



# MDSC-900EE Metal Double-sheet Detector

## User Manual

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## Preface

### Introduction

Thank you for purchasing MDSC-900EE series metal double-sheet detectors independently developed and manufactured by Atonm (Guangzhou) Intelligent Technology Co., Ltd.. The product is mainly used in automatic feeding system of various industries to detect the thickness difference of various kinds of metals (such as aluminum sheets, iron sheets, copper sheets, stainless steel sheets, etc.) and can effectively prevent double-sheet or multiple sheets together being sent to the next process, so as to avoid the damage to the equipment. This product is composed of two parts: detecting host and sensors.

This manual is mainly to describe the specifications, properties, and using methods, etc. of MDSC-900EE series metal double-sheet detectors. Before using the product, please carefully read this manual, so as to clearly know the properties of the product and safely use it.

### Manual acquisition

This manual is not shipped with the product. If you need to obtain the electronic PDF file, you can obtain it through the following methods:

- Follow the "Atonm Intelligent Technology" official account, and in the "Manual" menu bar, you can search for the manual and download it.
- Use your mobile phone to scan the QR code on the product body to obtain the product supporting manual.

### Safety cautions

- ◆ Please ensure the operating environment suitable to the limiting conditions as stipulated in the hardware specifications (Refer to the "parameters and properties" for details);
- Please don't install the product in such places where the magnetic field is too strong, or there is direct sunlight or high temperature, or strong mechanical vibration. And don't use the product in the places where there exist inflammable gases, or vapour, or dusts. Otherwise, explosion hazard may occur;
- Please don't use the product in the environment where drastic temperature change may occur or the humidity is very large. Otherwise, condensed water may be produced in the interior of the equipment and causes damage to the product;
- Please ensure that all the cable joints be firmly connected to this product. In case of loose connection, the wrong input or output signals may be generated;
- During usage, it is not allowed to use any tool to contact the display panel. Any damage to the panel due to over external force should be borne by the user;
- To avoid being electric shocked, please first cut off the power source before connecting the product to its power supply;
- The input voltage of the product is  $DC24V \pm 20\%$ . Please regularly check whether the DC power is stable or not;
- The port of NPN and PNP can only be connected to the DC system less than 48V;
- The sensor should be installed as far away from strong magnetic objects as possible (general requirement: more than 30cm);
- The sensor cable cannot be laid in parallel with the strong current cable (separated by more than 5cm or laid perpendicular to the strong current cable);
- The main controller power supply uses a separate isolated power supply and cannot be shared with strong interference sources such as servos and inverters;
- The sensor cable cannot be cut or spliced. If the cable is too long, it can be rolled into the electrical cabinet; if the length is insufficient, it can be customized;
- The learning position of the metal sheet should be as consistent as possible with the actual production testing position;
- Each time when the metal sheet has changed its specification or the position of the feeding material appears big change, it is required to adjust the equipment once more.

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# 1 Parameters and properties of the product



## 1.1 Technical Parameters of the Main Unit

Table 1-1: Technical Parameters of the Main Unit

Technical Parameters of the Main Unit		
Host model		MDSC-900EE
Operating voltage		DC24V/500mA
Dimensions	Main unit dimensions	132mm * 116mm * 48mm
	Cut-out dimensions for embedded installation	121mm * 105mm
Protection rating	Rear housing	IP20
	Front panel housing	IP65
Control output		1.NPN single and double-sheet switch signal output,maximum drive: 50mA/48V 2.PNP single and double-sheet switch signal output,maximum drive: 50mA/48V Note: The switch signal output width of the single and double sheets,factory default 50ms, adjustable range: 5 - 500ms
Response speed		600pcs/min
Weight		About 500g

