

User Manual

Mars-S100 Series

Applicable Model(s): Mars-100, Mars-S120

Date: February 2024

Doc Version: 1.4

English

Thank you for choosing our product. Please read the instructions carefully before operation. Follow these instructions to ensure that the product is functioning properly. The images shown in this manual are for illustrative purposes only.



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If there is any issue related to the product, please contact us.

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About the Company

ZKTeco is one of the world's largest manufacturer of RFID and Biometric (Fingerprint, Facial, Finger-vein) readers. Product offerings include Access Control readers and panels, Near & Far-range Facial Recognition Cameras, Elevator/floor access controllers, Turnstiles, License Plate Recognition (LPR) gate controllers and Consumer products including battery-operated fingerprint and face-reader Door Locks. Our security solutions are multi-lingual and localized in over 18 different languages. At the ZKTeco state-of-the-art 700,000 square foot ISO9001-certified manufacturing facility, we control manufacturing, product design, component assembly, and logistics/shipping, all under one roof.

The founders of ZKTeco have been determined for independent research and development of biometric verification procedures and the productization of biometric verification SDK, which was initially widely applied in PC security and identity authentication fields. With the continuous enhancement of the development and plenty of market applications, the team has gradually constructed an identity authentication ecosystem and smart security ecosystem, which are based on biometric verification techniques. With years of experience in the industrialization of biometric verifications, ZKTeco was officially established in 2007 and now has been one of the globally leading enterprises in the biometric verification industry owning various patents and being selected as the National High-tech Enterprise for 6 consecutive years. Its products are protected by intellectual property rights.

About the Manual

This manual introduces the operations of **Mars-S100 Series**.

All figures displayed are for illustration purposes only. Figures in this manual may not be exactly consistent with the actual products.

Features and parameters with ★ are not available in all devices.

Document Conventions

Conventions used in this manual are listed below:

GUI Conventions

For Software	
Convention	Description
Bold font	Used to identify software interface names e.g. OK , Confirm , Cancel .
>	Multi-level menus are separated by these brackets. For example, File > Create > Folder.

For Device	
Convention	Description
< >	Button or key names for devices. For example, press <OK>.
[]	Window names, menu items, data table, and field names are inside square brackets. For example, pop up the [New User] window.
/	Multi-level menus are separated by forwarding slashes. For example, [File/Create/Folder].

Symbols

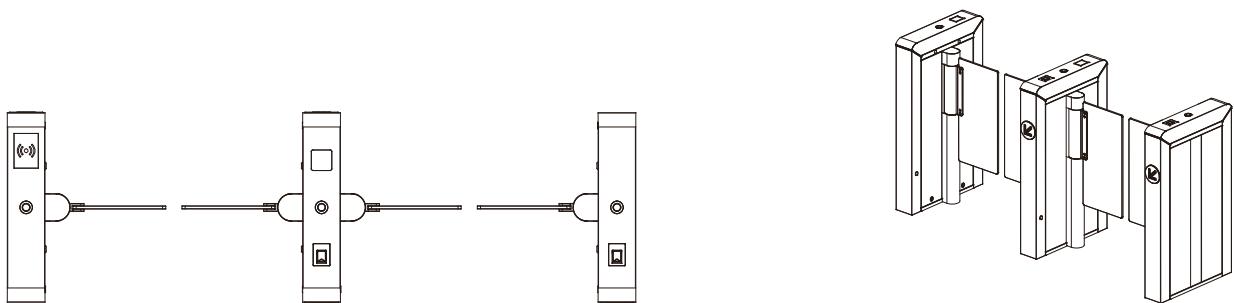
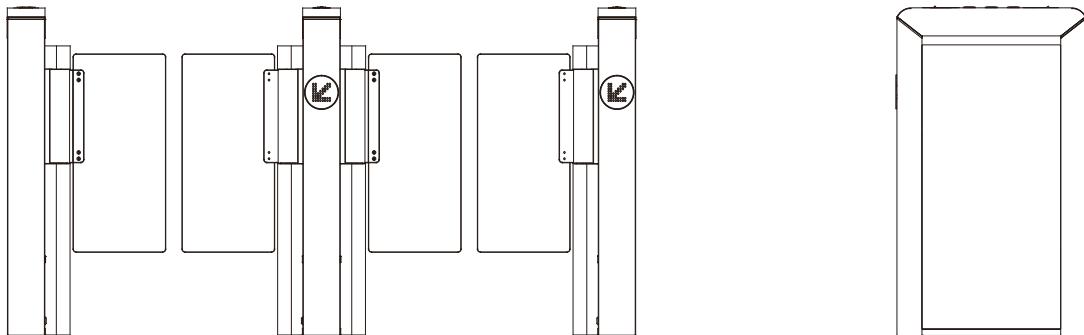
Convention	Description
	This represents a note that needs to pay more attention to.
	The general information which helps in performing the operations faster.
	The information which is significant.
	Care taken to avoid danger or mistakes.
	The statement or event that warns of something or that serves as a cautionary example.

