



广州联网科技

# D-MNSV7-X16 Instruction Manual



D-MNSV7-X16

Magnetic Navigation Sensor

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# User Manual

Thank you very much 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.

Updated: May 2022



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Safety Attention After reading this manual, please keep it in a safe place for future reference.



Here are important information about precautions and safety, so please be sure to  
Comply, the signs mean the following:



Warning: Failure to follow the instructions in this warning may result in death or serious injury.



Violation of the precautions during operation may result in personal injury or property damage.  
Product damage.



Remind you of the relevant matters that must be followed when operating the product so that you can use it correctly.



## 1. Security

### 1.1 Safety Warnings

The purpose of the precautions here is to enable you to use the product safely and correctly and to prevent accidents from happening.

It may cause harm and injury to you and others. Please use this product after fully understanding its contents.



#### Notice

Do not use in explosive gas environments, flammable gas environments, corrosive environments, places that are easily exposed to water, or near combustibles.

Failure to use this product may cause fire or injury. Please be careful when setting up, connecting, running, operating, inspecting, and diagnosing faults.

This must be performed by properly qualified personnel; otherwise, it may cause fire, injury or product damage.

#### set up

Please install the sensor inside the frame, otherwise the device may be damaged.

#### connect

Please make sure the power input voltage is within the rated range, otherwise it may cause a fire. Please connect according to the connection diagram.

Otherwise, it may cause a fire. Do not forcibly bend, pull or clamp the cable, otherwise it may cause a fire.

Please use cables of the specified size, otherwise it may cause a fire. Please observe the tightening torque of the driver screws, otherwise it may cause a fire or

Cause damage to the device.

#### Maintenance and inspection

Maintenance and inspection must be performed after cutting off the power supply, otherwise it may cause injury.

Do not touch during insulation resistance measurement or insulation withstand voltage test, otherwise it may cause electric shock.

#### Repair, disassembly, and modification

Do not disassemble or modify the sensor, as this may cause injury or damage to the device.

Please contact us.



## 2 Product Overview

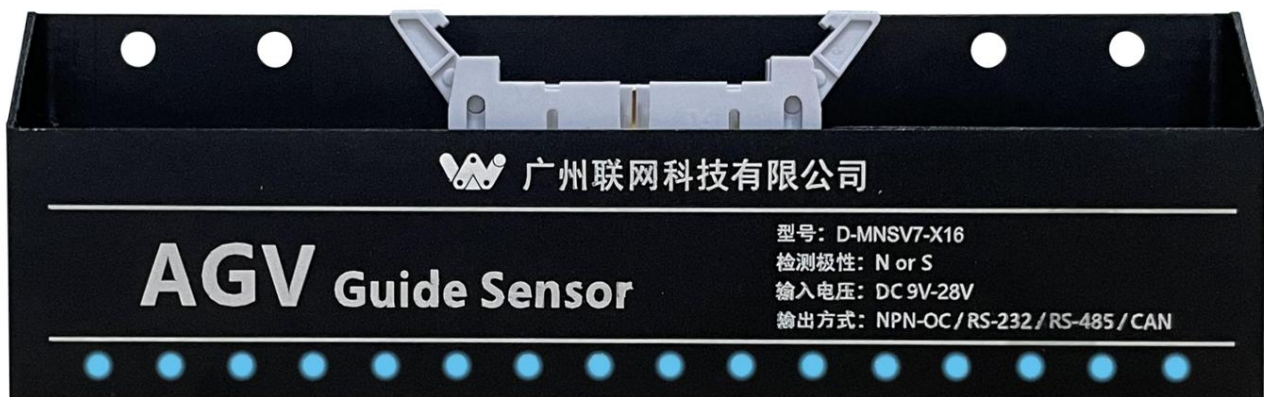
D-MNSV7-X16 is a magnetic navigation sensor designed for AGV magnetic strip navigation.

After receiving the magnetic stripe magnetic field signal, it outputs the switch signal to provide the required magnetic stripe signal to the main controller.

