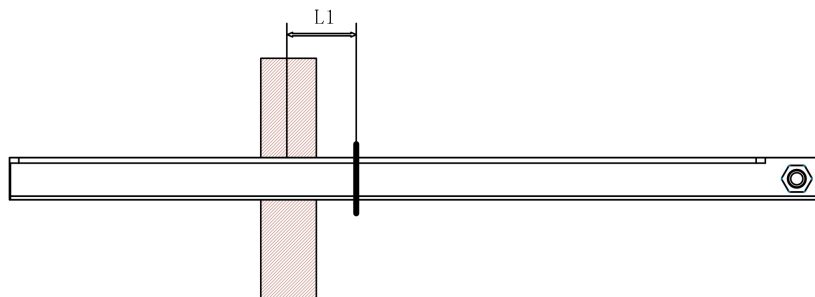
MLS-640N position range is 0-630mm;

■ Check digit (2 bytes)

The data check bit adopts the modbus CRC16 check method with the low bit first. The check value is calculated by the check formula. The specific calculation method is detailed in the appendix.

Examples:

The following figure shows the magnetic stripe signal status. There is only one magnetic stripe and the sensor considers it as the middle magnetic stripe detection.



Picture (8.1)

Send and obtain magnetic stripe position data:

Data identifier	Check bit
0x52 0x4d 0x70 0x6F 0x73	0xE7 0x6E

Return magnetic stripe position data :

Data identifier	Invalid	Sensor status	Magnetic stripe induction state	Left magnetic stripe position	Middle magnetic stripe position	Right magnetic stripe position	Check bit
0x52 0x4d 0x70 0x6F 0x73	0x00	0x00	0x02	0x00 0x00	0xFF 0xF2 (-14mm)	0x00 0x00	0xDA 0x77

◆ Send data 2-Selection of branch magnetic stripe

The fork selection command needs to be sent continuously to be in the selection state.

First byte	Data identifier	
Second byte		
Third byte		
Fourth byte		
Fifth byte		
Sixth byte	Fork road selection	
Seventh byte	Check bit	Low
Eighth byte		High

■ Data identifier (5byte)

Identifier is fixed data: 0x47 0x55 0x69 0x73 0x65

■ Fork road selection (1byte)

Control sensor magnetic stripe fork selection;

0x00: go straight without selecting fork

0x01: select left magnetic stripe to run

0x02: select right magnetic stripe to run

	0x00: Go straight	0x01: Select left fork road	0x02: Select Right fork road	0x03 : Select straight magnetic stripe to run
Left fork road	○	✓	×	✓
Right fork road	○	×	✓	✓
Crossroads	✓	×	×	×
Herringbone road	×	✓	✓	×
Left side branch merging	✓	×	✓	✓
Right side branch merging	✓	✓	×	✓
✓: Applicable ×: Inapplicable ○: Applicable at low speed				

0x03: Select the fork road and go straight through the magnetic stripe

■ Check bit (2byte)

The data check bit adopts the CRC16 check mode of Modbus low bit first. The calibration value is calculated by the calibration formula, and the specific calculation method is shown in the appendix

◆ Response data 2-response switch selection status

Byte 1	Data identifier	
Byte 2		
Byte 3		
Byte 4		
Byte 5		
Byte 6	Fork selection status	
Byte 7	Sensor status	
Byte 8	Magnetic stripe sensing status	
Byte 9	Magnetic stripe location	High
Byte 10		Low

Byte 11	Magnetic stripe strength	High
Byte 12		Low
Byte 13	Magnetic stripe points	High
Byte 14		Low
Byte 15	Check digit	Low
Byte 16		High

■ Data identifier (5byte)

The identifier is fixed data: 0x47 0x55 0x69 0x73 0x65

■ Switch selection status (1byte)

- 00 Straight line non selection status selection
- 01 Left side fork selection
- 02 Right fork selection
- 03 Straight selection of fork road

■ Sensor status (1byte)

The status of sensor 00 is normal.and the non-00 value is the error of the sensor

■ Magnetic stripe induction status (1byte)

The magnetic stripe status displays the data and position of the current magnetic stripe.the values of the magnetic stripe are shown in the following table

Right magnetic stripe sensing	Middle magnetic stripe sensing	Left magnetic stripe sensing	Magnetic stripe not detected
4	2	1	0

For example:

When two magnetic strips are detected.the return value is 1+2=3 when the magnetic strips are located in the middle and left of the sensor.

When two magnetic strips are detected.the return value is 4+2=6 when the magnetic strips are located in the middle and right of the sensor.

When three magnetic strips are detected.the return value is 4+2+1=7 when the magnetic strips are located in the middle.left and right position of the sensor.

■ Current magnetic stripe position (2byte)

The current selected magnetic stripe deviation position value;

MLS-160N position range is -70mm-70mm;

MLS-320N position range is -150mm-150mm;

MLS-480N position range is -230mm-230mm;

MLS-640N position range is -630mm-630mm;

■ Current magnetic stripe strength (2 bytes)

The magnetic field strength value of the currently selected magnetic stripe is the average magnetic field strength value of the magnetic stripe detected by the sensor. The length is 2 bytes and the value range is from -2048 to +2048. The N pole magnetic field signal is a negative value and the S pole magnetic field signal is a positive value. ;

■ Current magnetic stripe points (2 bytes)

The digital number of points of the currently selected magnetic stripe;

0: No magnetic stripe detected;

MLS-160N data range is 1-16;

MLS-320N data range is 1-32;

MLS-480N data range is 1-48;

MLS-640N data range is 1-64;

■ Check digit (2 bytes)

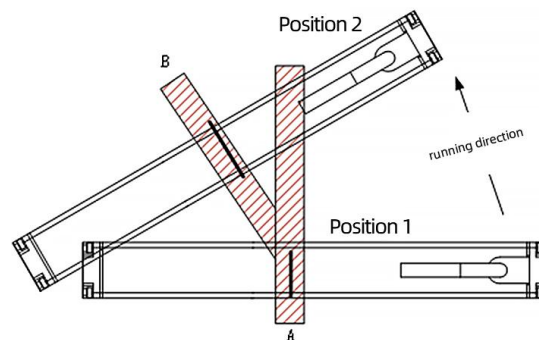
The data check bit adopts the modbus CRC16 check method with the low bit first. The check value is calculated by the check formula. The specific calculation method is detailed in the appendix.

For example:

A fork selection is required;

Position 1: Send the left fork selection command;

Position 2: Only provide the left magnetic stripe position and signal to the host computer;



Picture (8.2)

Send to get the magnetic stripe location data:

Data Identifiers	Fork selection status	Check digit
0x47 0x55 0x69 0x73 0x65	0x01	0x05 0xB7

Returns the magnetic stripe location data:

Data identifier	Fork road selection status	Sensor status	Magnetic stripe induction state	Magnetic stripe position	Magnetic stripe strength	Magnetic stripe points	Check bit
0x47 0x55 0x69 0x73 0x65	0x 01	0x 00	0x 01	0xFF 0xF5 (-11)	0x00 0x45 (69)	0x 00 0x 08	0x9F 0xFD

NOTE

1) The fork road selection command must be sent before the magnetic stripe reaches the position 1. The status data will be sent once and the status will be kept until the fork road selection command is received again.

◆ **Send data 3-get magnetic field strength**

The sensor model corresponds to the intensity data;

Model	Data description
CNS-MLS-160N	Only S1-S16 magnetic field strength data is valid;
CNS-MLS-320N	Only S1-S32 magnetic field strength data is valid;
CNS-MLS-480N	Only S1-S48 magnetic field strength data is valid;
CNS-MLS-640N	S1-S64 data is valid;

Byte 1	Data identifier	
Byte 2		
Byte 3		
Byte 4		
Byte 5		
Byte 6	Check digit	Low
Byte 7		High

■ **Data identifier (5byte)**

The identifier is fixed data: 0x52 0x4D 0x67 0x64 0x61
field intensity of each sensing point

■ **Check bit (2byte)**

Data check bit, Adopted the CRC16 check mode of Modbus low bit first. The calibration value is calculated by the calibration formula and the specific calculation method is shown in the appendix.

◆ Response data 3-feedback magnetic field strength

1st byte	Data Identifiers	
2nd byte		
3rd byte		
4th byte		
5th byte		
6th byte	S1	
7th byte		
8th byte	S2	High
9th byte		Low
10th byte	S3-S62	High
.....		
73rd byte		low
74th byte	S63	high
75th byte		low
132nd byte	S64	high
133rd byte		low
134th byte	校验位	low
135th byte		low

■ Data identifier (5 bytes)

The identifier is fixed data: 0x52 0x4d 0x67 0x64 0x61;

■ Magnetic field strength at point S1 (2 bytes)

The field strength data detected at the S1 position point ranges from -2048 to +2048, the N pole magnetic field signal is a negative value, and the S pole magnetic field signal is a positive value.

■ Magnetic field strength at point S2 (2 bytes)

The field strength data detected at the S2 position point ranges from -2048 to +2048, the N pole magnetic field signal is a negative value, and the S pole magnetic field signal is a positive value.

■ S3-S62 (120byte)

S2-S62: Field strength data of position point detection. The length of each point position value is 2 bytes, ranging from -2048 to +2048. The N-pole magnetic field signal is a negative value, and the S-pole magnetic field signal is a positive value.

■ S63 point magnetic field strength (2byte)

The field strength data detected at the S63 position point ranges from -2048 to +2048. The N-pole magnetic field signal is a negative value, and the S-pole magnetic field signal is a positive value.