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1 Overview

The Mars-S100 Series speed gates are an elegant and cost-effective entrance control system designed for high-traffic volume. These speed gates are normally held in a locked position, thus denying access to the secured side.



1.1 Features

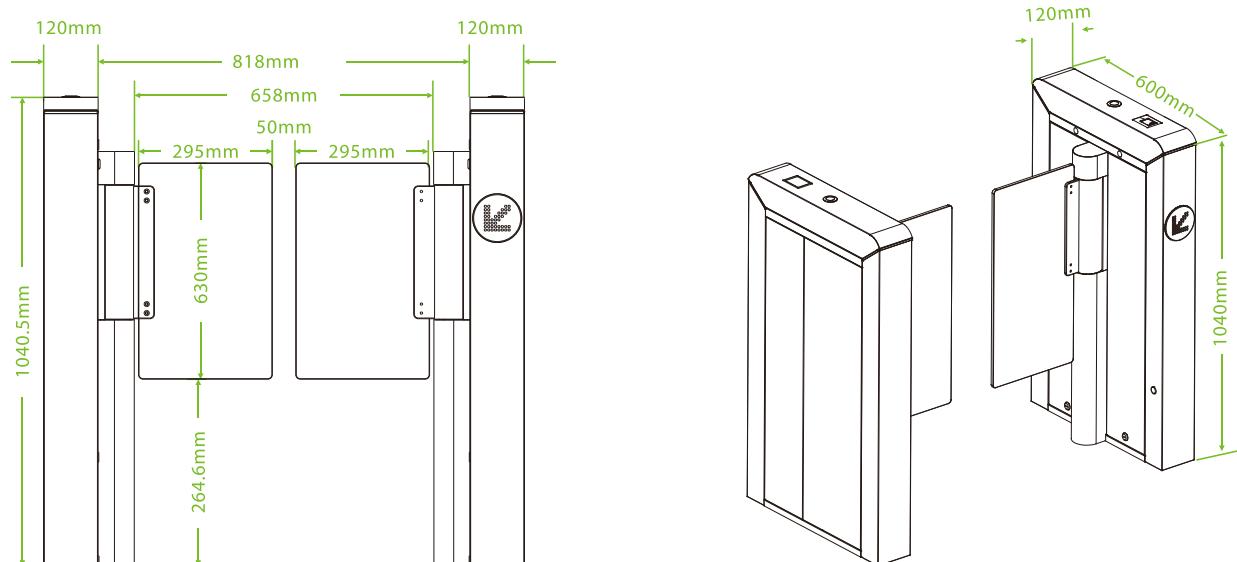
- Long service life, capable of opening and closing the gate more than 5 million times when measured.
- With multi alarm function, such as break-in, wrong direction entry and door open overtime.
- With emergency mode that gate automatically open if power off or fire signal trigger.
- Security function prevent people break-in gate, due to the gate have equipped with a pair of clutches, it will engage if barrier was forced and automatically reset after engaged.
- Self-protection function to prevent strong intrusion, excessive current and other special circumstances, such as damage to the product, death, etc.
- Multiple anti-pinch function, reasonable distribution of infrared, to protect the safety of pedestrian passage within the infrared anti-pinch, blocking anti-pinch infrared secondary open.
- Unload the force when encountering blocking to prevent bruising pedestrians.

- Combined with peripheral verification devices, it supports face, human ID, swipe card, ESD device, sweep code and other verification methods.
- Normally open/normally closed function switching, suitable for different places.
- With memory function, it can pass multiple people after several consecutive swipes.
- Development interfaces are available for system integration.
- SUS304 stainless steel case that ensures long-lasting durability.
- Beautiful and generous, the device runs smoothly, silently and consumes low power.
- With a clear indication of the direction of passage, the standard arrow indicator, the passage state green passage arrow, abnormal state red prohibition of passage arrow.