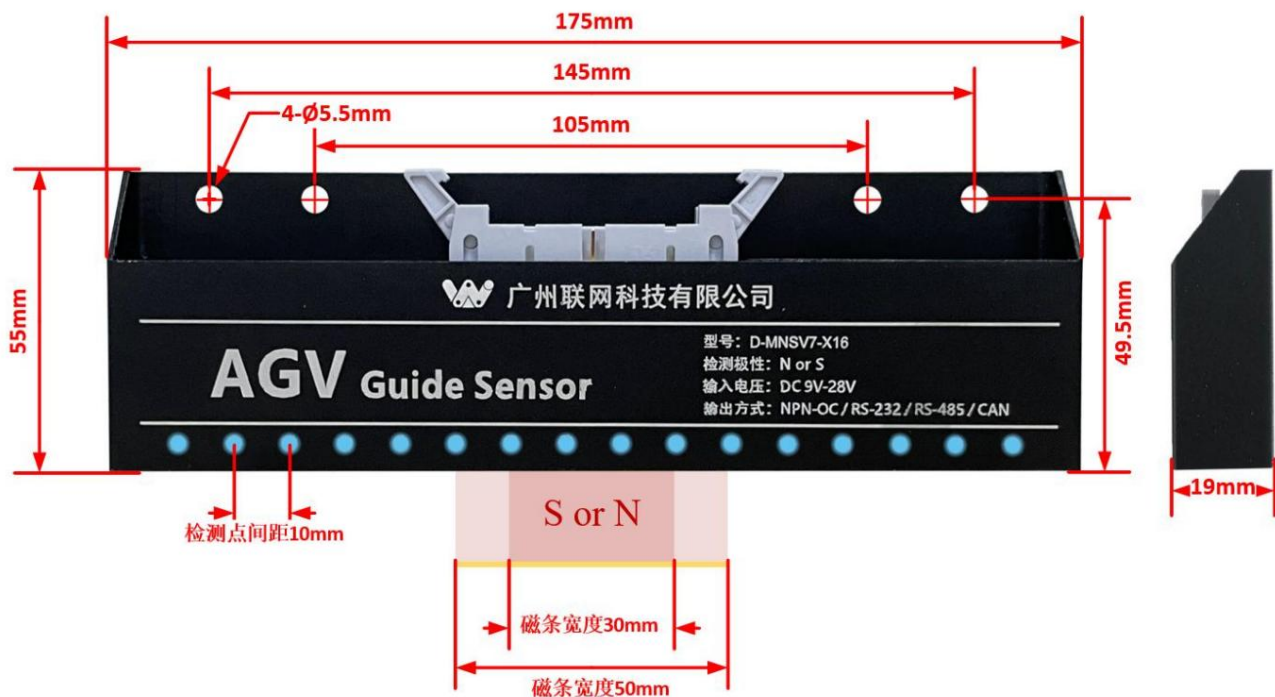
### Product Composition

model	Input Power	Output signal type	Function
D-MNSV7-X16	DC 9V to 28V	NPN	16-point signal output
FC-26P cable 0.7M			Signal extension cable

### 2.1 Appearance



### 2.2 Dimensions





## Magnetic navigation sensor installation direction



## Magnetic navigation sensor installation and setting precautions

The magnetic navigation sensor is recommended to be installed in this way.

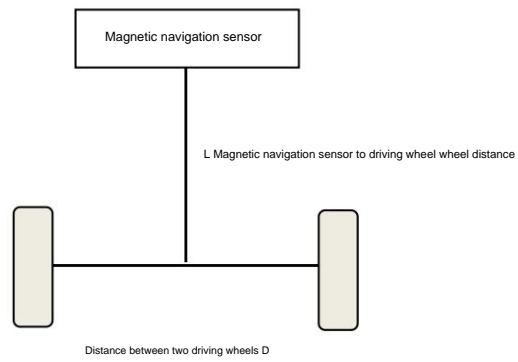
The fixing plate can provide a certain degree of protection.



Magnetic stripe sensor fixing plate, please use aluminum or stainless steel. Magnetic metals (iron, cobalt, nickel) are prohibited.



## Magnetic navigation sensor installation location



For better control effect,  $L/D=1.5$  is recommended

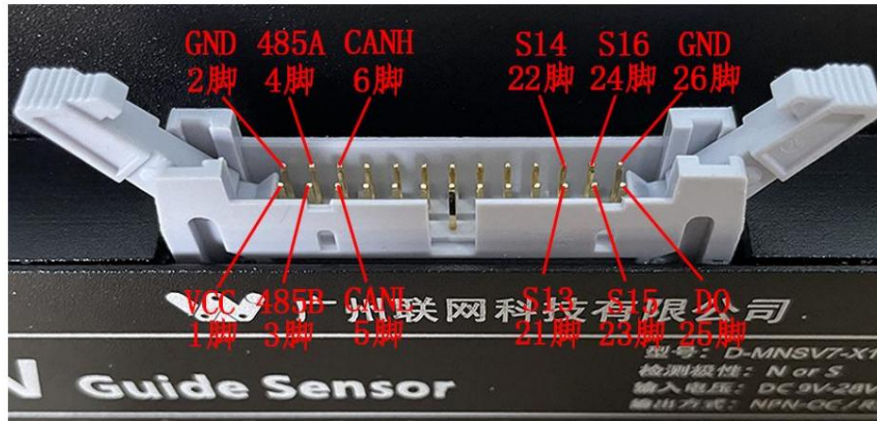
Installation conditions	1) The magnetic navigation sensor fixing plate must be made of non-magnetic material 2) The background magnetic field strength of the magnetic navigation sensor should be less than 2 Gauss
Usage Environment	Ambient temperature: -20~80℃ Ambient humidity: below 80%RH (no frost or dew)
Use gas environment	Do not use in corrosive, flammable gas or dust environments