■ S64 point magnetic field strength (2byte)

The field strength data detected at the S64 position point ranges from -2048 to +2048. The N-pole magnetic field signal is a negative value, and the S-pole magnetic field signal is a positive value.

■ Check digit (2 bytes)

The data check bit adopts the modbus CRC16 check method with the low bit first. The check value is calculated by the check formula. The specific calculation method is detailed in the appendix.

Fox example:

Send and get signal strength of magnetic stripe

Data identifier	Check bit
0x52 0x4d 0x67 0x64 0x61	0xD0 0x57

Return magnetic stripe strength data:

Data identifier	S1	S2	S3-S62	S63	S64	Check bit
0x52 0x4d 0x67 0x64 0x61	0xFF 0xF8	0xFF 0xFF	FF F2 FF F4 FF F7 FF F7 FF FA FF F2 FF F6 FF F5 FF F6 FF F5 FF F5 FF F9 FF F8 FF F8 FF F6 FF F8 FF F2 FF F8 FF F7 FF F3 FF F5 FF F5 FF F5 FF F6 FF FB FF FB 00 01 FF FD FF FD 00 00 FF FB FF FF FC FF F8 FF F5 FF F4 FF F5 FF F0 FF EF FF EA FF EC FF EB FF F3 FF FB 00 00 00 07 00 0C 00 06 00 08 00 07 00 04 00 02 FF FD FF F9 FF FD FF FD FF F8 FF FE 00 00 FF F9	0xFF 0xFB	0xFF 0xF7	0xA7 0xDF

◆ Send data 4-Get digital point data

Byte 1	Data identifier	
Byte 2		
Byte 3		
Byte 4		
Byte 5		
Byte 6	Check digit	Low
Byte 7		High

■ Data identifier (5 bytes)

The identifier is fixed data: 0x52 0x4D 0x67 0x73 0x77;

■ Check bit (2 bytes)

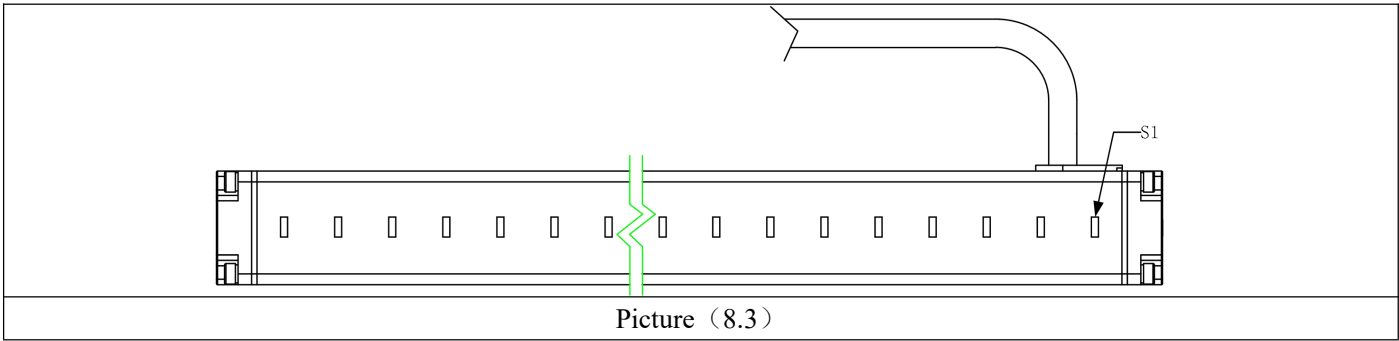
Data check bit, using the modbus low-order CRC16 check method. The check value is calculated by the check formula. For details on the calculation method, see the appendix.

◆ **Response data 4-Feedback digital point data**

The sensor model corresponds to the digital quantity data;

Model	Data description
CNS-MLS-160N	Only S1-S16 data is valid;
CNS-MLS-320N	Only S1-S32 data is valid;
CNS-MLS-480N	Only S1-S48 data is valid;
CNS-MLS-640N	S1-S64 data is valid;

S1 point starting position



Byte 1	Data Identifiers	
Byte 2		
Byte 3		
Byte 4		
Byte 5		
Byte 6	S1-S8	Digital quantity data
Byte 7	S9-S16	
Byte 8	S17-S24	
Byte 9	S25-S32	
Byte 10	S33-S40	
Byte 11	S41-S48	
Byte 12	S49-S56	
Byte 13	S57-S64	
Byte 14	Check digit	Low bit
Byte 15		High bit

■ Data identifier (5byte)

The identifier is fixed data: 0x52 0x4D 0x67 0x73 0x77

■ Digital data (3 bytes)

● 6th byte

	S1-S8							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S8	S7	S6	S5	S4	S3	S2	S1
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● 7th byte

	S9-S16							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S16	S15	S14	S13	S12	S11	S10	S9
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● 8th byte

Data	S17-S24							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S24	S23	S22	S21	S20	S19	S18	S17
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● 9th byte

	S25-S32							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S32	S31	S30	S29	S28	S27	S26	S25
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● 10th byte

	S33-S40							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S40	S39	S38	S37	S36	S35	S34	S33
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● 11th byte

	S41-S48							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S48	S47	S46	S45	S44	S43	S42	S41
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● 12th byte

	S49-S56							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S56	S55	S54	S53	S52	S51	S50	S49
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● 13th byte

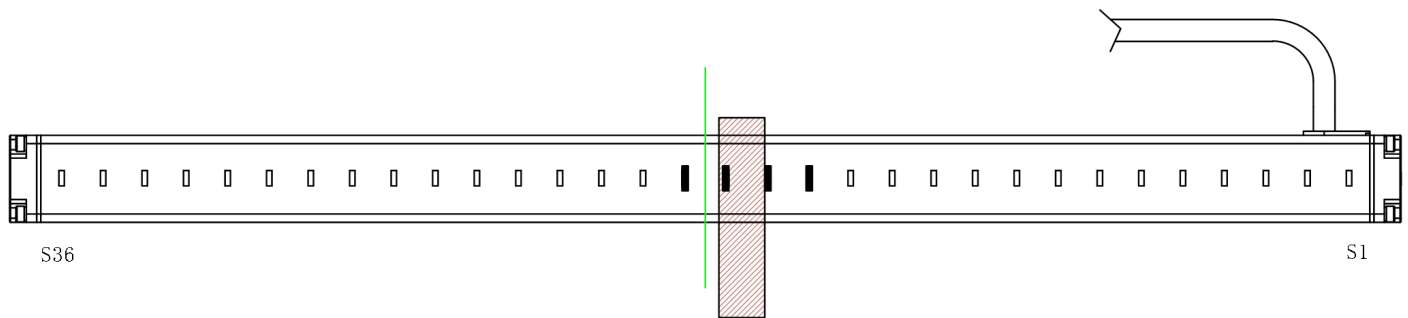
	S57-S64							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S64	S63	S62	S61	S60	S59	S58	S57
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

■ Check digit (2 bytes)

The data check bit adopts the modbus CRC16 check method with the low bit first. The check value is calculated by the check formula. The specific calculation method is detailed in the appendix.

For example:

Take the detection status of the MSL-320N model as an example, the magnetic stripe signal status is shown in the figure below



Picture (8.4)

Send to get the digital data of magnetic stripe:

Data Identifiers	Check digit
0x52 0x4D 0x67 0x73 0x77	0x5E 0x69

Returns the digital data of the magnetic stripe:

Data Identifiers	S1-S8	S9-S16	S17-S24	S25-S32	S33-S40	S41-S48	S49-S56	S57-S64	Check digit
0x52 0x4D 0x67 0x73 0x77	0x00	0x80	0x0F	0x00	0x00	0x00	0x00	0x00	0xFC 0x81

7.1.5 CRC Check

C language verification instructions

cBuffer: Calculate the array of CRC check codes

iBufLen: The length of the array

```

unsigned int CRC_Verify(unsigned char *cBuffer, unsigned int iBufLen)
{
    unsigned int i, j;                //define wPolynom 0xA001
    unsigned int wCrc = 0xffff;
    unsigned int wPolynom = 0xA001;
    /*-----*/
    for (i = 0; i < iBufLen; i++)
    {
        wCrc ^= cBuffer[i];
    for (j = 0; j < 8; j++)
        {
            if (wCrc & 0x0001)
            { wCrc = (wCrc >> 1) ^ wPolynom; }
            else
            { wCrc = wCrc >> 1; }
        }
    }
    return wCrc;
}

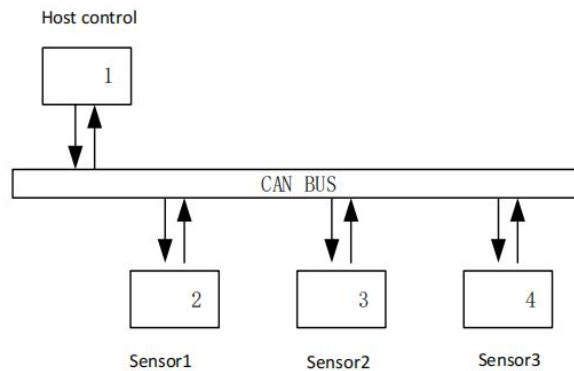
```

8.2 CAN-HS PROTOCOL

For the following data to take effect, it is necessary to set the parameter named sensor control mode to CANBUS-HS protocol mode

8.2.1 Communication mode

CAN BUS communication mode is adopted.