1.2 Appearance and System Components

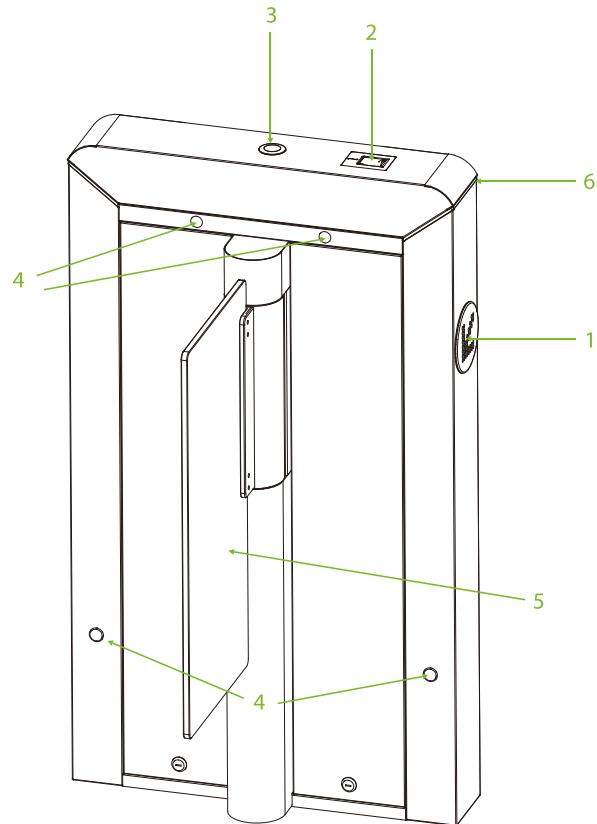
1.2.1 Appearance

The appearance and dimensions of the Mars-S100 series are shown in the figure below:



1.2.2 System Components

The system components of the Mars-S100 series are shown below:



1. Traffic indicator	2. Verification units★
3. Reserved hole for face device	4. Infrared sensor
5. Barrier	6. Pass through indicator

1.3 Mechanical System

The mechanical system of the turnstile consists of the chassis and the core component. The chassis is a carrier where the Traffic Indicator, Reader★, QR code scanner★, Fingerprint reader★, Infrared Sensor and the Door lock are installed. The core component mainly consists of the Motor, Frame, Bearing and Swing Arm.

1.4 Electronic Control System

The electronic control system of a turnstile is mainly composed of the Reader★/QR code scanner★/Fingerprint reader★, Infrared Sensor, Turnstile Control Board, Traffic Indicator and Alarm.

Reader★: The reader reads the data on the card and transmits it to the Access Controller.

Fingerprint Reader★: The device compares the fingerprint that is being pressed onto the fingerprint reader with all the fingerprint data and sends it to the Access Controller.

QR code Reader★: The device compares the acquired QR code with all QR code data registered in the device and sends it to the Access Controller.

Infrared Sensor: It detects the position of the pedestrian and plays a role in ensuring safety and protection.

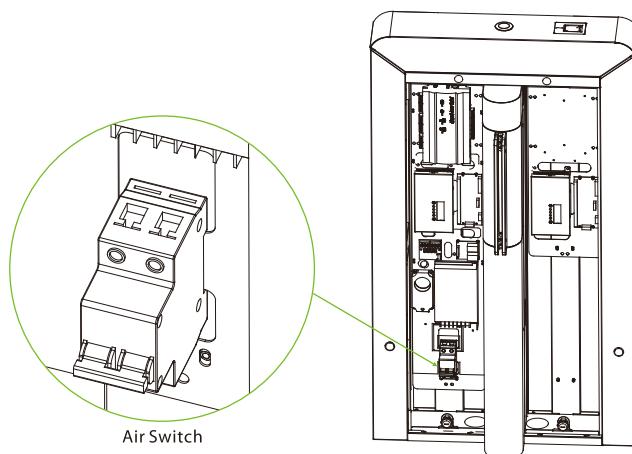
Turnstile Control Board: The Turnstile control board is the system's control center that receives signals from the Card reader★/fingerprint reader★/QR code reader★. The IR performs logical calculation and processing these signals and then sends executive commands to the Traffic Indicator, Electric Motor, and alarm.

Traffic Indicator: When the gate is closed, the system will illuminate the red indicator. However, when someone successfully passes the verification, the system will illuminate the green indicator.

Alarm: The alarm gives the voice and light alarm if the system detects any unauthorized entry to the passage, false direction entry, anti-tailgate and other violations.

1.5 Working Principle

1. When the device is powered on, it undergoes a Power-On Self-Test (POST). If no issues are detected during the test, the device will operate normally. If a failure is detected, the system will display relevant error messages on the digital tube, allowing the user to quickly identify and resolve the problem.