## 3 Port Features and Functions

### 3.1 IO output characteristics

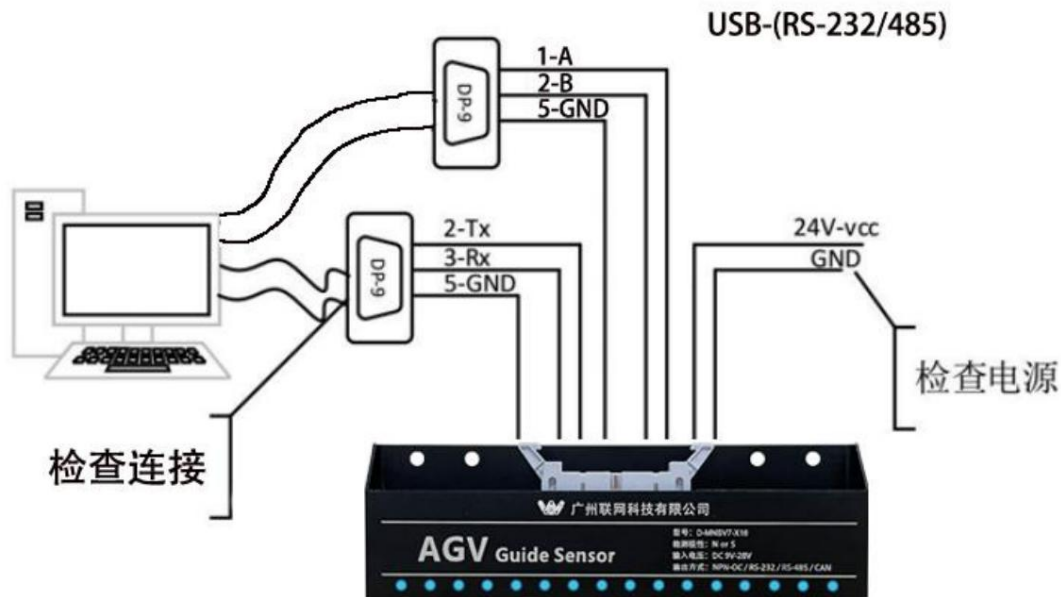


Pin No.	name	Note	Cable color
1 Pin 2	VCC	Input power (9-28V) Positive Input power (9-28V)	brown
Pin 3	GND	Negative	red
Pin	485B	RS-485 communication pin B	orange
4 pins	485A	RS-485 communication pin A	yellow
5 feet	CANL	CAN communication L pin	green
6 foot	CANH	CAN communication H pin	blue
7 foot	232T	RS-232 communication TX pin	purple
8 foot	232R	RS-232 communication RX pin	Ash
9 foot	S1	NPN open drain output (detection point 1)	white
10 foot	S2	NPN open drain output (detection point 2)	black
11 foot	S3	NPN open drain output (detection point 3)	brown
12 foot	S4	NPN open drain output (detection point 4)	red
13 foot	S5	NPN open drain output (detection point 5)	orange
14 feet	S6	NPN open drain output (detection point 6)	yellow
15 feet	S7	NPN open drain output (detection point 7)	green
16 feet	S8	NPN open drain output (detection point 8)	blue
17 feet	S9	NPN open drain output (detection point 9)	purple
18 feet	S10	NPN open drain output (detection point 10)	Ash
19 feet	S11	NPN open drain output (detection point 11)	white
20 feet	S12	NPN open drain output (detection point 12)	black
21 feet	S13	NPN open drain output (detection point 13)	brown
22 feet	S14	NPN open drain output (detection point 14)	red
23 feet	S15	NPN open drain output (detection point 15)	orange
24 feet	S16	NPN open drain output (detection point 16) For	yellow
25 feet	DO	manufacturer use, please leave it unconnected	green
26 feet	GND	Input power (9-28V) negative pole	blue



### 3.2 Functional Configuration

ÿ Confirm the magnetic navigation sensor configuration connection



ÿ Turn on the power and configure the magnetic navigation sensor parameters

Configure the magnetic navigation sensor parameters through the PC software. For specific operations, please see the "Magnetic Navigation Sensor Parameter List" below.

After the parameter setting is completed, configure and load the sensor, wait for the prompt to succeed, and then restart the magnetic navigation sensor.





## ü Magnetic navigation sensor parameter list

Parameter name	parameter	Default parameters and descriptions
Detecting magnetic pole pattern	S pole N pole	Default N pole
Sensor temperature	Read-only parameters	Read-only parameters
Sensitivity	Level 0-13	The higher the level, the more sensitive it is.
Automatic output	none  Change CAN output (output when parameters change)  Continuous CAN output (7ms interval continuous output)  Changing 485 output (output when parameters change) Continuous 485 output  (7ms interval continuous output) Changing 232 output (output when parameters change) Continuous 232 output (7ms interval continuous output)	none

## ü Communication failure If

communication is unsuccessful, please check the following: 1)

Confirm that the magnetic navigation sensor has been properly supplied with DC 9-28V power; 2) Confirm

that the USB to RS232/RS485 serial port cable driver is installed and the port is configured correctly, or try another RS232/RS485 communication module. 3) Confirm that the computer has correctly

installed the configuration software and operating environment; 4) If the problem still cannot be

solved after the above confirmation, please try to replace a PC and try again; 5) If the problem still cannot be solved after the above confirmation,

please contact Guangzhou Network Technology after-sales technical support.