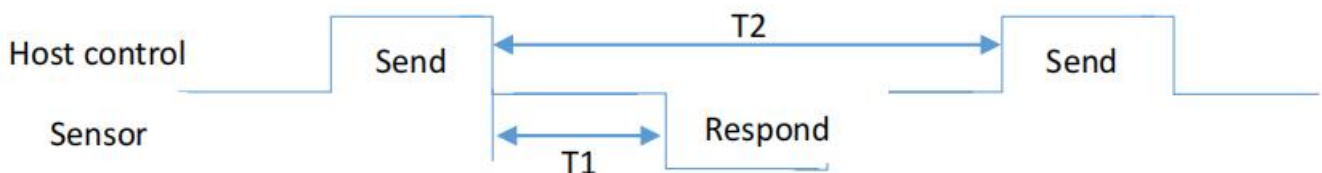


8.2.2 Communication specifications

Communication model	BUS mode
Communication speed	1000k (default) , 500k, 250k, 125k
Data frame	Standard frame
Communication standard	CAN BUS 2.0 B
Broadcast time	0 (No broadcast) -500ms
Support protocol	CAN-HS protocol CAN OPEN protocol

8.2.3 Communication sequence

No broadcast mode



T1	<1ms
T2	The recommended time must be within 5-40ms

Broadcast mode



T1	The broadcast time must be 5ms-40ms.
-----------	--------------------------------------

8.2.4 Communication data

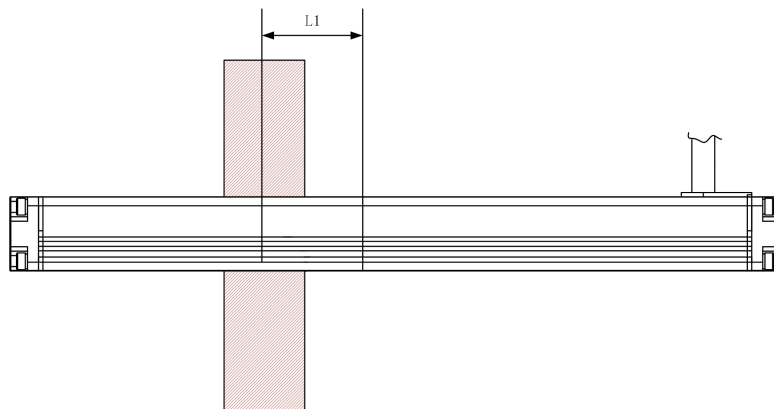
The sensor has two data output modes, which are the following:

Location data mode: The output magnetic stripe position data is accurate 1 mm, and can be used for branch control.

Switch data mode: Output switch state data of sensor.

Location data mode

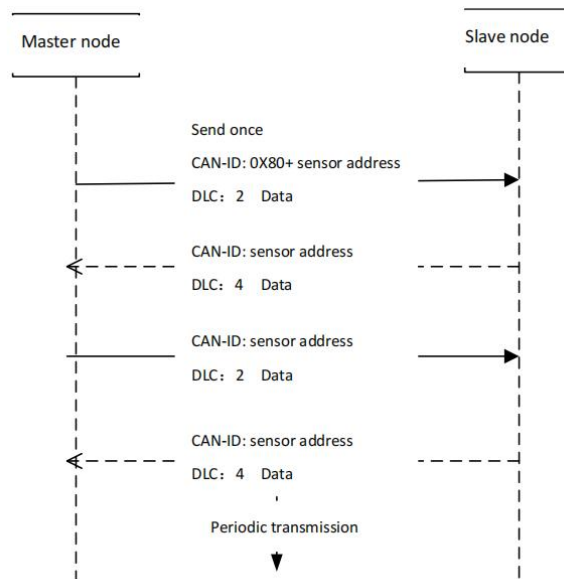
Magnetic stripe detection



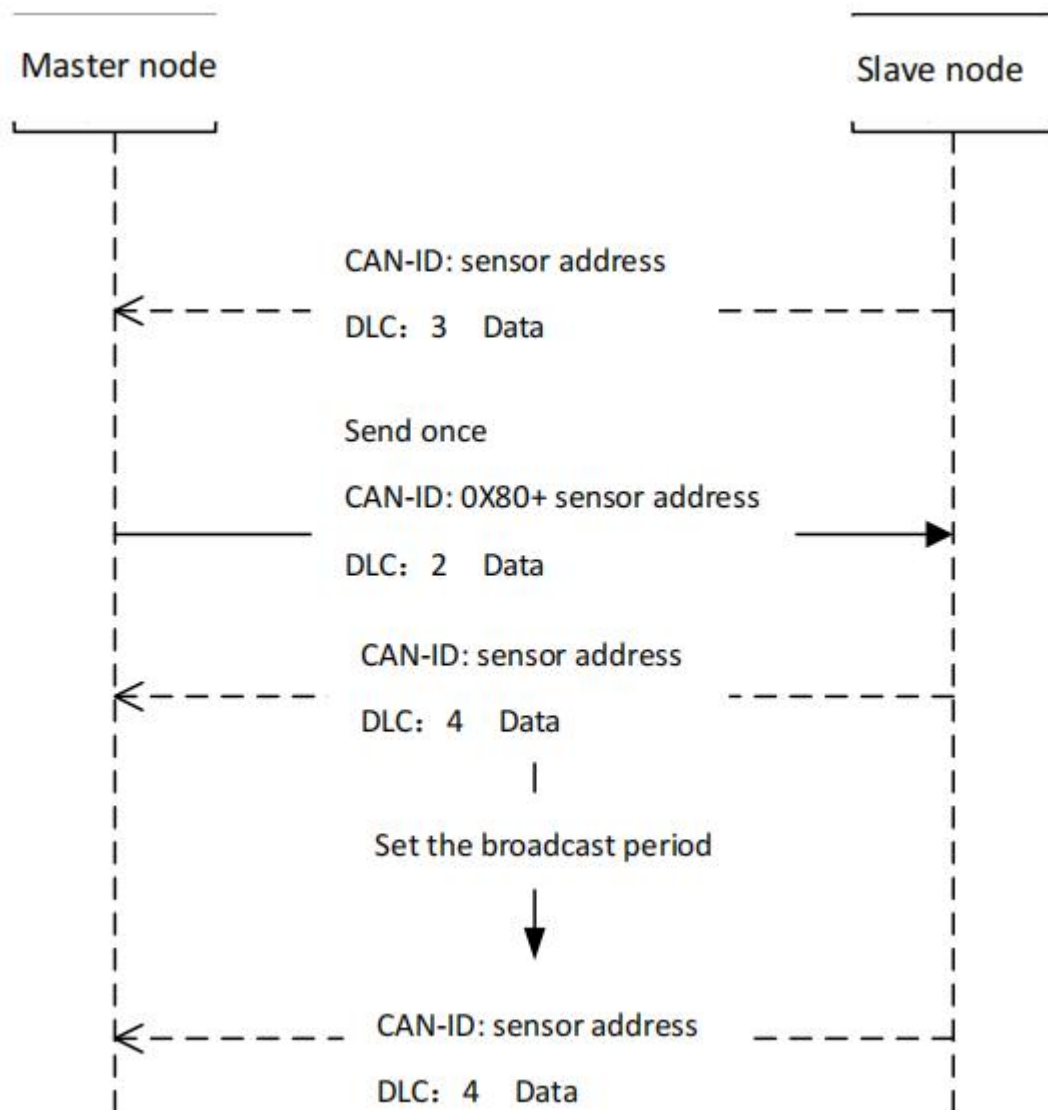
Picture (8.6)

Displays the middle magnetic stripe position L1, which is the current magnetic stripe magnetic field center and sensor center position value.

No broadcast mode



Broadcast mode



Send data

CAN ID	DLC	Data	
0x80 +CANBus communication address	2	0 byte	1 byte
		0x 88	Fork road selection status

■ CAN ID

0x80+sensor address

For example:

Sensor parameter setting. CANBus communication address is 0X05.(please refer to configuration software manual for specific setting)

Then the CAN ID sent is:0x80+0x05+=0x85;

■ 0 byte

Current byte fixed data 0x88。

■ 1 byte Fork road selection status

Control sensor branch selection

0x00: Go straight without fork road

0x01: Select the left magnetic stripe to run

0x02: Select the right magnetic stripe to run

0x03: Select the bifurcated straight magnetic strip to run

	0x00: Go straight without fork road	0x01: Select the left magnetic stripe to run	0x02: Select the right magnetic stripe to run	0x03: Select the bifurcated straight magnetic strip to run
Left fork road	○	√	×	√
Right fork road	○	×	√	√
Crossroads	√	×	×	×
Herringbone road	×	√	√	×
Left side branch merging	√	×	√	√
Right side branch	√	√	×	√

merging				
✓ : Applicable ×: Inapplicable ○: Applicable at low speed				

Response data

CAN ID	DLC	Data			
CAN bus communication address	4	0 byte	1 byte	2 byte	3 byte
		Sensor tatus	Magnetic stripe induction statu	Current magnetic stripe position	

Sensor tatus (1byte)

The status of the sensor 00 is normal.and the non-00 value is error.

■ Magnetic stripe induction status (1byte)

The magnetic stripe status displays the data and position of the current magnetic stripe.the values of the magnetic stripe are displayed in the following table

Right magnetic stripe sensing	Middle magnetic stripe sensing	Left magnetic stripe sensing	Magnetic stripe not detected
4	2	1	0

Fox example:

When two magnetic strips are detected, which are located in the middle and left positions of the sensor, the return value is $1+2=3$

When two magnetic strips are detected, which are located in the middle and right positions of the sensor, the return value is $4+2=6$

When 3 magnetic strips are detected, they are located in the middle position of the sensor, the left position and the right position of the magnetic strips, the return value is $4+2+1=7$

Current magnetic stripe position (2byte)

The currently selected magnetic stripe deviation position value

Send fork control data:

CAN ID	DLC	Data	
0x81	2	0 byte	1 byte
		0x88	0x01(Choose the fork on the left)
Prompt	Select the command of the fork, and the position 1 before the magnetic strip must be sent to the position 1 before the fork. The position 1 is 20cm-40cm from the fork.		