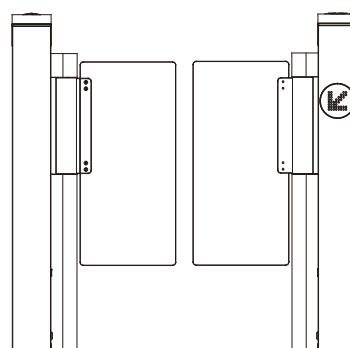
2. When a valid card★/fingerprint★/QR code★, the display will show whether it is successful or not, the buzzer will give a positive audible prompt to the pedestrian, indicating that successfully verified. And then, the card reader★/fingerprint reader★/QR code reader★ sends signals to the Access Controller to request permission to pass through the passage. The Access Controller will send the signal to the Turnstile Control Board.
3. After receiving the signal from the card★/fingerprint★/QR code★ and the Infrared Sensor, the Turnstile Control Board will send valid control signals to the servo motor driver. At this time, if the system is in forbidden passing mode, the mode indicator light will turn red, and the Turnstile Control Board will not accept signals of card★/fingerprint★/QR code★.
4. Once the passenger passes through the channel in accordance with the opening direction of the swing arm, the Infrared Sensor will continuously monitor the pedestrian's movement throughout the passage. It will continue to send signals to the Turnstile Control Board until the pedestrian completes the passage.
5. If the pedestrian enters the passage without verifying their identification or presents an invalid card★/fingerprint★/QR code★ the system will sound an audible alarm to alert the pedestrian to stop. The alarm signal will persist until the pedestrian retreats from the passage. Only after a card★/fingerprint★/QR code★ is successfully verified can the pedestrian process through the passage.

Note: Make sure the ground wire of the system is reliably connected to avoid personal injuries or other accidents.

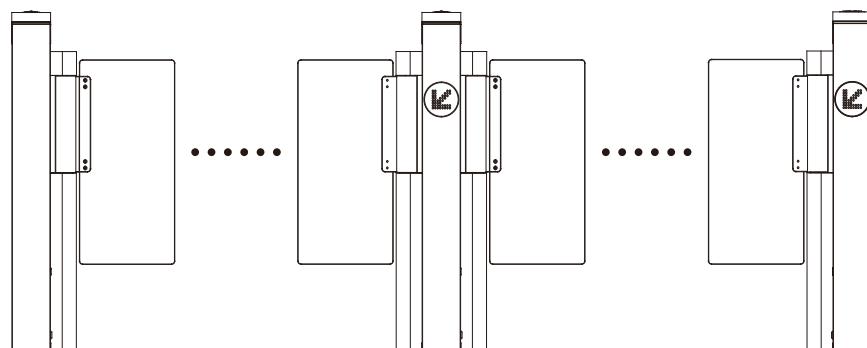
1.6 System Composition

The single-passage management system consists of two single-core speed gates. The multi-passage management system consists of two single-core speed gates and multiple dual-core speed gates.

- **The single-lane management system:**



- **The multi-lane management system:**



1.7 Technical Specifications

Feature	Specification
Communication	TCP/IP, RS485, 4G/WIFI
Input Voltage	AC110V/240V, 50/60Hz
Input Control Signal	Switching signal
Output Voltage	DC 24V
Time of Gate Opening/Closing	0.8 Sec (Adjustable)
Operating Humidity	5% to 80% (Non-condensing)
Operating Temperature	-28°C to 60°C (Standard)
Throughput Rate	Up to 25 people/min (Using credential)
Drive Unit	Brushless Motor
Infrared Sensor	4 pairs
LED Indicator	Support
Working Environment	Indoor
Drive Unit	Brushless motor