## ü Sensor magnetic field calibration The

sensor has been calibrated before leaving the factory. Generally, the user does not need to calibrate it. Please use the calibration function with caution.



## 4 RS-232/RS-485 interface MODBUS-RTU protocol

Parameters	Parameters Information	Default settings
Mode	Point to Point	
Receiving/sending mode	Full-duplex/half-duplex communication mode	
	1-255	1
Communication ID	Communication rate 115200	115200 bps
bps Data bit 8 bits Parity bit No		8-bit
parity Stop bit 1 bit		No verification
		1 bit

### 4.1 RS-232 / RS-485 Connection

#### RS-232 Configuration Connection

Corresponding wiring					
sensor	26 feet GND	8 feet RxD	7 feet TXD	1 foot VCC	2 pins GND
RS-232 Module GND Power Supply		TXD	RxD		
				Power+	power supply-

#### RS-485 Configuration Connection

Corresponding wiring					
sensor	26 feet GND	4 pins A	3-pin B	1 foot VCC	2 pins GND
RS-485 module GND power supply		A	B		
				Power+	power supply-

### 4.2 MODBUS-RTU communication protocol

#### Function code 03H: Read register value

Host sends:

1	2	3 4 Start register	5 6 Number of registers	7	8
ADR	03H	High Byte Initial deposit Low Byte	High Byte Low register count byte	CRC low byte	CRC high byte

1st byte ADR: slave address code (=00~255)

2nd byte 03H: Read register value function code

Bytes 3 and 4: The starting address of the register to be read

To read the FCC downlink meter,

Bytes 5 and 6: Number of registers to read

Bytes 7 and 8: CRC16 checksum from bytes 1 to 6



Slave loopback:

1	2	3	4, 5	6, 7		M-1, M	M+1	M+2
ADR 03H	Byte total	register data 1	register data 2		.... Register	data M CRC low byte	CRC high byte	

1st byte ADR: slave address code (=001j255)

2nd byte 03H: Return read function code

Byte 3: Total number of bytes from 4 to M (including 4 and M)

Bytes 4 to M: Register data

Bytes M+1, M+2: CRC16 checksum from byte 1 to M

When the slave receives an error, there is no feedback from the slave.

ÿ Function code 06H: Write single register value

Host sends:

1	2	3	4	5	6	7	8
ADR	06H	Register high word Section Address	Register low word Section Address	Data high word Festival	Data low word Festival	CRC code low byte	CRC code high byte

When the slave receives the data correctly, it sends back:

1	2	3	4	5	6	7	8
ADR	06H	Register high word Section Address	Register low word Section Address	Data high word Festival	Data low word Festival	CRC code low byte	CRC code high byte

When the slave receives an error, there is no feedback from the slave.

ÿ Function code 10H: Write multiple register values continuously

Host sends:

1	2	3	4	5	6	7
ADR	10H	Start register High byte address	Start register Low byte address	Number of registers High Byte	Number of registers Low Byte	Total data bytes number

8,9 10,11		N,N+1	N+2	N+3
Register Data 1	Register data 2	Register data M	CRC code low word Festival	CRC code low word Festival

When the slave receives the data correctly, it sends back:

1	2	3	4	5	6	7	8
ADR	10H	Register high word Section Address	Register low word Section Address	Number of registers High Byte	Number of registers Low Byte	CRC code low byte	CRC code high byte

When the slave receives an error, there is no feedback from the slave.

ÿ Function code 20H: Empty magnetic field calibration

Host sends:

1	2	3	4	5	6	7	8
ADR	20H	00H	00H	00H	00H	CRC code low byte	CRC code high byte



When the slave receives the data correctly, it sends back:

1	2	3	4	5	6	7	8
ADR	20H	00H	00H	00H	00H	CRC code low byte	CRC code high byte

When the slave receives an error, there is no feedback from the slave.

ÿ Function code 21H: Uniform magnetic field calibration

Host sends:

1	2	3	4	5	6	7	8
ADR	20H	00H	00H	00H	00H	CRC code low byte	CRC code high byte

When the slave receives the data correctly, it sends back:

1	2	3	4	5	6	7	8
ADR	20H	00H	00H	00H	00H	CRC code low byte	CRC code high byte

When the slave receives an error, there is no feedback from the slave.