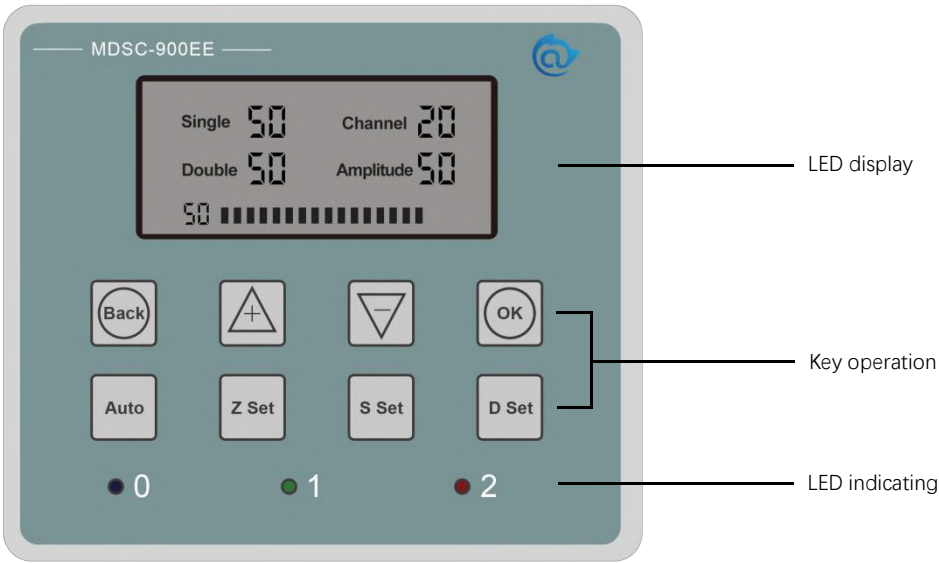
## 1.2 Sensor Parameters

Table 1-2: Dimensions and Technical Parameters of the Sensor

Technical Parameters of the Sensor			
Sensor size 【choose one from two】		Rectangular sensor (SE-1000BS-F5.0)	45mm*30mm*12mm with standard configuration of 5m cables
		Circular sensor (SE-1000BC-F5.0)	18mm (Diameter) * 50mm(Length), with standard configuration of 5m cables
Material measurement range		Steel sheet, iron sheet	0.2-2.5mm
		Copper	0.1-2.5mm
		Aluminum/Aluminum alloy	0.1-8.0mm
Ambient temperature		0°C~50°C	
Ambient temperature		IP65	

2 Panel and function description of the product

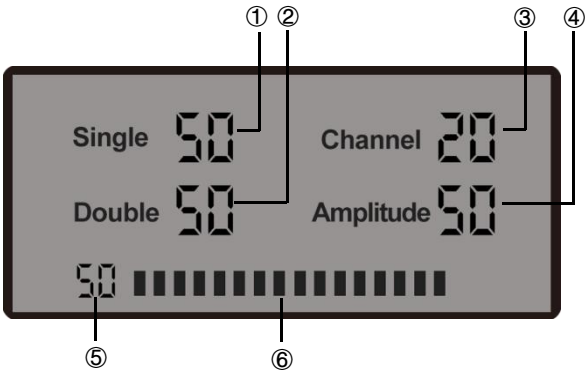
2.1 LED display



2-1: Host panel diagram

Table 2-1: host panel terminology explanation

Terminology explanation	Terminology explanation
<b>Single:</b> Single sheet	<b>Double:</b> Double sheet
<b>Channel:</b> Channel display	<b>Amplitude:</b> Amplitude display
<b>Back:</b> Cancel the previous operation	<b>OK:</b> Confirm
<b>Auto:</b> Automatic adjustment	<b>Z Set:</b> Zero-sheet setting
<b>S Set:</b> Single-sheet setting	<b>D Set:</b> Double-sheet setting
<b>0:</b> Zero-sheet indicator light	<b>1:</b> Single-sheet indicator light
<b>2:</b> Double-sheet indicator light	-



2-2:LCD panel diagram

Table 2-2: LCD panel display instructions

No.	Items	Content displayed	Description
1	Single-sheet	0~99	Single sheet threshold. If it is greater than this value and less than the double sheet threshold, a single sheet will be output. It is adjustable in the setting mode.
2	Double-sheet	0~99	Double sheet threshold, if the value is greater than this, double sheets will be output. It is adjustable in setting mode.
3	Channel display	0~23	Displaying the present selected channel; automatic selecting and unadjustable.
4	Amplitude display	0~99	Displaying the present signal output Amplitude;automatic selecting and unadjustable.
5	Signal strength	0~99	Displaying the metal signal value strength.
6	Signal amplitude bars	0~16 grids	Displaying the metal signal value that has been detected; the more grids, the stronger of the signal.