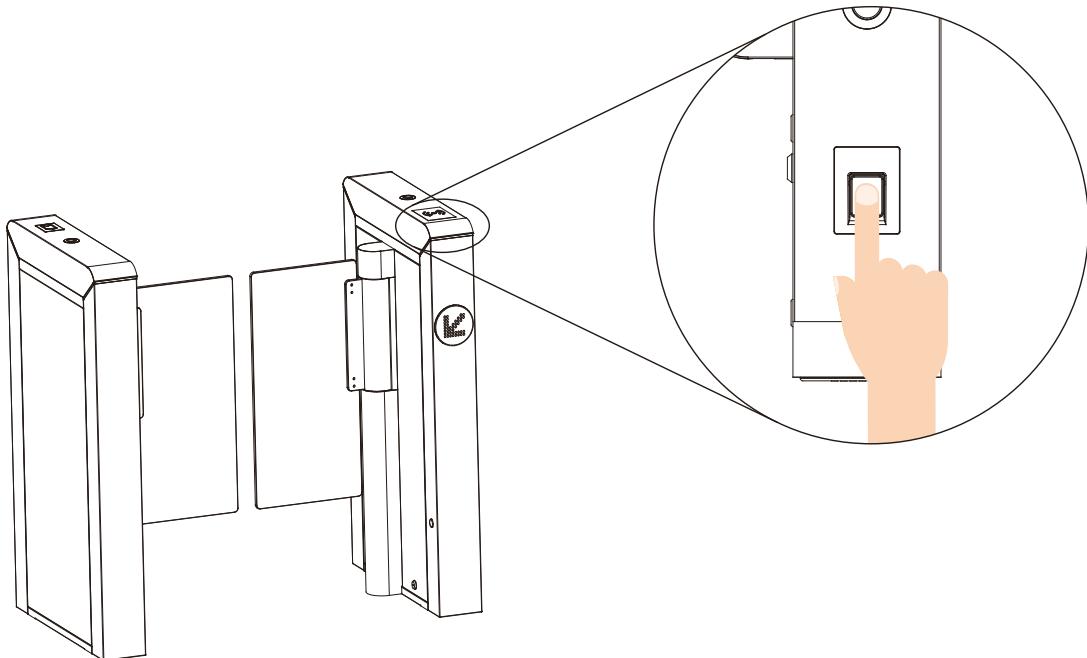
Barrier Movement	Swing
Lane Width	660mm (Option: 900mm)
MCBF	5 millions
Dimension (mm) (L*W*H)	600*120*1040
Dimensions with Packaging (L*W*H)	762*362*1040(mm) (2 boxes)
Net Weight	50kg ($\pm 5\text{kg}$)
Gross Weight	64kg ($\pm 5\text{kg}$)
Noise	<60dB
Certifications	CE and FCC
Traffic Indicator	Green: Lane available Red: Lane unavailable

2 Function Introduction

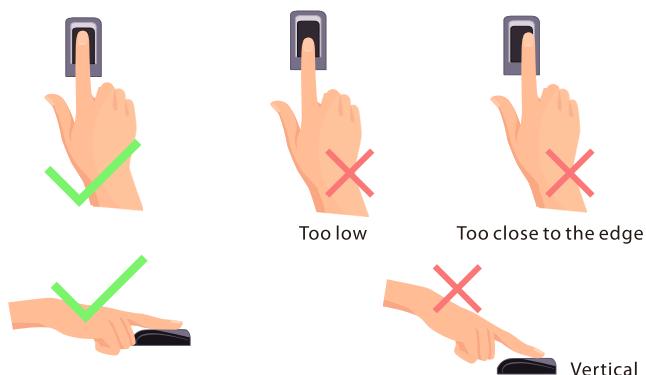
2.1 Fingerprint Verification★

In this verification mode, the device compares the fingerprint that is being pressed onto the fingerprint reader with all the fingerprint data sends and it to the Access Controller.

The device enters the fingerprint authentication mode when a user presses their finger onto the fingerprint scanner.