#### 4.3 MODBUS-RTU communication protocol register table

Address content	Description No.	Read-only
00H	1 magnetic field state value (2-byte floating point number)	
01H	The second channel no magnetic field status value (2-byte floating point number)	
02H	The third channel no magnetic field status value (2-byte floating point number)	
03H	4th channel no magnetic field status value (2-byte floating point number)	
04H	The 5th channel no magnetic field status value (2-byte floating point number)	
05H	The 6th channel no magnetic field status value (2-byte floating point number)	
06H	7th channel no magnetic field status value (2-byte floating point number)	
07H	8th channel no magnetic field status value (2-byte floating point number)	
08H	9th channel no magnetic field status value (2-byte floating point number)	
09H	10th channel no magnetic field status value (2-byte floating point number)	
0AH	11th channel no magnetic field status value (2-byte floating point number)	
0BH	12th channel no magnetic field status value (2-byte floating point number)	
0CH	13th channel no magnetic field status value (2-byte floating point number)	
0D	14th channel no magnetic field status value (2-byte floating point number)	
0E	15th channel no magnetic field status value (2-byte floating point number)	
0FH	16th channel no magnetic field status value (2-byte floating point number)	
10H	The first channel uniform magnetic field state value (2-byte floating point number)	
11H	The second uniform magnetic field status value (2-byte floating point number)	
12H	The third channel uniform magnetic field state value (2-byte floating point number)	
13H	4th channel uniform magnetic field state value (2-byte floating point number)	
14H	The fifth channel uniform magnetic field status value (2-byte floating point number)	
15H	The sixth channel uniform magnetic field status value (2-byte floating point number)	
16H	7th channel uniform magnetic field status value (2-byte floating point number)	
17H	8th channel uniform magnetic field status value (2-byte floating point number)	
18H	9th channel uniform magnetic field status value (2-byte floating point number)	



19H	The 10th uniform magnetic field status value (2-byte floating point number)	
1AH	11th channel uniform magnetic field status value (2-byte floating point number)	
1BH	12th channel uniform magnetic field status value (2-byte floating point number)	
1CH	13th channel uniform magnetic field status value (2-byte floating point number)	
1DH	14th channel uniform magnetic field status value (2-byte floating point number)	
1EH	15th channel uniform magnetic field status value (2-byte floating point number)	
1FH	16th channel uniform magnetic field status value (2-byte floating point number)	
20H	1st channel detection value (low 1-byte integer) + 2nd channel detection value (high 1-byte integer)	ÿ
21H	3rd channel detection value (low 1-byte integer) + 4th channel detection value (high 1-byte integer)	ÿ
22H	5th channel detection value (low 1-byte integer) + 6th channel detection value (high 1-byte integer)	ÿ
23H	7th channel detection value (low 1-byte integer) + 8th channel detection value (high 1-byte integer)	ÿ
24H	9th channel detection value (low 1-byte integer) + 10th channel detection value (high 1-byte integer)	ÿ
25H	11th channel detection value (low 1-byte integer) + 12th channel detection value (high 1-byte integer)	ÿ
26H	13th channel detection value (low 1-byte integer) + 14th channel detection value (high 1-byte integer)	ÿ
27H	15th channel detection value (low 1-byte integer) + 16th channel detection value (high 1-byte integer)	ÿ
28H	16-channel switch output (2-byte unsigned integer) Real-	ÿ
29H	time sensor temperature (2 byte integer)	ÿ
2AH	Reserved	
2BH	Reserve	
2CH	RS-232 and RS-485 baud rate (2-byte integer) 0:4800 1:9600 2:14400 3:19200 4:38400 5:56000 6:57600 7:115200 8:128000 9:256000	
2DH	CAN baud rate (2-byte integer) 0:100K 1:125K 2:500K 3:1M	
2EH	CAN 11-bit ID (2-byte unsigned integer)	
2F	Automatic output mode (2-byte integer) 0: No automatic output 1: CAN variable output 2: CAN continuous output 3: 485 variable output 4: 485 continuous output 5:232 Variation output 6:232 Continuous output	
30H	Basic settings (2-byte integer) 0bit = 0: S polarity mode 0bit = 1: N polarity mode 1bit=0: filter off 1bit=1: filter on	
31H	Trigger factor (2-byte integer)	
32H	Difference coefficient (2-byte integer)	
33H	RS-232 and RS-485 MODBUS-based device ID (1-byte unsigned integer)	
34H	Date of manufacture	ÿ

#### 4.4 MODBUS-RTU Protocol Example

Access switch data protocol:

0x01 0x03 0x00 0x28 0x00 0x01 0x04 0x02

Protocol for accessing analog data:

0x01 0x03 0x00 0x20 0x00 0x08 0x45 0xC6

Setting 232 changes the automatic output protocol:

0x01 0x06 0x00 0x2F 0x00 0x05 0x78 0x00

Set 232 to continue automatic output protocol:

0x01 0x06 0x00 0x2F 0x00 0x06 0x38 0x01

Cancel the automatic output protocol of the serial port:

0x01 0x06 0x00 0x2F 0x00 0x00 0xB8 0x03



Access switch data protocol		
After sending the access agreement, the device responds to the agreement, one question and one answer		
Description Send	01 03 00 28 00 01 04 02	Send access agreement
(HEX) Receive (HEX)	01 03 02 00 00 B8 44	Received agreement response
Data parsing (HEX)		
Modbus ID	01	Modbus ID of this machine
Modbus function code 03	register	Null
length data	02	The following data corresponds to 2 bytes
protocol	00 00	Data high byte: 9th-16th switch output Data low byte: 1st to 8th switch output 2 bytes of data converted into 16 bits in binary, corresponding to 16 switch quantities
CRC 16 check bit B8 44		Modbus-RTU CRC 16 checksum