Return sensor data:

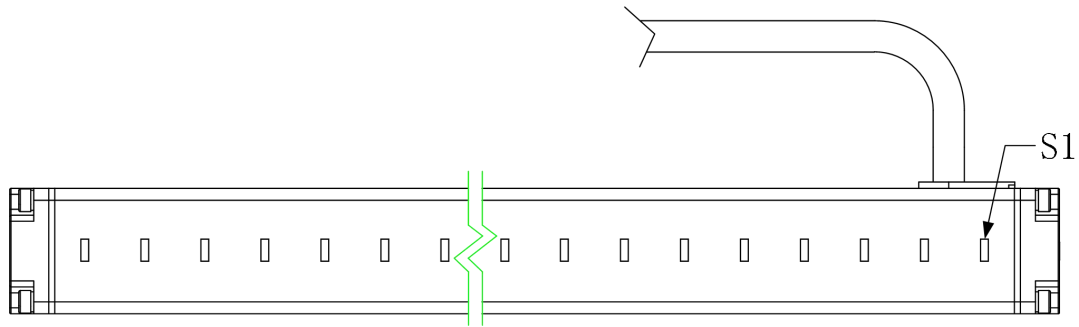
CAN ID	DLC	Data			
0x 01	4	0 byte	1 byte	2 byte	3 byte
		Sensor status	Status	Magnetic stripe position	

Digital data mode

Magnetic stripe detection

Sensor model corresponds to digital quantity data;

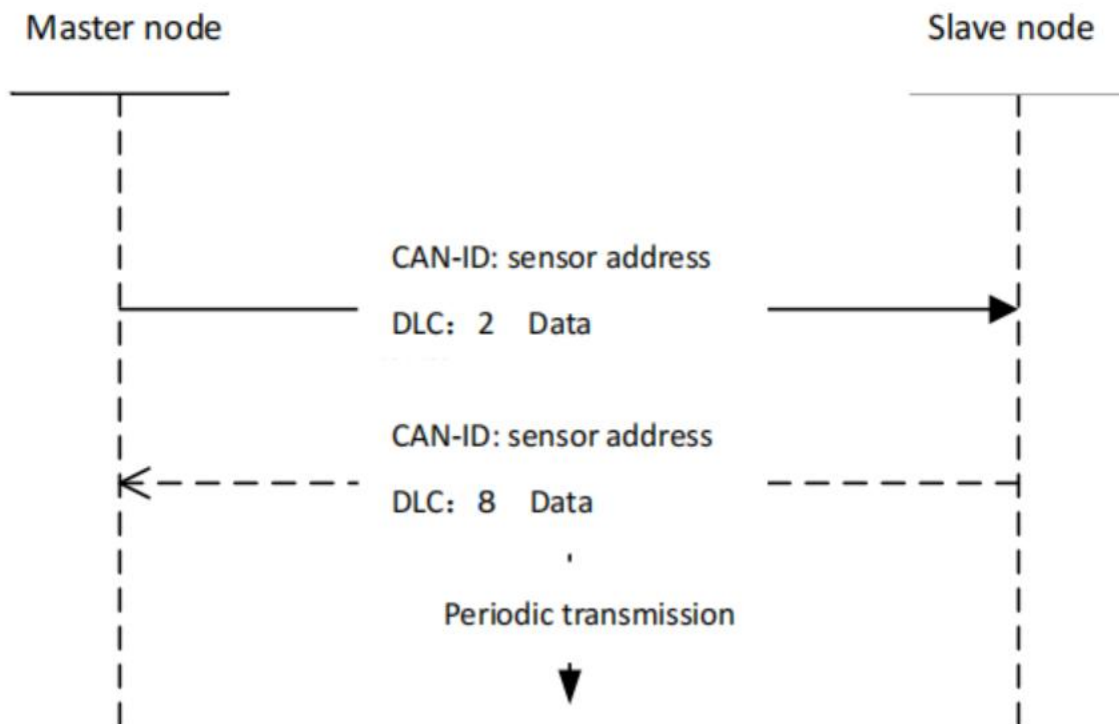
Model	Data description
CNS-MLS-160N	Only S1-S16 digital data is valid;
CNS-MLS-320N	Only S1-S32 digital data is valid;
CNS-MLS-480N	Only S1-S48 digital data is valid;
CNS-MLS-640N	S1-S64 digital data is valid;



Picture (8.9)

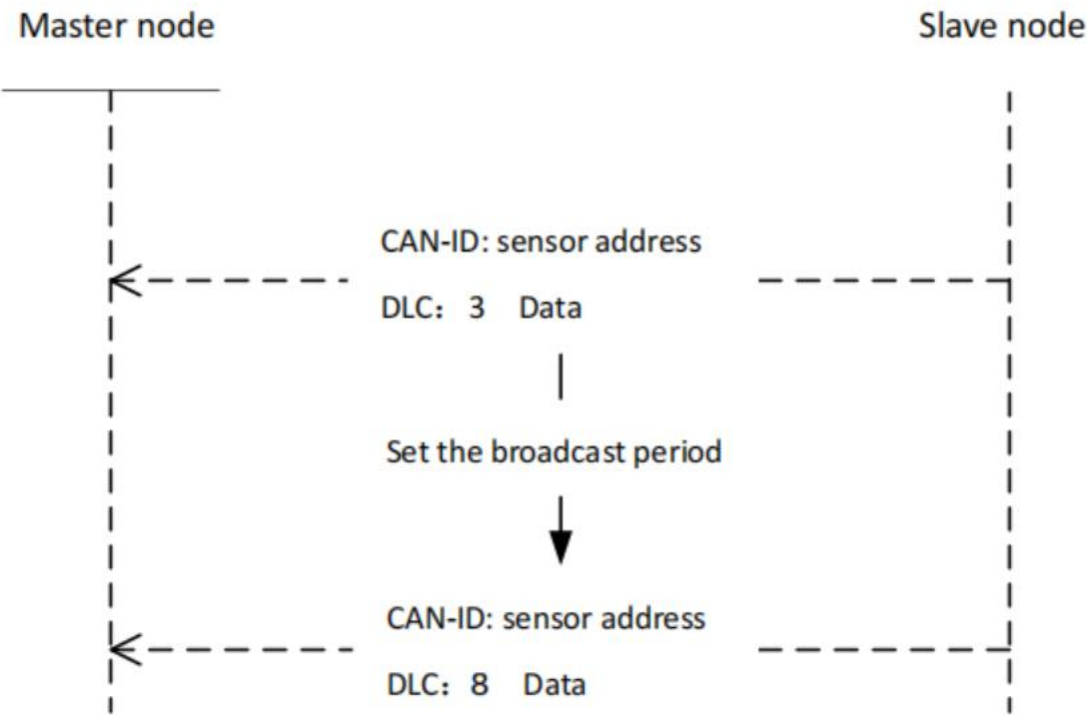
1Byte(H)	2Byte	3Byte	4Byte	5Byte	6Byte	7Byte	8Byte(L)
S1-S8	S9-S16	S17-S24	S25-S32	S33-S40	S41-S48	S49-S56	S57-S64

No broadcast mode



Picture (8.10)

Broadcast Mode



Picture (8.11)

Sending Data

CAN ID	DLC	Data	
CAN bus communication address	2	0 byte	1 byte
		0x88	无效

■ CAN ID

Sensor Address

For example:

Sensor parameter setting, CAN bus communication address is 0x05; (For specific settings, please refer to the configuration software manual)

Then the sent CAN ID is, $0x05+0x80=0x85$;

■ 0 Byte

In position data output mode, it must start with 0x88.

■ 1 Byte

Invalid data sent: 00;

Response data

CAN ID	DLC	Data							
CAN Bus communication address	8	1 Byte (H)	2 Byte	3 Byte	4 Byte	5 Byte	6 Byte	7 Byte	8 Byte(L)
		S1-S8	S9-S16	S17-S24	S25-S32	S33-S40	S41-S48	S49-S56	S57-S64

● Byte 1

Data	S1-S8 (1Byte)							
Hexadecimal	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S8	S7	S6	S5	S4	S3	S2	S1
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● Byte 2

Data	S9-S16 (1Byte)							
Hexadecimal	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S16	S15	S14	S13	S12	S11	S10	S9
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● Byte 3

Data	S17-S24 (1Byte)							
Hexadecimal	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S24	S23	S22	S21	S20	S19	S18	S17
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● Byte 4

Data	S25-S32 (1Byte)							
Hexadecimal	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S32	S31	S30	S29	S28	S27	S26	S25
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● Byte 5

Data	S33-S40 (1Byte)							
Hexadecimal	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S40	S39	S38	S37	S36	S35	S34	S33
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● Byte 6

Data	S41-S48 (1Byte)							
Hexadecimal	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S48	S47	S46	S45	S44	S43	S42	S41
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● Byte 7

Data	S49-S56 (1Byte)							
Hexadecimal	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S56	S55	S54	S53	S52	S51	S50	S49
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● Byte 8

Data	S57-S64 (1Byte)							
Hexadecimal	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S64	S63	S62	S61	S60	S59	S58	S57
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

8.3 CAN-OPEN PROTOCOL

8.3.1 Basic concept

Electronic Data Document (EDS): The directory used to record and describe all parameters of the Can Open node; through the EDS file, you can obtain all CAN Open parameters of the node, manufacturer, serial number, version information, Potter rate, etc. When using the Can Open function, PLC et al. You need to import the EDS file first and configure it through an object dictionary recorded in EDS.