## 2.2 Operating functions of the keys

Table 2-3: Keys description

Name of keys	Function description
<b>OK</b>	1. Long press it for 3s and enter the setting mode (including automatic adjustment and study modes). Then the LED screen is lighted, and the electric control outputs of the NPN/PNP are prohibited. Shortly press it to confirm the current operation; 2. Under setting mode, Shortly press the "OK" key and the single-sheet/double-sheet sensitivity can be chosen and set; 3. Under study mode, Shortly press the "OK" key and the current study data can be saved.
<b>Back</b>	1. Cancel the previous operation; 2. Under setting mode, long press it for 3s to exit the setting mode and enter the working state.
<b>Up/+</b>	Shortly press the corresponding set value to add 1, and long press the set value to continuously add.
<b>Down/-</b>	Shortly press the corresponding set value to subtract 1, and long press the set value to continuously subtract.
<b>Auto</b>	Shortly press the "Auto" key and enter the automatic adjustment mode.
<b>S Set</b>	Under Auto adjustment mode: Place one single testing metal and Shortly press the "S Set" key, and then the 3 LED lamps flicker. Waiting for a few seconds until only the "2" LED flickering, then the single-sheet automatic adjustment is completed.
<b>D Set</b>	Under Auto adjustment mode: Place double testing metal sheets and Shortly press the "D Set" key, and then the 3 LED lamps flicker. Waiting for a few seconds until the "2" LED lamps are continuously lit, then the double-sheet automatic adjustment is completed.
<b>Z Set</b>	Without metal sheets being placed, Shortly press the "Z Set" until the "0" LED flickers and enter the zero-sheet study mode. Press the "OK" key to save.

Notes: All the pressing keys can only be operated after long pressing the "OK" key to enter the setting mode. Otherwise, it is void!

## 2.3 LED indication

LED is used to indicate the real-time testing state of the sensors. When it is zero sheet, the blue LED is on; when it is single sheet, both the blue and green LED lamps are on; when it is double sheet, all the blue, green and red LED lamps get illuminated.

Under study mode, the corresponding LED indicating lamps flickering means that they are undergoing study at their corresponding states.

## 3 Installation and wiring instructions

### 3.1 Host installation

Open a rectangular hole of 121mm \* 105mm in the equipment panel at the installation position and put the testing host into it. Then insert the fixing clumps at the hole opening position of the top and bottom sides of the host and tighten the screws.

### 3.2 Installation of sensors

It is suggested that the sensors for the metal double-sheet detector be installed on the metal or plastic supports as shown in the 3-1 diagram: the transmitting port T is at the bottom and the receiving port R is at the top; the working sides (with black circular plate) are installed at opposition. The distance between the working sides allowed is 30~50mm and 40mm is recommended. When the testing sheet is relatively thick (The magnetic material whose thickness is over 2mm.) or its area is relatively small (Its diameter is less than 10cm), the distance can be adjusted to 30mm; when the testing sheet is thin (such as the non-magnetic material is less than 0.5mm), the distance can be adjusted to 50mm.

When material feeding is being tested, the testing metal sheets should pass through the valid induction area (at least it should approximately align with the internal edge of the sensor, or more deeper into the area). The installation position is recommended as shown in the 3-1 diagram.

Note: Net space is required for the sensors' facing area and can't be sheltered by other metals.

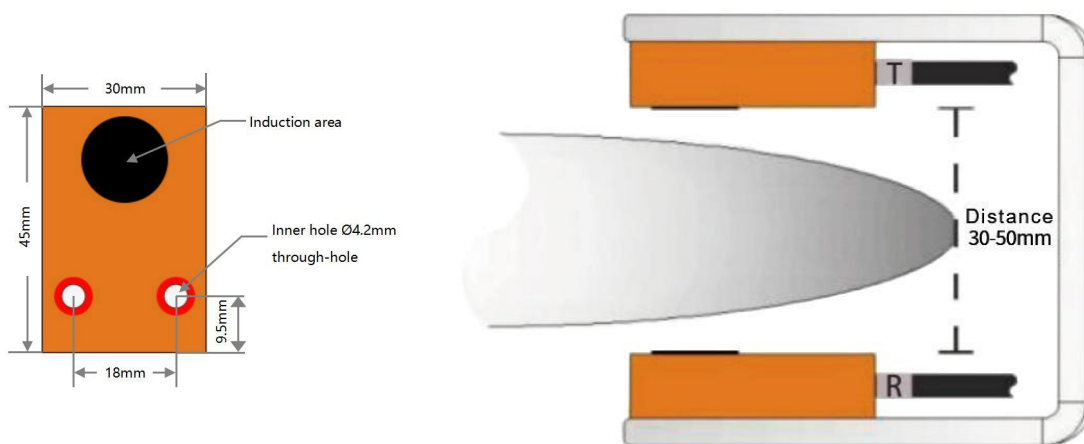


Diagram 3-1: Sensor installation diagram



#### attention

It is recommended to install the transmitter (T) sensor at the top and the receiver (R) sensor at the bottom. If you use the installation method of moving one sensor, it is recommended to move the transmitter (T) sensor.