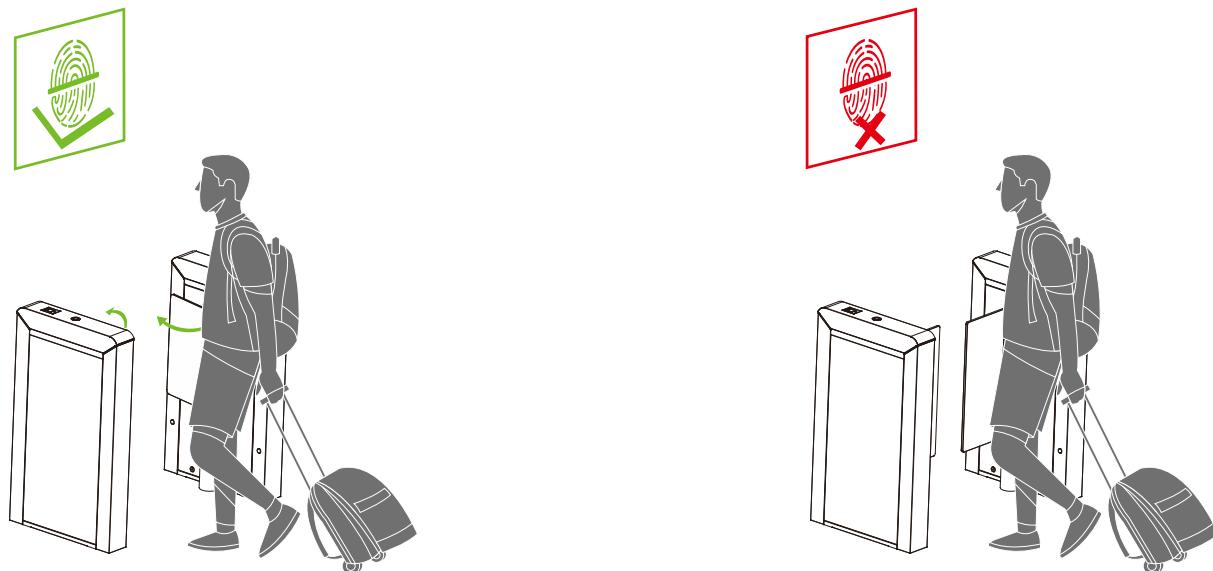


Recommended fingers: It is recommended to use index, middle, or ring finger for registration and avoid using the thumb or little finger, as they are difficult to accurately press onto the fingerprint reader.



Note: Please ensure that you use the correct method when pressing your fingers onto the fingerprint reader for registration and identification. It is important to follow the proper guidelines to avoid any recognition issues. Please note that our company will not be liable for any recognition

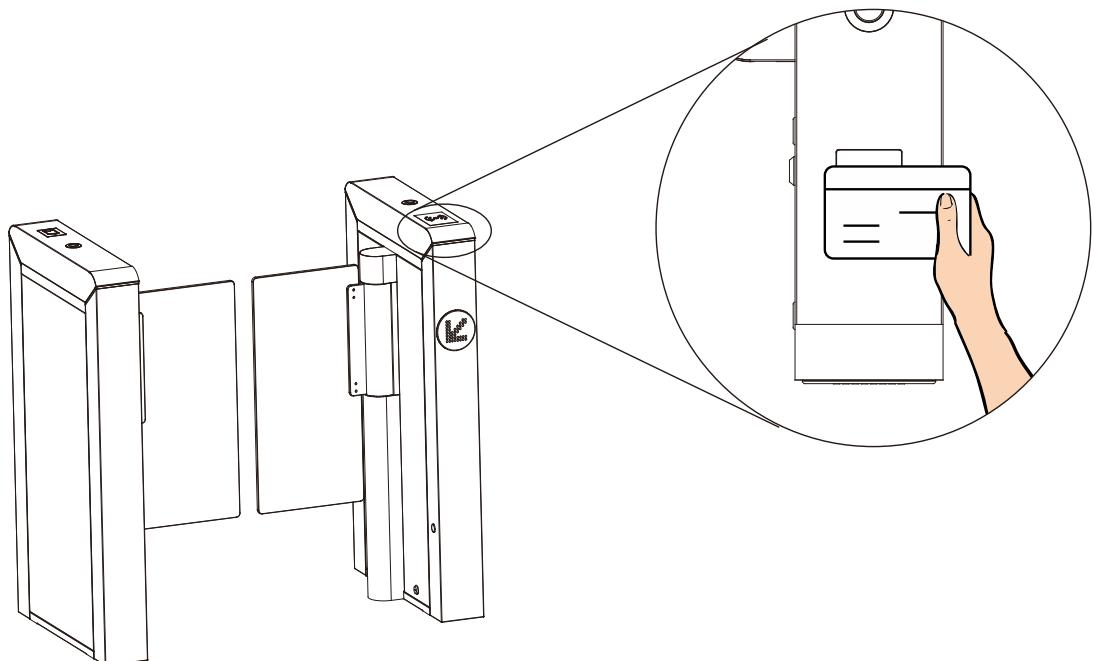
issues that may arise from incorrect usage of the product. We reserve the right to make the final interpretation and modifications regarding this matter.