Service Data object (SDO): SDO is mainly used for the parameter configuration of the CAN Open main site to the parameter of the Stepon node. After each SDO message is sent out, there will be answering information to ensure that the message is accurately delivered. In a Can Open communication system, there is usually only one main station as a client, from the site node as SDO server to respond to SDO packets. The main station client access and modify the corresponding index parameters within any node EDS through the SOD message.

Process data object (PDO): PDO is used to transmit real-time data, unidirectional transmission, no need to receive from the station node response. A PDO message is transmitted up to 8 byte data, which is mainly used to transmit real-time data. The main station node and the from the site node define the sending data and receiving data corresponding to the PDO in advance. Therefore, there is no need to confirm again during the transmission process, there is no time to respond and responding data, thereby increasing the utilization rate of the bus.

8.3.2 Communication specifications

Communication way	Bus mode
Communication rate	1000k (default) , 500k, 250k, 125k
Communication address	1-127 (default)
TPDO	4
RPDO	4
Online message	support
Hello Message	support
Heartbeat consumption	support
SDO	support

8.3.3 Control message

The sensor node supports the control message sent by the main station (NMT Module Control message), and the control message information should not be answered.

Packet format

COB-ID	DLC	Byte 0	Byte 1
0x 000	1	CS Control function code	Node-ID

CS: Control function code

Command code	NMTServe	effect
0x01	Enter operation status	Node starts PDO sending and receiving status
0x02	State in the state	Node entry stopped state
0x80	Enter the pre-operation status	The node enters the pre-operation status, used to configure PDO mapping and parameter settings
0x81	Resetting node	The application layer of the reset node, the communication parameters are restored to the initial state value;
0x82	Reset communication	The communication node communication is disturbed by the communication, the node bus is wrong, and the bus is re-initialized when the bus is closed

Node-id: node address, when node-id = 0, all nodes are controlled;

8.3.4 node online message

After the sensor nodes are called, they will send a frame to the online packet.

Packet format

The frame ID of the node online message is 0x700+node-id, the data length is 1, and the data is 00;

COB-ID	DLC	Byte 0
0x 700+Node-ID	1	00

8.3.5 Hello Message

Sensor nodes support the sending heartbeat text, configure the heartbeat time according to the index 0x1017, send the heartbeat newspaper;

index	Sub -index	Data Types	Defaults	Description
0x1017	non	Uns 16	0x00	Configuration of the hello message sending cycle, unit :ms ;

Packet format

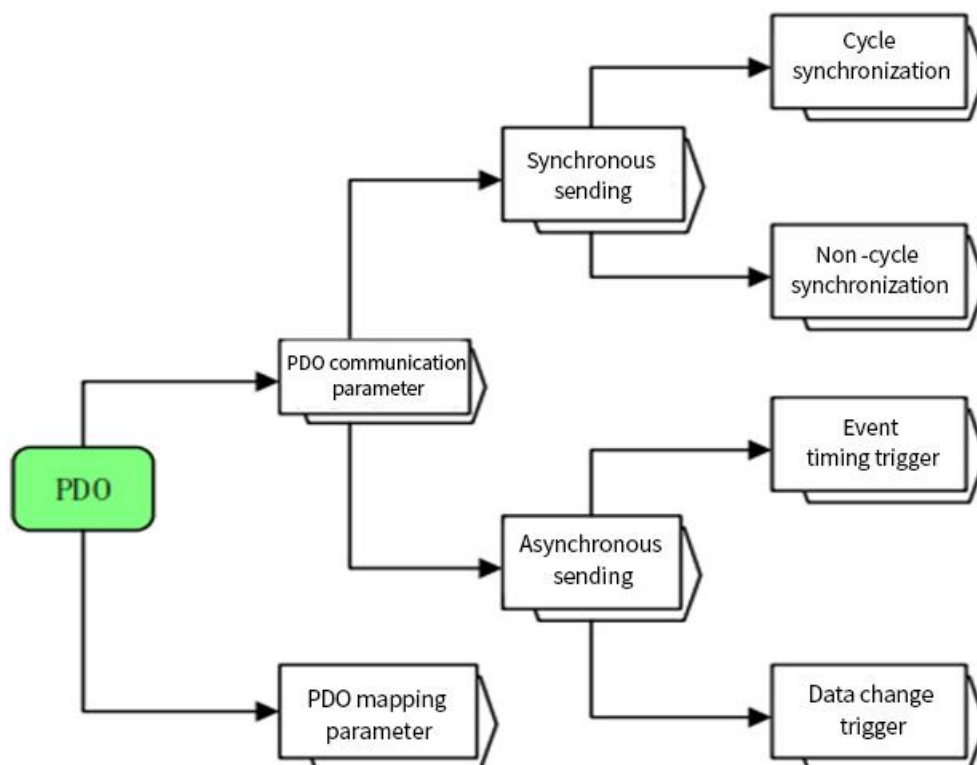
COB-ID	DLC	Byte 0
0x 700+Node-ID	1	status code

The frame ID of the node online message is 0x700+node-id, the data length is 1, and the data represents the current node status.

status code:

status code	status
0x05	Enter operation status
0x04	State in the state
0x7F	Enter the pre -operation status

8.3.6 Process data object (PDO)



PDO send/receiving is observed by the (Slave) Cannian node.

The sensor node defines 4 TPDO and 4 RPDO;

PDO message format

COB-ID	DLC	Data
	1-8	1-8Byte

COB-ID

Object	COB-ID
TPDO1 (send)	0x180+Node ID
RPDO1 (accept)	0x200+Node ID
TPDO2 (send)	0x280+Node ID
RPDO2 (accept)	0x300+Node ID
TPDO3 (send)	0x380+Node ID
RPDO3(accept)	0x400+Node ID
TPDO4 (send)	0x480+Node ID
RPDO4 (accept)	0x500+Node ID

Data (1-8byte): Determination of data according to the mapping data in the mapping parameter

PDO communication parameters

index	Sub -index	Data Types	Defaults	Description
RPDO 0x1400--0x15FF TPDO 0x1800--0x19FF	0x00	Uns 8	0x08	Number of parameters
	0x01	Uns 32	0x 00	COB-ID
	0x02	Uns 8	0x 00	Synchronous
	0x03	Uns 16	0x 00	Substance to production prohibition (unit: 100US))
	0x05	Uns 16	0x 00	Event timer trigger time (unit: MS)
	0x06	Uns 8	0x 00	Sync synchronization initial value

Number of parameters: The number of subdivisions in this quotation includes the number of subdams;

COB-ID: Accepting and sending frame ID of the current PDO

Synchronous type:

Synchronous	Trigger conditions (B = Meet two conditions, o = meet one condition)			PDO transmission
	Sync (receiving synchronous packets)	RTR (receiving remote frames)	Event (data change or timer)	
00	B	-	B	Non -cycle synchronization
01-240	O	-	-	Cycle, synchronous,(1-240 Numeroshi represents the number of sync packets received between two PDO packets)

241-251	-	-	-	reserve
252	B	B	-	Synchronous, after RTR
253	-	O	-	Asynchronous, after RTR
254	-	O	O	Asynchronous, manufacturer -specific events
255	-	O	O	Asynchronous, device sub -protocol specific events

Production forbidden restraint time: the minimum interval sent by the two PDOs, avoid frequent sending PDOs, resulting in increased in the bus load;

Event timer trigger time: PDO time sending cycle time;

Sync synchronous initial value: set the number of synchronous packets, PDO transmitted synchronously, and after receiving the setting value number synchronization message, the PDO data is replied. For example, set it to 5, then receive 5 synchronous messages, respond to PDO data;

PDO mapping parameter

Set the corresponding index data that the current PDO needs to be transmitted. By setting the PDO to the corresponding index, the custom transmission of the data is completed. The length of a PDO is maximum 8BYTE. The length of the mapping data cannot exceed 8byte. The sensor has the default mapping, and the mapping can be changed according to demand;

RPDO default mapping

Only RPDO1, RPDO2, RPDO3 are used in the default mapping;

index	Sub -index	Data Types	Defaults	Description
RPDO1 0x1600	0x00	Uns 8	8	Number of parameters
	0x01	Uns 32	0x20040008	The mapping is the 8 -bit length data of the index 0x2004 submules 0x00;
	0x02-0x08	Uns 32	0x00	Not mapping;

TPDO Default mapping

index	Sub -index	Data Types	Defaults	Description
TPDO1 0x1A00	0x00	Uns 8	8	Number of parameters
	0x01	Uns 32	0x20020008	The mapping is the 8 -bit length data of the index 0x2002 submules 0x00;
	0x02	Uns 32	0x20030008	The mapping is the 8 -bit length data of the index 0x2003 submules 0x00;
	0x03	Uns 32	0x20050010	The mapping is the 16 -bit length data of the index 0x2005 submules 0x00;
	0x04	Uns 32	0x20060010	The mapping is the 16 -bit length data of the index 0x2006 submules 0x00;
	0x05	Uns 32	0x20070010	The mapping is the 16 -bit length data of the index 0x2007 submules 0x00;
	0x06-0x08	Uns 32	0x00	Not mapping;
TPDO2	0x00	Uns 8	8	Number of parameters