Accessing analog data protocol		
After sending the access agreement, the device responds to the agreement, one question and one answer		
Description Send (HEX)	01 03 00 20 00 08 45 C6 Receive	Send access agreement
(HEX) 01 03 10 00	00 02 00 06 04 04 05 03 04 00 00 00 00 00 00 81 F3	Received agreement response
Data parsing (HEX)		
Modbus ID	01	Modbus ID of this machine
Modbus function code 03		Null
The following data in the register 10		The following data corresponds to 16 bytes (0x20-0x27)
Data protocol 2nd channel detection value (high 1-byte integer) + 1st channel detection value (low 1-byte integer)	00 00	
Data protocol 4th detection value (high 1-byte integer) + 3rd detection value (low 1-byte integer)	00 00	
Data protocol 6th detection value (high 1-byte integer) + 5th detection value (low 1-byte integer)	00 00	
Data protocol 8th detection value (high 1-byte integer) + 7th detection value (low 1-byte integer)	00 00	
Data protocol 10th channel detection value (high 1-byte integer) + 9th channel detection value (low 1-byte integer)	00 00	
Data protocol 12th channel detection value (high 1-byte integer) + 11th channel detection value (low 1-byte integer)	00 00	
Data protocol 14th channel detection value (high 1-byte integer) + 13th channel detection value (low 1-byte integer)	00 00	
Data Protocol	00 00 16th	detection value (high 1-byte integer) + 15th detection value (low 1-byte integer)
CRC 16 check digit 81 F3		Modbus-RTU CRC 16 checksum

232 Change automatic output protocol		
After sending the setup agreement, the device data will be automatically uploaded every time it changes.		
Description Send	01 06 00 2F 00 05 78 00	Send setting 232 Change output protocol
(HEX) Receive (HEX)	01 AB 00 28 00 10 A5 D6	Automatically upload data
Data parsing (HEX)		
Modbus ID	01	Modbus ID of this machine
Modbus function code AB		Null
Register address 00 28 Data		16 switch outputs (2-byte unsigned integer)
protocol 00 10		Data high byte: 9th-16th switch output Data low byte: 1st to 8th switch output The data is converted into 16 bits in binary, corresponding to 16 switch quantities.
CRC 16 check digit A5 D6		Modbus-RTU CRC 16 checksum





232 Continuous Automatic Output Protocol		
After sending the setup agreement, the device data continues to upload automatically		
Description Send	01 06 00 2F 00 06 38 01	Send set to 232 continuous output protocol
(HEX) Receive (HEX)	01 AB 00 28 00 00 A4 1A	Automatically upload data
Data parsing (HEX)		
Modbus ID	01	Modbus ID of this machine
Modbus function code AB		Null
Register length 00 28	Data	16 switch outputs (2-byte unsigned integer)
protocol 00 00		Data high byte: 9th-16th switch output Data low byte: 1st to 8th switch output
CRC 16 check digit A4 1A		Modbus-RTU CRC 16 checksum

Cancel automatic output protocol		
Set to no automatic output mode		
Description Send	01 06 00 2F 00 00 B8 03	Send settings without automatic output protocol
(HEX) Receive (HEX)	01 06 00 2F 00 00 B8 03	Indicates successful setup

## 5. RS-232, RS-485 and CAN automatic output protocol

Change output mode: When the detected value changes each time, the switch value will be output immediately.

Continuous output mode: send the current switch value every 7ms

parameter	Parameter information	Default settings
Communication	peer to peer	
method receiving/sending	Full-duplex/half-duplex communication mode	
method communication ID	1-255	01
RS-232/485 communication rate 115200 bps		115200 bps
RS-232/485 data bit 8 bits		8-bit
RS-232/485 parity bit no parity		No verification
RS-232/485 stop bit 1 bit		1 bit
CAN communication rate	500K bps	500K bps
CAN communication node	161H	161H

Format:

MODBUS Device ID	Function code	Register high word Section Address	Register Low Byte Address	Data high word Festival	Data low word Festival	CRC code low word Festival	CRC code high byte
XXH	ABH	00H	28H	XXH	XXH	XXH	XXH

Data high byte: 9th-16th switch output

Data low byte: 1st to 8th switch output



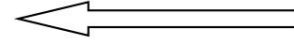
## 6. Inspection and troubleshooting

### 6.1 Inspection Contents Since AGV is

a moving device, it operates in a vibrating environment. To ensure that the product can operate stably and without failure,

Therefore, it is necessary to conduct regular inspections of the equipment and the inspection contents.

Recommended inspection cycle: 3 months



Check the tightness of the housing fixing nut

Check the tightness of the terminal and the condition of the wires in the port.