### 3.3 Wiring diagram

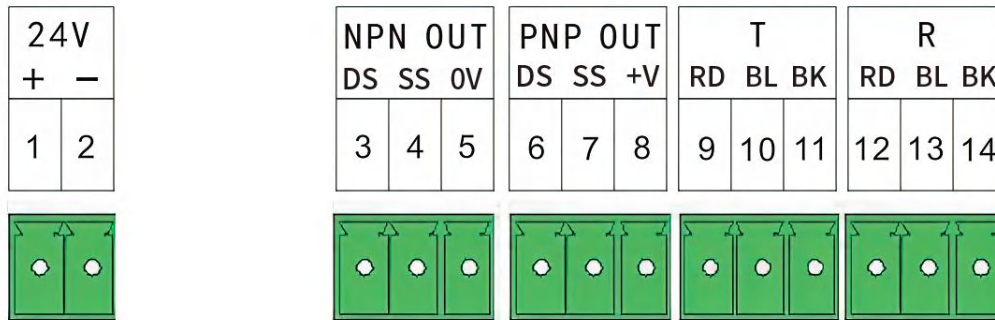


Diagram 3-2: Wiring diagram

Table 3-1: Wiring panel terminology explanation

Terminology explanation	Terminology explanation
<b>DS:</b> Double-sheet signal output	<b>SS:</b> Single-sheet signal output
<b>RD:</b> Red	<b>BL:</b> Blue
<b>BK:</b> Black	-

Table 3-2: Wiring description

Position No.	Wiring description
1、 2	DC power input, DC24V $\pm$ 20%; Recommending 24V/500mA
3、 4、 5	NPN single-sheet/double-sheet signal output, maximum drive:50mA/48V; PLC or Driving relay can be connected.
6、 7、 8	PNP single-sheet/double-sheet signal output, maximum drive:50mA/48V; PLC or Driving relay can be connected.
9、 10、 11	Transmitting sensors (T), 9 connecting to the red terminal, 10 connecting to the blue terminal, and 11 connecting to the black terminal.
12、 13、 14	Receiving sensors (R), 12 connecting to the red terminal,13 connecting to the blue terminal, and 14 connecting to the black terminal.