0x1A01	0x01	Uns 32	0x20020008	The mapping is the 8 -bit length data of the index 0x2002 submules 0x00;
	0x02	Uns 32	0x20030008	The mapping is the 8 -bit length data of the index 0x2003 submules 0x00;
	0x03	Uns 32	0x20080010	The mapping is the 16 -bit length data of the index 0x2008 submules 0x00;
	0x04	Uns 32	0x20090010	The mapping is the 16 -bit length data of the index 0x2009 submules 0x00;
	0x05	Uns 32	0x20010010	The mapping is the 16 -bit length data of the index 0x2001 submules 0x00;
	0x06-0x08	Uns 32	0x00	Not mapping;
TPDO3 0x1A02	0x00	Uns 8	8	Number of parameters
	0x01	Uns 32	0x20020008	The mapping is the 8 -bit length data of the index 0x2002 submules 0x00
	0x02	Uns 32	0x20030008	The mapping is the 8 -bit length data of the index 0x2003 submules 0x00;
	0x03	Uns 32	0x20000020	The mapping is the 32 -bit length data of the index 0x2000 submules 0x00;
	0x04-0x08	Uns 32	0x00	Not mapping;

8.3.7 Service Data object (SDO)

Send a message format

COB-ID	DLC	LBS							MBS
0x600+Node-ID	8	Control function code	Object index	Object subcontinent		Up to 4 bytes			

Control function code

Command code	Description
0x40	The command words when the message is sent
0x2F	It means that the sending data is 1 byte;
0x2B	It means that the sending data is 2 bytes;
0x23	It means that the sending data is 4 bytes;

Node response message format

COB-ID	DLC	LBS						
0x580+Node-ID	8	Receive command	Object index	Object subcontinent	Up to 4 bytes			

		code			
--	--	------	--	--	--

Control function code

Command code	Description
0x60	packet sends successfully
0x80	SDO message error
0x4F	It means that the receiving data is 1 byte;
0x4B	It means that the receiving data is 2 byte;
0x43	It means that the receiving data is 4 byte;

8.3.8 EDS file

Please visit the website to obtain the EDS file

8.3.9 index definition

Object index	Object subindex	Object description	Data type	Attributes	Defaults
2000h	00h	Digital signal data	UNS64	R	H L
					00 00 00 00 00 00 00 00
2001h	00h	Magnetic field strength data object sub-index number	UNS8	R	0040h
	01h	Magnetic field strength data 1	INT16	R	0000h
	02h	Magnetic field strength data 2	INT16	R	0000h
	03h	Magnetic field strength data 3	INT16	R	0000h
	04h	Magnetic field strength data 4	INT16	R	0000h
	05h	Magnetic field strength data 5	INT16	R	0000h
	06h	Magnetic field strength data 6	INT16	R	0000h
	07h	Magnetic field strength data 7	INT16	R	0000h
	08h	Magnetic field strength data 8	INT16	R	0000h
	09h	Magnetic field strength data 9	INT16	R	0000h
	0Ah	Magnetic field strength data 10	INT16	R	0000h

	0Bh	Magnetic field strength data 11	INT16	R	0000h
	0Ch	Magnetic field strength data 12	INT16	R	0000h
	0Dh	Magnetic field strength data 13	INT16	R	0000h
	0Eh	Magnetic field strength data 14	INT16	R	0000h
	0Fh	Magnetic field strength data 15	INT16	R	0000h
	10h	Magnetic field strength data 16	INT16	R	0000h
	11h	Magnetic field strength data 17	INT16	R	0000h
	12h	Magnetic field strength data 18	INT16	R	0000h
	13h	Magnetic field strength data 19	INT16	R	0000h
	14h	Magnetic field strength data 20	INT16	R	0000h
	15h	Magnetic field strength data 21	INT16	R	0000h
	16h	Magnetic field strength data 22	INT16	R	0000h
	17h	Magnetic field strength data 23	INT16	R	0000h
	18h	Magnetic field strength data 24	INT16	R	0000h
	19h	Magnetic field strength data 25	INT16	R	0000h
	1Ah	Magnetic field strength data 26	INT16	R	0000h
	1Bh	Magnetic field strength data 27	INT16	R	0000h
	1Ch	Magnetic field strength data 28	INT16	R	0000h
	1Dh	Magnetic field strength data 29	INT16	R	0000h
	1Eh	Magnetic field strength data 30	INT16	R	0000h
	1Fh	Magnetic field strength data 31	INT16	R	0000h
	20h	Magnetic field strength data 32	INT16	R	0000h

	21h	Magnetic field strength data 33	INT16	R	0000h
	22h	Magnetic field strength data 34	INT16	R	0000h
	23h	Magnetic field strength data 35	INT16	R	0000h
	24h	Magnetic field strength data 36	INT16	R	0000h
2002h	00h	Sensor status	UNS8	R	00h
2003h	00h	Magnetic stripe induction status	UNS8	R	00h
2004h	00h	Fork selection	UNS8	R/W	00h
2005h	00h	Fork selection returns magnetic stripe position	INT16	R	0000h
2006h	00h	Fork selection returns magnetic field strength	INT16	R	0000h
2007h	00h	Fork selection returns magnetic induction points	UNS16	R	0000h
2008h	00h	Left magnetic stripe position	INT16	R	0000h
2009h	00h	Middle magnetic stripe position	INT16	R	0000h
200Ah	00h	Right magnetic stripe position	INT16	R	0000h
200Bh	00	Left magnetic stripe average strength value	INT16	R	0000h
200Ch	00	Middle magnetic stripe average strength value	INT16	R	0000h
200Dh	00	Right magnetic stripe average strength value	INT16	R	0000h
200Eh	00	Left magnetic stripe sensing points	UNS16	R	0000h
200Fh	00	Middle magnetic stripe sensing points	UNS16	R	0000h
2010h	00	Right magnetic stripe sensing points	UNS16	R	0000h

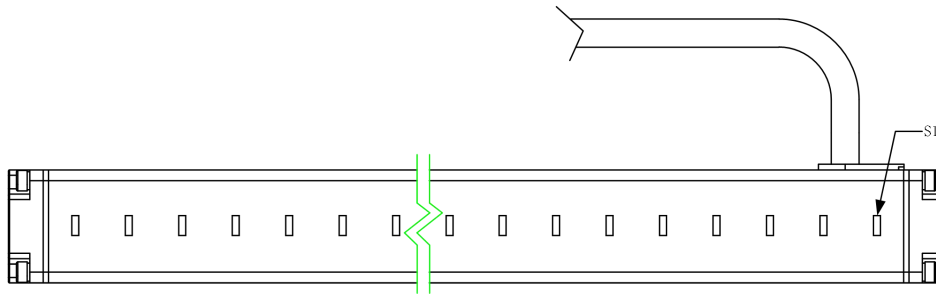
Data analysis

2000 00h--Digital signal data

The sensor model corresponds to the digital quantity data;

Model	Data description
CNS-MLS-160N	Only S1-S16 digital data is valid;

CNS-MLS-320N	Only S1-S32 digital data is valid;
CNS-MLS-480N	Only S1-S48 digital data is valid;
CNS-MLS-640N	S1-S64 digital data is valid;



1Byte(L)	2Byte	3Byte	4Byte	5Byte	6Byte	7Byte	8Byte(H)
S1-S8	S9-S16	S17-S24	S25-S32	S33-S40	S41-S48	S49-S56	S57-S64

● Byte 1

	S1-S8							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S8	S7	S6	S5	S4	S3	S2	S1
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● Byte 2

	S9-S16							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S16	S15	S14	S13	S12	S11	S10	S9
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● Byte 3

Data	S17-S24							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S24	S23	S22	S21	S20	S19	S18	S17
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● Byte 4

	S25-S32							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S32	S31	S30	S29	S28	S27	S26	S25
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● Byte 5

	S33-S40							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S40	S39	S38	S37	S36	S35	S34	S33
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

- Byte 6

	S41-S48							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S48	S47	S46	S45	S44	S43	S42	S41
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

- Byte 7

	S49-S56							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S56	S55	S54	S53	S52	S51	S50	S49
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

- Byte 8

	S57-S64							
Bit status	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S64	S63	S62	S61	S60	S59	S58	S57
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

2001--Magnetic Field Strength Data

The sensor model corresponds to the intensity data;

Model	Data description
CNS-MLS-160N	Only S1-S16 magnetic field strength data is valid;
CNS-MLS-320N	Only S1-S32 magnetic field strength data is valid;
CNS-MLS-480N	Only S1-S48 magnetic field strength data is valid;
CNS-MLS-640N	S1-S64 data is valid;

02h-40h

The field strength data detected at the S1-S64 position points, each value is 2 bytes long, the value range is from -2048 to +2048, the N pole magnetic field signal is a negative value, and the S pole magnetic field signal is a positive value.

2002h--Sensor Status

The sensor status 0x00 is a normal status, and a non-00 value is a sensor error.