### 6.2 Troubleshooting When the product

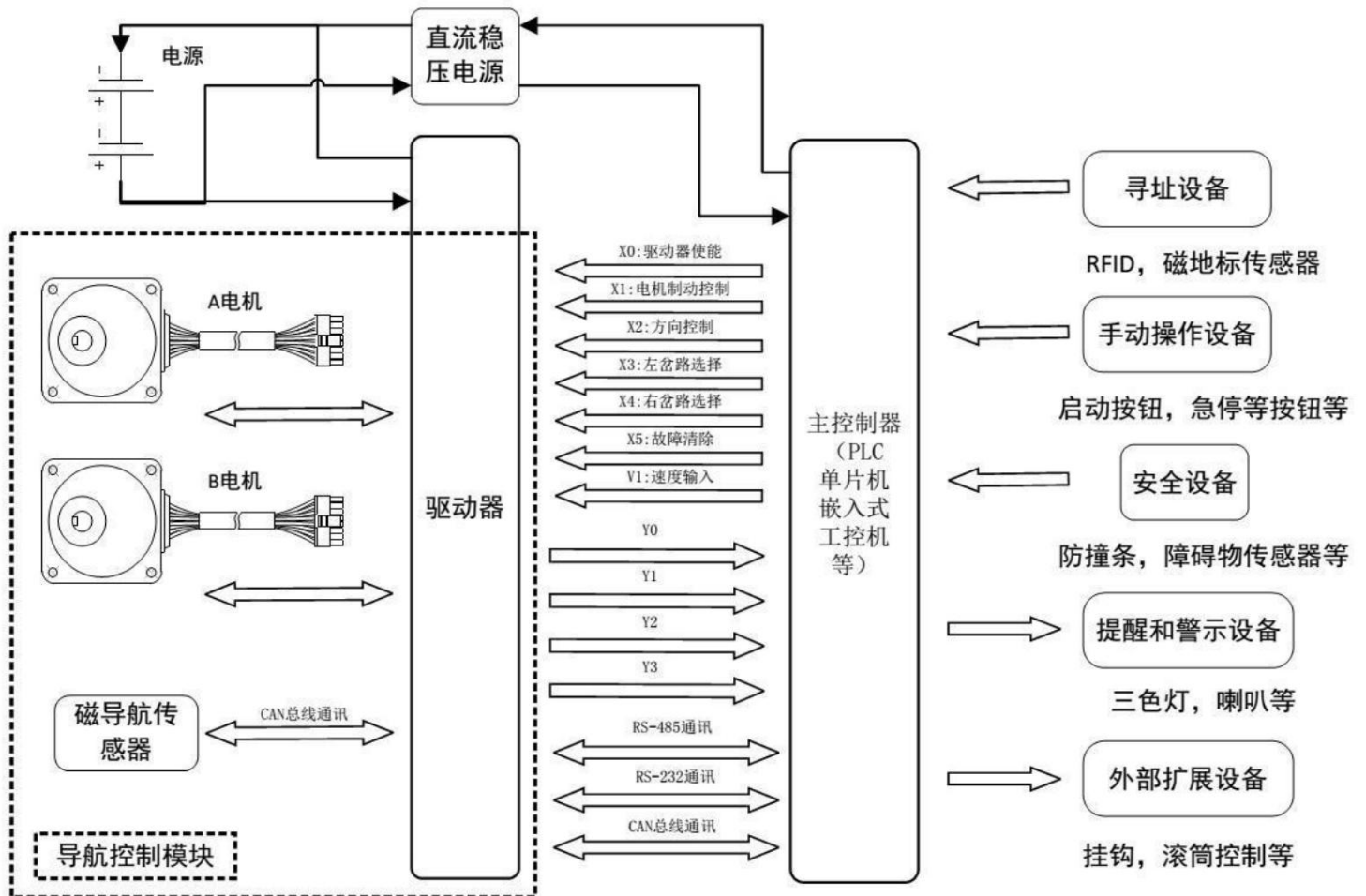
has abnormal faults and cannot operate normally, please refer to the fault list for troubleshooting.

Fault phenomenon inspection and determination		Treatment measures
LED is not on	1) Check whether the power supply voltage is normal; 2) Check whether the VCC and GND line sequence is correct.	1) Provide correct voltage power supply; 2) Correct the line sequence;
Signal discontinuity	1) Check whether the sensing polarity matches the magnetic stripe polarity; 2) Check whether the sensor is less than 15mm from the magnetic stripe.	1) Adjust the configuration parameters; 2) Adjust the installation location.
No signal	1) Check whether the installation height exceeds 50mm; 2) Check whether the set induction polarity matches the magnetic strip polarity;	1) Adjust the configuration parameters; 2) Adjust the installation location.