### 3.4 Electric control wiring diagram

#### 3.4.1 Single and double output interface and Relay wiring diagram

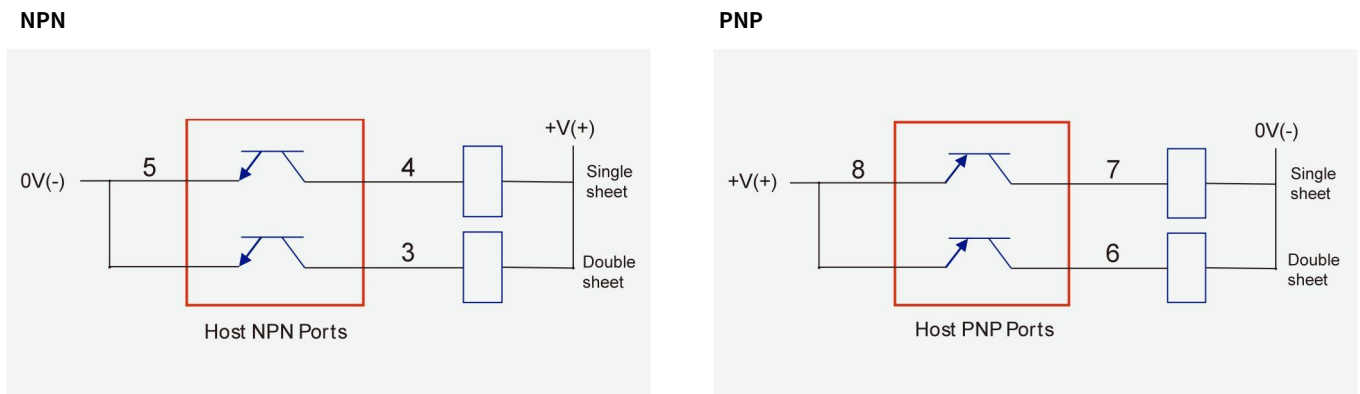


Diagram 3-3: Host output interface and relay wiring diagram

#### 3.4.2 Single and double output interfaces and PLC wiring diagrams

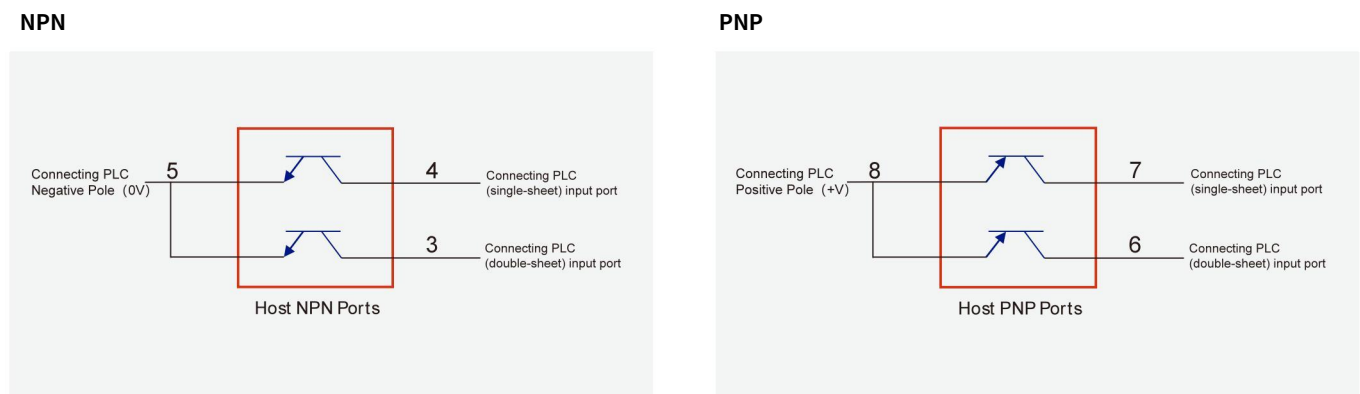


Diagram 3-4: Host output interface and PLC wiring diagram

## 4 Host debugging procedures

### 4.1 Preparations

Install the testing host and sensors well as request and connect the electric wires. Switch on the power, and the LCD displays normally, which means that the host is under the working mode. If all the parameters have been set earlier and the metal sheets conveyed remain unchanged, then the host can directly work. Otherwise, the setting should be done as the following procedures.