2003h—Magnetic stripe sensing status

The magnetic stripe status displays the currently sensed magnetic stripe data and position; the following table displays the sensed magnetic stripe value;

Right magnetic stripe induction	Intermediate magnetic stripe induction	Left magnetic strip sensing	Magnetic stripe not detected
4	2	1	0

In the state of multiple magnetic strips, the return value is accumulated to the magnetic strip value;

E.g:

When the two magnetic strips are detected, the magnetic bar is located in the middle of the sensor and the left position, the return value is $1+2 = 3$;

When the two magnetic strips are detected, the magnetic bar is located in the middle of the sensor and the right position, the return value is $4+2 = 6$;

When the three magnetic strips are detected, it is located in the middle of the sensor, the magnetic bar on the left and right positions, and the return value is $4+2+1 = 7$;

2004H — Fort Road Selection

Control the sensor magnetic stripe fork selection;

0x00: Go straight without choosing a fork

0x01: Select the left magnetic strip to run

0x02: Select the right magnetic stripe running

0x03: Choose the Magnetic Striper Strike of the fork Road to run

	0x00: Go straight	0x01: Select the left magnetic stripe to run	0x02: Select the Right magnetic stripe to run	0x03: Select a fork to go straight to run the magnetic stripe
Left fork road	○	√	×	√
Right fork road	○	×	√	√
Crossroads	√	×	×	×
Herringbone road	×	√	√	×
Merge on the left fork road	√	×	√	√
Merge on the right fork road	√	√	×	√
√ : Applicable ×: Not applicable ○: Applicable under low speed conditions				

2005h—Choosing the position of the magnetic stripe

The distance of the currently selected magnetic strip relative to the center of the sensor;

MLS-160N position range is -70mm-70mm;

MLS-320N position range is -150mm-150mm;

MLS-480N position range is -230mm-230mm;

MLS-640N position range is -630mm-630mm;

2006h—Fork selection magnetic field strength

The average magnetic field strength of the currently selected magnetic stripe is 2 bytes long and ranges from -2048 to +2048. The N-pole magnetic field signal is a negative value and the S-pole magnetic field signal is a positive value.

2007h—Fork in the road to choose magnetic stripe points

The number of digital signal points sensed by the currently selected magnetic stripe;

MLS-160N data range is 1-16;

MLS-320N data range is 1-32;

MLS-480N data range is 1-48;

MLS-640N data range is 1-64;

2008h—Left magnetic stripe position

When the sensor detects more than two magnetic stripes, the magnetic stripe deviation distance value on the left side of the sensor;

MLS-160N position range is -70mm-0;

MLS-320N position range is -150mm-0;

MLS-480N position range is -230mm-0;

MLS-640N position range is -630mm-0;

2009h—Middle magnetic stripe position

When the sensor detects more than two magnetic stripes, the magnetic stripe deviation distance value at the center of the sensor;

MLS-160N position range is -70mm-70mm;

MLS-320N position range is -150mm-150mm;

MLS-480N position range is -230mm-230mm;

MLS-640N position range is -630mm-630mm;

200Ah—Right magnetic stripe position

When the sensor detects more than two magnetic stripes, the magnetic stripe deviation distance value on the right side of the sensor;

MLS-160N position range is 0-70mm;

MLS-320N position range is 0-150mm;

MLS-480N position range is 0-230mm;

MLS-640N position range is 0-630mm;

200Bh—Average magnetic field strength of the left magnetic stripe

When the sensor detects more than two magnetic stripes, the average magnetic field strength value of the magnetic stripes on the left side of the sensor is 2 bytes long and ranges from -2048 to +2018. The N pole magnetic field signal is

negative and the S pole magnetic field signal is positive.

200Ch—Average magnetic field strength of the middle magnetic strip

When the sensor detects more than two magnetic stripes, the average magnetic field strength value of the magnetic stripes near the center of the sensor is 2 bytes long and ranges from -2048 to +2018. The N pole magnetic field signal is negative and the S pole magnetic field signal is positive.

200Dh—Average magnetic field strength of the right magnetic stripe

When the sensor detects more than two magnetic stripes, the average magnetic field strength value of the magnetic stripes on the right side of the sensor is 2 bytes long and ranges from -2048 to +2018. The N pole magnetic field signal is negative and the S pole magnetic field signal is positive.

200Eh—Left magnetic stripe sensing points

The number of digital signal points sensed by the current left magnetic stripe;

0: No magnetic stripe detected;

MLS-160N data range is 1-6;

MLS-320N data range is 1-16;

MLS-480N data range is 1-24;

MLS-640N data range is 1-32;

200Fh—Middle magnetic stripe sensing points

The number of digital signal points sensed by the current middle magnetic stripe;

MLS-160N data range is 1-16;

MLS-320N data range is 1-32;

MLS-480N data range is 1-48;

MLS-640N data range is 1-64;

2010h—Right magnetic stripe sensing points

The number of digital signal points sensed by the current right magnetic stripe;

0: No magnetic stripe detected;

MLS-160N data range is 1-6;

MLS-320N data range is 1-16;

MLS-480N data range is 1-24;

MLS-640N data range is 1-32;

8.3.10 PDO Data

The address mapping of RPDO and TPDO is pre-done in the sensor, but the communication parameters are configured;

RPDO

RPDO Default Configuration

index	Sub-index	Description	Data Types	Default initial value
1600h	00h	Number of parameters	Un8	6
	01h	COB-ID; PDO address	Un32	RPDO1: 0x200+node address
	02h	Send type	Un8	00
	03h	Production prohibition constraint time	Un16	0000
	05h	Event timer trigger time	Un16	0000
	06h	SYNC synchronization initial value	Un8	00

RPDO1

CAN ID	DLC	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
0x200+Node ID	8	Fork in the road	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Control sensor magnetic stripe fork selection;

00: go straight without selecting fork

01: select left magnetic stripe to run;

02: select right magnetic stripe to run;

TPDO

TPDO default Configuration

index	Sub-index	Description	Data Types	Default initial value
1800h 1801h 1802h	00h	Number of parameters	Un8	6
	01h	COB-ID; PDO address	Un32	TPDO1: 0x180+node address TPDO2: 0x280+node address TPDO3: 0x380+node address
	02h	Send type	Un8	00
	03h	Production prohibition constraint time	Un16	0000
	05h	Event timer trigger time	Un16	0000
	06h	SYNC synchronization initial value	Un8	00

TPDO1

CAN ID	DLC	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
--------	-----	-------	-------	-------	-------	-------	-------	-------	-------

0x180+ Node ID	8	Sensor Status	Magnetic stripe sensing status	Fork in the road to return to the magnetic stripe position	Fork selection returns magnetic field strength	Fork selection returns magnetic induction points
-----------------------	---	---------------	--------------------------------	--	--	--

TPDO2

CAN ID	DLC	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
0x280+Node ID	8	Sensor Status	Magnetic stripe sensing status	Left magnetic stripe position	Middle magnetic stripe position	Right magnetic stripe position			

TPDO3

CAN ID	DLC	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
0x380+Node ID	8	Digital signal data							

8.4 RS485-MODBUS FREE AGREEMENT

The parameters in the sensor must be set to the-sensor control method to the RS485 Modbus protocol.

8.4.1 Communication specification

The basic parameters of the serial port need to be set before communication. The following parameters are the basis for establishing communication.

	Parameter	Default setting
Communication way	Single master/multi-slave mode	
Working mode	MODBUS RTU mode	RTU mode
Receiving/sending method	Half-duplex communication mode	
Communication ID	1-127 configurable	127
Communication rate	9600bps , 19200bps , 38400bps , 576000bps , 115200bps	115200bps
Data bit	8 bit	8 bit
Check bit	No verify. Odd verify. Even verify	No verify
Stop bit	1 bit. 2 bit	1 bit

8.4.2 Master-Slave Communication Sequence

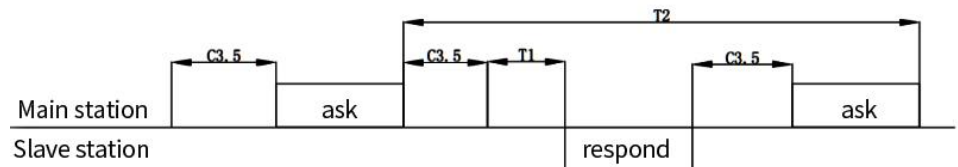
The communication mode of MODBUS protocol is single-master/multi-slave mode

Unicast mode

The master station sends an inquiry to one slave station. The slave performs processing and responds.



The master station sends a query to a slave station



The slave executes the processing and sends back a response.

Serial number	Name	Contents
C3.5	Quiet interval	As the waiting time for sending, please make sure to leave an interval of 3.5 words or more. If the number of words is less than 3.5, the driver will not respond. When the communication speed exceeds 19200 bps, please leave an interval of 1.75 ms or more.
T1	Send wait time	After receiving the inquiry from the master, the slave switches the communication line to the sending state, and the time until it starts to reply. The sending waiting time is 10 ms. The actual sending waiting time will become the static interval (C3.5) + command processing time + sending waiting time (T1)
T2	Communication timeout	It can be configured within 0.05s - 1s

Important Tips

Since RS485 communication cannot send and receive at the same time, it is recommended to control the communication interval to 30-50ms during the communication sequence. And continue the next transmission after confirming that the last transmission is completed.