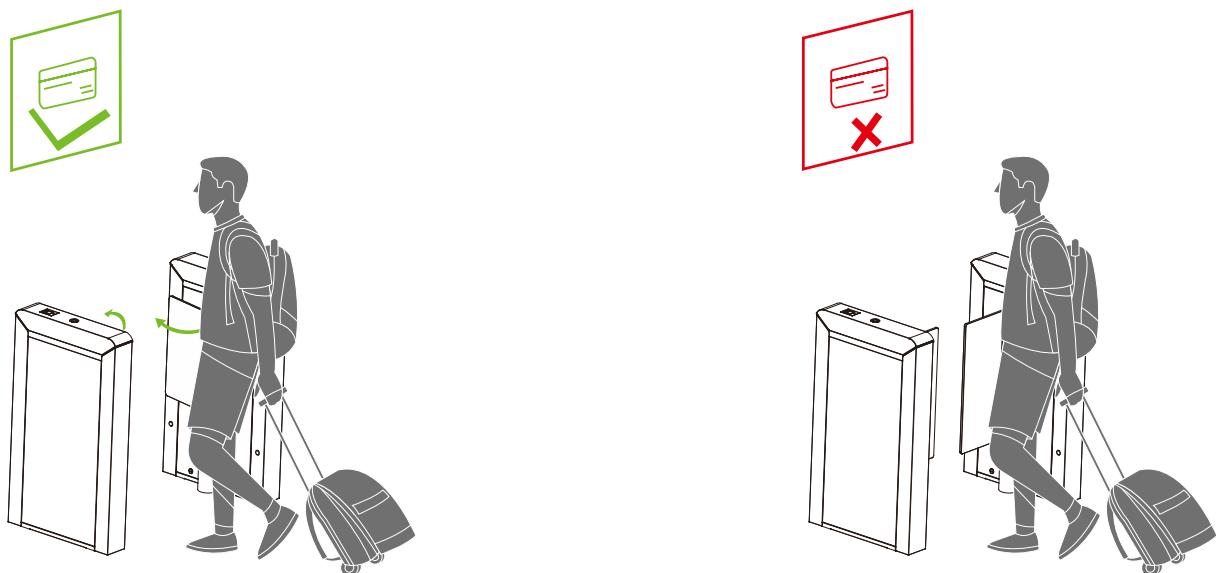


2.2 Card Verification★

In the Card Verification mode, the device compares the card number in the card induction area with all the card number data registered in the device and sends it to the Access Controller.

When a user presses their card on the card reading area, the device enters card authentication mode.