### 4.2 Automatic adjustment

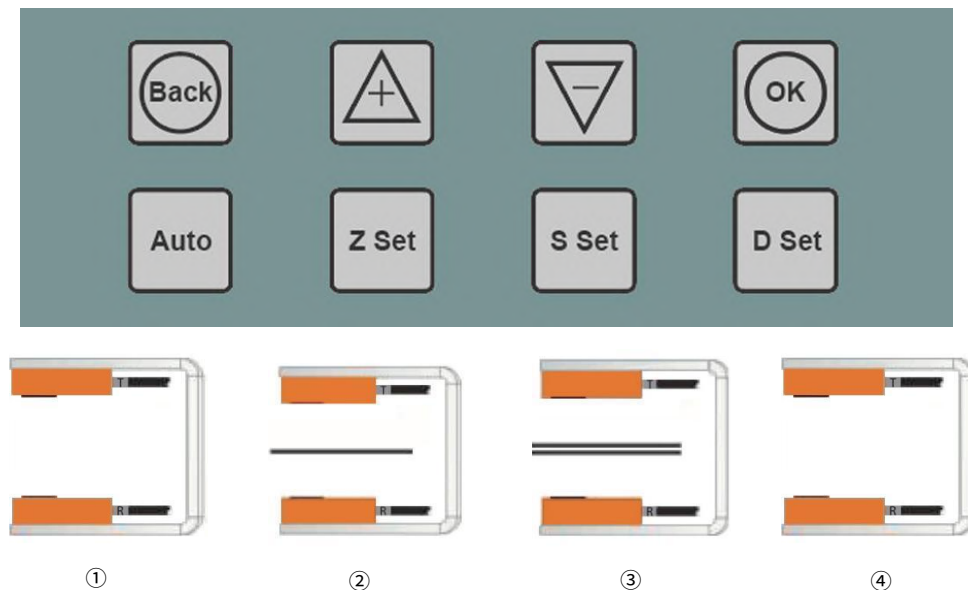


Table 4-1: Instructions for learning of sheet materials

Step	Items	Operation
①	Enter learning mode	Long press the “OK” Key for 3s; Shortly press the “Auto” Key; the “1” LED flicks; enter the Auto Adjustment mode.
②	Teaching Single-sheet	Let the feeding control system convey one metal sheet to the middle of the sensors and stop. At the time the largest area of the metal sheet lies in the center of the sensors (If it cannot be realized by the feeding control system, the operator can also manually take one metal sheet into the center of the sensors. The position where the metal sheet being placed should be consistent with that made by the feeding control system as much as possible.). Shortly press the "S Set" key and only until the "2" red indicating lamp flickers can the single metal sheet be moved away. Then the single-sheet adjustment has been completed.
③	Teaching Double-sheet	Let the feeding control system convey two metal sheets together to the center of the sensors (If it cannot be realized by the feeding control system, the operator can also manually take one metal sheet into the center of the sensors. The position where the metal sheet being placed should be consistent with that made by the feeding control system as much as possible.). Shortly press the "D Set" key and until the "2" red indicating lamp get illuminated. Then the double-sheet adjustment has been completed.
④	Teaching Zero-sheet	Do not place the metal sheet, and press the “Z Set” Key. Shortly press the “OK” Key to save.
⑤	Exit learning mode	Long press the “Back” key to exit.

### 4.3 Manual setting (not a must)

If you feel single-sheet or double-sheet detecting is not sensitive enough or too sensitive, then you can long press the "OK" key for 3s to enter the setting mode. After that shortly press the "OK" key, then the numbers beside the "1" on the LCD will flicker. At this time, you can press "+" or "-" key to adjust the sensitivity value of the single-sheet. The bigger the number, the higher sensitivity. Then press the "OK" key to save the sensitivity setting of the single-sheet and turn to the sensitivity setting for the double-sheet. At the moment, the numbers beside the "2" on the LCD flickers. The sensitivity adjustment of the double-sheet can be done as that of the single-sheet. After finishing adjustment, press the "OK" key to save. And during the sensitivity adjustment for the single-sheet or double-sheet, you can press the "Back" key to exit adjustment and resume the previous sensitivity setting.

**Note**

During sensitivity adjustment for the single-sheet or double-sheet, that is, when the numbers on the LCD are flickering, the seven steps ① ~ ④ cannot be done. Non-professionals are not suggested to operate the manual sensitivity setting.

## 5 Warranty agreement

The warranty period for this product is 18 months and subject to the equipment's bar code. If the product breaks down or appears damage under normal operation as described in the User Manual, our company shall take the responsibility of free-charge repair and maintenance of the product.

Within the warranty period, if the damage to the product is caused by the following statements, certain amount of repair and maintenance fees shall be charged.

- The damage to the product is due to wrong usage or at-will dismantlement, repair, maintenance and remolding of the product;
- The damage to the product is caused by fire disaster, flooding, abnormal voltage, other natural disasters and secondary disasters, etc.;
- The damage to the product's hardware is due to man-made drop or transportation after the product has been purchased;
- The damage to the product is caused by operating not in compliance with the User Manual provided by our company;
- The breakdown or damage is caused by the troubles out of the product itself (such as the peripheral equipment problems).

Should you find any problem in our service process, please timely contact our company.

If the customer purchased this product, it means that the customer has agreed to this Warranty Agreement, whose interpretation rights shall belong to Atonm (Guangzhou) Intelligent Technology Co., Ltd.

## 6 Contact us

Should you encounter any problem or have any requirement in the course of using the product, please don't hesitate to contact the technicians of Atonm (Guangzhou) Intelligent Technology Co., Ltd. by calling the hot line: 400 0088 976.

Note: The company is committed to the continuous improvement, optimization and upgrading of its products, so some parameters of the product will be changed without prior notice.

### Application Notes

- 1、 The sensor cable cannot be cut or spliced. If the cable is too long, it can be rolled into the electrical cabinet; if the length is insufficient, it can be customized.
- 2、 The learning position of the metal sheet should be as consistent as possible with the actual production testing position.
- 3、 After the learning is completed, the difference between single-sheet and double-sheet must be greater than 8, and the difference between zero-sheet and single-sheet must be greater than 5; otherwise, you need to adjust the sensor position and repeat the setting steps. When it is difficult to ensure the above indicators for very thin or special materials, it is necessary to adjust the sensitivity to widen the difference between zero, single and double sheets.