8.4.3 Register address function

Write holding register – function code 16

Register address	Data	Data content				
2000	00-03	Control sensor magnetic stripe fork selection;				
		0x00: go straight without selecting fork				
		0x01: select left magnetic stripe to run				
		0x02: select right magnetic stripe to run				
		0x03: select fork to run straight magnetic stripe				
			0x00: Go straight without taking a fork in the road	0x01: Select the left magnetic stripe to run	0x02: Select the right magnetic stripe to run	0x03: Select the fork road and go straight through the magnetic stripe
		Left fork	○	✓	×	✓
		Right fork	○	×	✓	✓
		Crossroad	✓	×	×	×
		H-shaped	×	✓	✓	×
Left fork merges	✓	×	✓	✓		
Right fork merges	✓	✓	×	✓		
✓ : Applicable						
× : Not applicable						
○ : Applicable under low speed conditions						

Read input register - function code 04

Register	Data	Definition	Illustrate
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address											
1000	00-02	Sensor status	The sensor status 0x00 is a normal status, and a non-00 value is a sensor error.								
1001	00-07	Magnetic stripe sensing status	The magnetic stripe status displays the currently sensed magnetic stripe data and position; the following table displays the sensed magnetic stripe value; <table border="1"> <thead> <tr> <th>Right magnetic stripe sensor</th><th>Middle magnetic stripe induction</th><th>Left magnetic stripe sensor</th><th>Magnetic stripe not detected</th></tr> </thead> <tbody> <tr> <td>4</td><td>2</td><td>1</td><td>0</td></tr> </tbody> </table> In the case of multiple magnetic stripes, the return value is the accumulation of the magnetic stripe values; For example: When 2 magnetic stripes are detected, they are located in the middle and left of the sensor respectively, the return value is 1+2=3; When 2 magnetic stripes are detected, they are located in the middle and right of the sensor respectively, the return value is 4+2=6; When 3 magnetic stripes are detected, they are located in the middle, left and right of the sensor respectively, the return value is 4+2+1=7;	Right magnetic stripe sensor	Middle magnetic stripe induction	Left magnetic stripe sensor	Magnetic stripe not detected	4	2	1	0
Right magnetic stripe sensor	Middle magnetic stripe induction	Left magnetic stripe sensor	Magnetic stripe not detected								
4	2	1	0								
1002	-630mm-630mm	The fork selection returns the magnetic stripe position	The currently selected magnetic stripe position distance relative to the sensor center is: MLS-160N position range is -70mm-70mm; MLS-320N position range is -150mm-150mm; MLS-480N position range is -230mm-230mm; MLS-640N position range is -630mm-630mm;								
1003	-2048--+2048	The fork selection returns the magnetic field strength	The average magnetic field strength of the currently selected magnetic stripe is 2 bytes long and ranges from -2048 to +2048. The N-pole magnetic field signal is a negative value and the S-pole magnetic field signal is a positive value.								
1004	0-64	The fork selection returns the number of magnetic induction points	The number of digital signal points sensed by the currently selected magnetic stripe, 0: No magnetic stripe detected; MLS-160N data range is 1-16; MLS-320N data range is 1-32; MLS-480N data range is 1-48; MLS-640N data range is 1-64;								
1005	-630mm-0	Left magnetic stripe position	When the sensor detects more than 2 magnetic stripes, the magnetic stripe deviation distance value on the left side of the sensor; MLS-160N position range is -70mm-0; MLS-320N position range is -150mm-0; MLS-480N position range is -230mm-0; MLS-640N position range is -630mm-0;								
1006	-630mm-630mm	Middle magnetic stripe position	When the sensor detects more than one magnetic stripe, the magnetic stripe deviation distance value at the center of the sensor; MLS-160N position range is -70mm-70mm; MLS-320N position range is -150mm-150mm; MLS-480N position range is -230mm-230mm; MLS-640N position range is -630mm-630mm;								

1007	0-630mm	Right magnetic stripe position	When the sensor detects more than 2 magnetic stripes, the magnetic stripe deviation distance value on the right side of the sensor; MLS-160N position range is 0-70mm; MLS-320N position range is 0-150mm; MLS-480N position range is 0-230mm; MLS-640N position range is 0-630mm;				
1008	-2048--+2048	Average strength value of left magnetic stripe	When the sensor detects more than two magnetic stripes, the average magnetic field strength value of the magnetic stripes on the left side of the sensor is 2 bytes long and ranges from -2048 to +2048. The N-pole magnetic field signal is negative and the S-pole magnetic field signal is positive.				
1009	-2048--+2048	Average strength value of the middle magnetic stripe	When the sensor detects more than one magnetic stripe, the average magnetic field strength value of the magnetic stripe at the center of the sensor is 2 bytes long and ranges from -2048 to +2048. The N pole magnetic field signal is negative and the S pole magnetic field signal is positive.				
1010	-2048--+2048	Average strength value of the right magnetic stripe	When the sensor detects more than two magnetic stripes, the average magnetic field strength value of the magnetic stripes on the right side of the sensor is 2 bytes long and ranges from -2048 to +2048. The N-pole magnetic field signal is negative and the S-pole magnetic field signal is positive.				
1011	0-32	Number of sensing points of the left magnetic stripe	The number of digital signal points sensed by the current left magnetic stripe; 0: No magnetic stripe detected; MLS-160N data range is 1-6; MLS-320N data range is 1-16; MLS-480N data range is 1-24; MLS-640N data range is 1-32;				
1012	0-64	Number of sensing points of the middle magnetic stripe	The number of digital signal points sensed by the current middle magnetic stripe; 0: No magnetic stripe detected; MLS-160N data range is 1-16; MLS-320N data range is 1-32; MLS-480N data range is 1-48; MLS-640N data range is 1-64;				
1013	0-32	Number of sensing points on the right magnetic strip	The number of digital signal points sensed by the current right magnetic stripe; 0: No magnetic stripe detected; MLS-160N data range is 1-6; MLS-320N data range is 1-16; MLS-480N data range is 1-24; MLS-640N data range is 1-32;				
1014	0-65535	Digital signal data 4	S49-S64 digital signal				MLS-640N
1015	0-65535	Digital signal data 3	S33-S48 digital signal			MLS-480N	
1016	0-65535	Digital signal data 2	S17-S32 digital		MLS-320N		

			signal				
1017	0-65535	Digital signal data 1	S1-S16 digital measureme nt signal	MLS-160N			
1018	-2048--+2048	S1 magnetic field strength value	The S1 magnetic field value range is from -2048 to +2048, the N pole magnetic field signal is negative, and the S pole magnetic field signal is positive.				
.	-2048--+2048		The S2-S63 magnetic field value range is from -2048 to +2048, the N pole magnetic field signal is negative, and the S pole magnetic field signal is positive.				
1082	-2048--+2048	S64 Magnetic Navigation Strength	The S64 magnetic field value range is from -2048 to +2048, the N pole magnetic field signal is negative, and the S pole magnetic field signal is positive.				

The sensor model corresponds to the digital measurement data;

Model	Data description
CNS-MLS-160N	Only S1-S16 digital data is valid;
CNS-MLS-320N	Only S1-S32 digital data is valid;
CNS-MLS-480N	Only S1-S48 digital data is valid;
CNS-MLS-640N	S1-S64 digital data is valid;

● Byte 1

Data	S1-S8 (1Byte)							
Hexadecimal	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S8	S7	S6	S5	S4	S3	S2	S1
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● Byte 2

Data	S9-S16 (1Byte)							
Hexadecimal	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S16	S15	S14	S13	S12	S11	S10	S9
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

● Byte 3

Data	S17-S24 (1Byte)
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Hexadecimal I	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S24	S23	S22	S21	S20	S19	S18	S17
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

- Byte 4

Data	S25-S32 (1Byte)							
Hexadecimal I	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S32	S31	S30	S29	S28	S27	S26	S25
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

- Byte 5

Data	S33-S40 (1Byte)							
Hexadecimal I	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S40	S39	S38	S37	S36	S35	S34	S33
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

- Byte 6

Data	S41-S48 (1Byte)							
Hexadecimal I	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S48	S47	S46	S45	S44	S43	S42	S41
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

- Byte 7

Data	S49-S56 (1Byte)							
Hexadecimal I	0x 00							
Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S56	S55	S54	S53	S52	S51	S50	S49
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

- Byte 8

Data	S57-S64 (1Byte)							
Hexadecimal I	0x 00							

Binary	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	S64	S63	S62	S61	S60	S59	S58	S57
Description	A signal point is displayed as 1, and no signal is displayed as 0;							

Hint

1) The fork road selection command must be sent at position 1 before the magnetic stripe reaches the fork road. After the status data is sent once, the status is maintained and waits to be updated after receiving the fork road selection command again.

9 FAILURE STATE

9.1 FAILURE EXCLUSION

When the product fails to run abnormalities and cannot run normally, please refer to the fault list for investigation first.

Fault phenomenon	Check and confirm	Treatment measures
Unable to respond	Check whether the power supply voltage is normal; Check whether the 24V and GND wiring is correct. Communication parameters do not match	Provide correct voltage power supply; Change line sequence; Confirm communication parameters;
Intermittent signal	Check whether the sensing polarity matches the magnetic stripe polarity; The distance between the sensor and the magnetic stripe is less than 15mm.	Adjust configuration parameters; Adjust installation location.
No signal	Whether the installation height exceeds 60mm; Check whether the setting induction polarity matches the magnetic strip polarity;	Adjust configuration parameters; Adjust installation location.

10 AFTER -SALES

10.1 WARRANTY PERIOD

CNS-MLS provides a limited time warranty. During the warranty period, if the product cannot be used normally due to quality problems, design defects, etc., we will carry out after-sales maintenance for free.

- Warranty period: 2 years from sale.

10.2 WARRANTY SCOPE

If the product is within the scope of the warranty during the warranty period, we will repair or replace it for free

- The product warranty and after-sales service are only limited to mainland China
- The product cannot be used normally when it is out of the box due to transportation
- Failure to work normally caused by damage to the product's own components
- Product design defects can not be used normally

10.3 EXEMPTION SCOPE

Please pay attention to the following conditions during the use of the product, we will not provide free after-sales and warranty.

- Failure to install the product according to the instructions correctly, causing damage to the product
- Use this product under unsuitable environments and conditions, causing product damage
- Damage to the product due to non-compliance with the product specification
- Disassemble or repair the product without the permission of the company
- Product damage caused by irresistible external forces such as natural disasters and fires

10.4 TECHNICAL SUPPORT

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