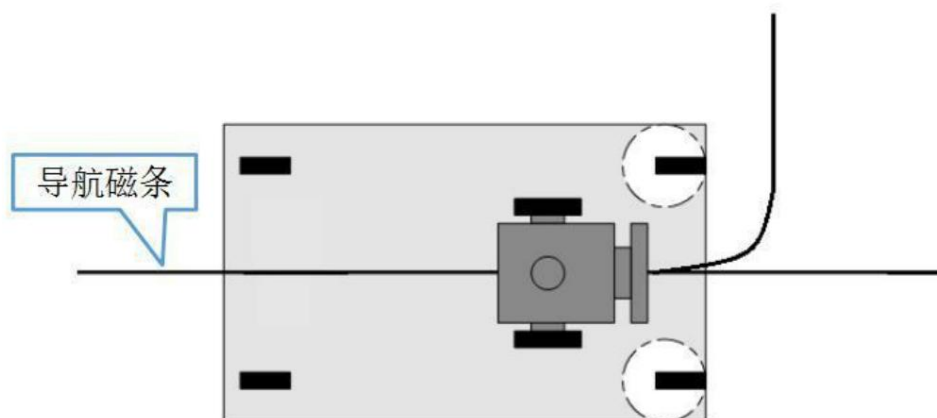
## 7 AGV system architecture example

Driver connection diagram



### 7.1 Single drive control scheme

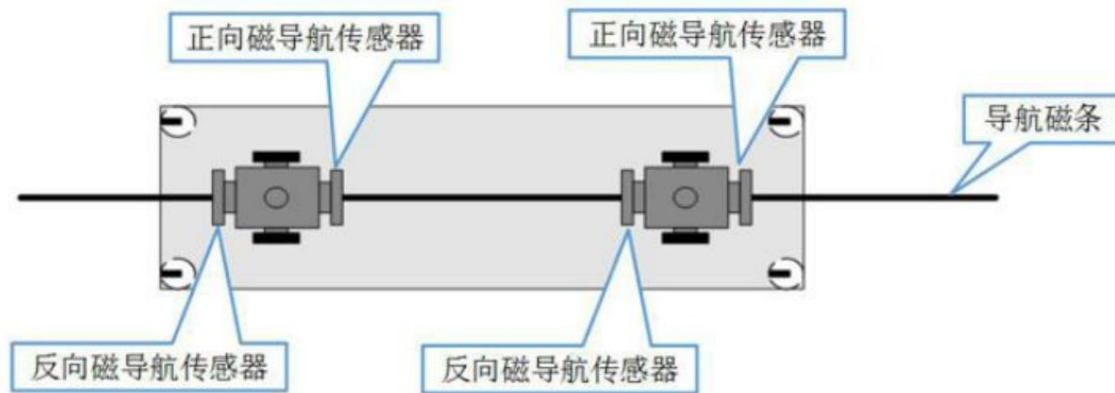
Schematic diagram of a single-drive solution. The single-drive solution is generally a 6-wheel structure, used for traction or backpack AGVs





## 7.2 Dual drive control scheme

Dual drive scheme diagram





## 8 Specifications

General Specifications of the

Product	Specification
Project Operating Environment	Ambient temperature -20~+80 (no ice) Ambient humidity
	below 80% (no frost) Height Medium Environment No
	Below 1000m above sea level
	corrosive, flammable gas or dust, etc., cannot be used in special environments containing radioactive substances, strong magnetic fields and vacuum
	Vibration Do not apply continuous vibration or excessive impact Storage Environment
humidity below 85% (no frost) Height Product Weight	Ambient temperature -25~+70 (no ice) Ambient
	230g below 1000m above
	sea level, error 10% (excluding connecting wires)

Magnetic Navigation Sensor General Specifications

	Specification
Input power rated voltage	DC 9~28V Rated current: 95mA The sensor has power reverse protection communication function RS-232/
RS-485/CAN communication	Communication rate: 115200bps
Magnetic point spacing	10mm
Sensitivity 0~255	Signal response
Communication status	Based on the query data sent by the host computer, the response is less than 8ms
Suitable for magnetic stripe specifications	30mm wide,
50mm wide Installation	conditions It is recommended to use aluminum alloy
or stainless steel Filling	material
Silicone Shell material	Aluminum alloy
Protection level IP54	



## 9 After-sales

### 9.1 Warranty Period D-MNSV7-

X16 provides a limited warranty period. During the warranty period, any product failure due to product quality problems, design defects, etc.

If the product is used normally, we will provide free after-sales

maintenance. •Warranty period: 1 year from the date of sale.

### 9.2 Warranty Scope During the

warranty period, if the product falls within the warranty conditions, we will repair or replace it free of charge. •The warranty and after-sales

service of this product are limited to mainland China; •The product cannot

be used normally due to unpacking during transportation; •The product cannot work

normally due to damage to its own components; •The product cannot be used

normally due to design defects.

### 9.3 Scope of Disclaimer Please

note that we will not provide free after-sales service and warranty within the following conditions during the use of the product. • Failure to

install the product correctly according to the instructions, resulting in product damage;

• Using the product in an unsuitable environment and conditions, resulting in product damage; •

Failure to follow the product instructions to operate the product, resulting in product

damage; • Disassembling or repairing the product without the company's

permission; • Product damage caused by irresistible external forces such as natural disasters and fires.

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