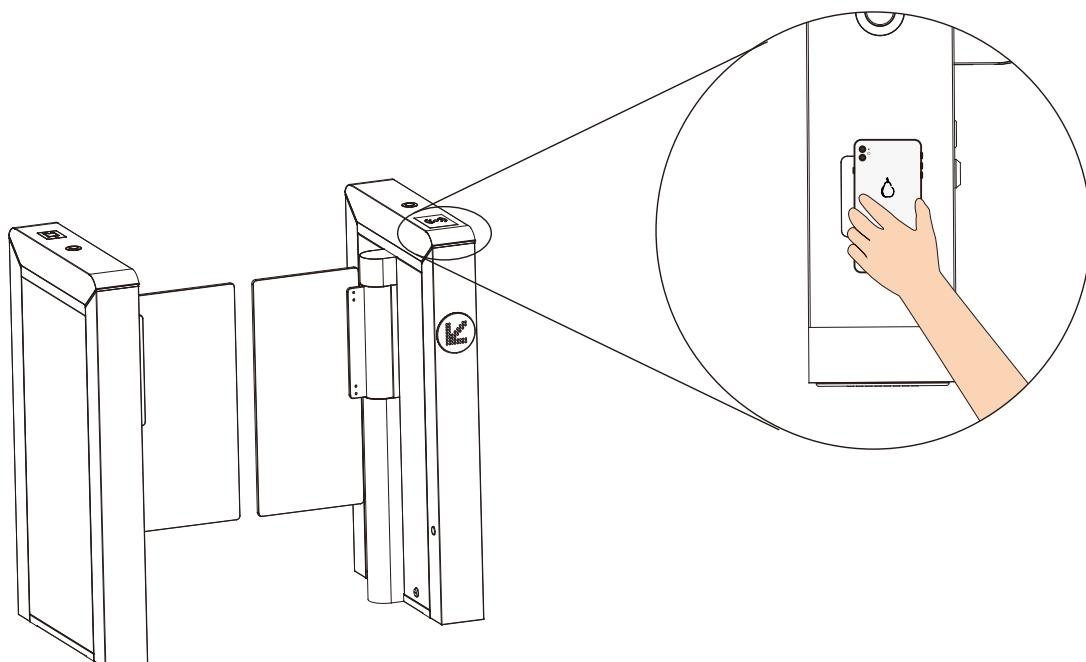


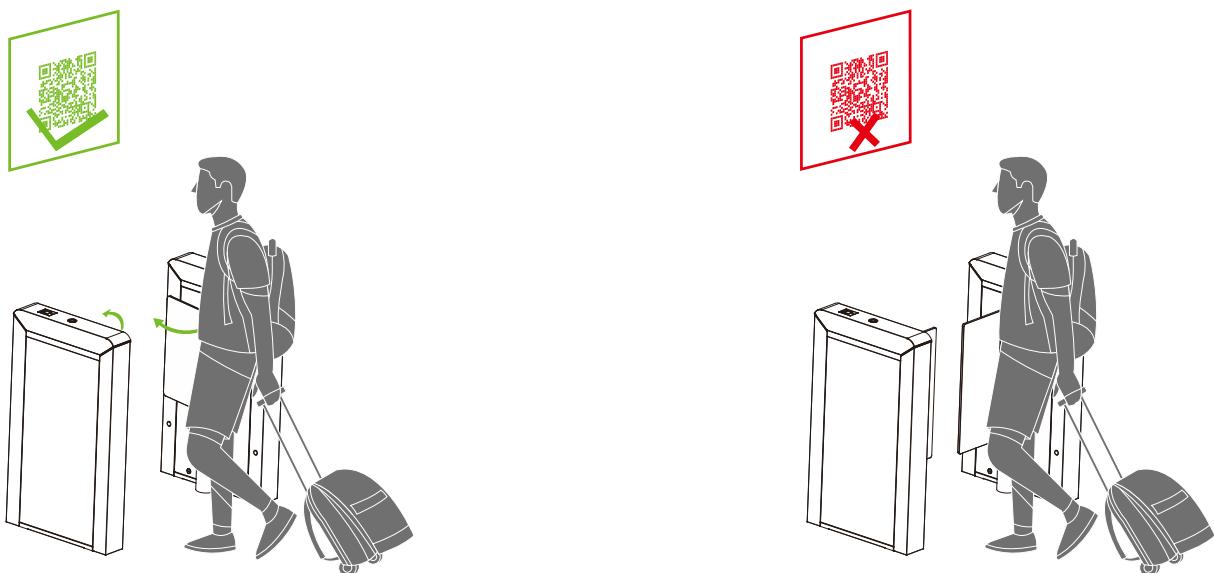


2.3 QR code Verification★

In the QR code Verification mode, the device scans the QR code on the user's mobile phone using the QR code scanner. It then compares the scanned data with the registered QR code and sends the result to the Access Controller.

When the user places the mobile phone displaying the QR code on top of the QR code scanner, the device enters the QR code authentication mode.





2.4 Facial Verification★

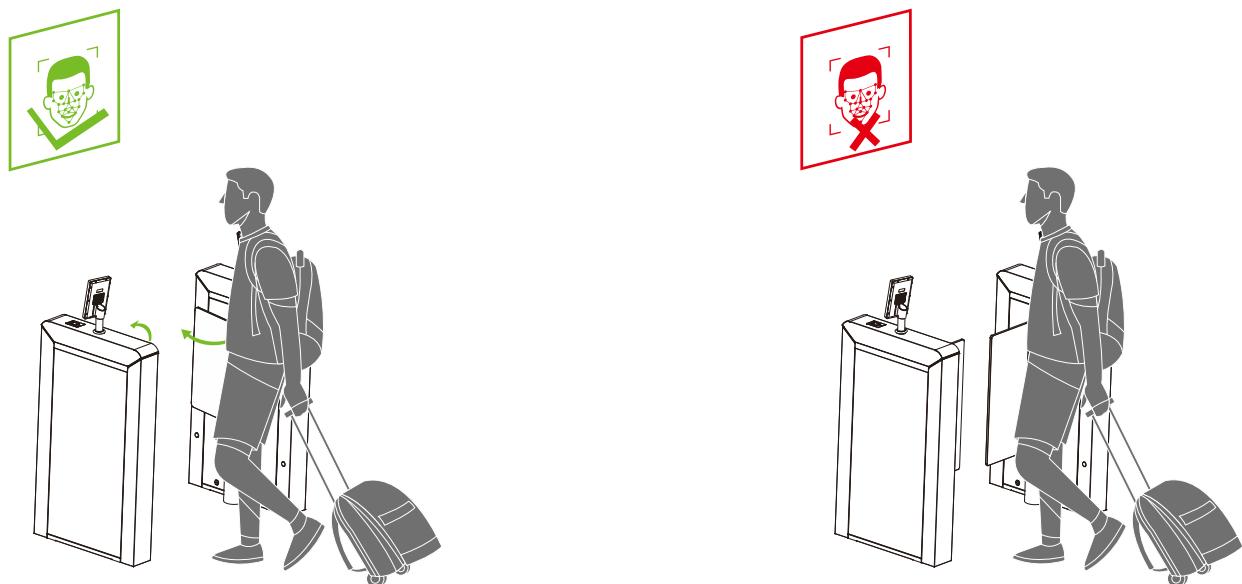
In this verification mode, the device compares the collected facial images with all registered face data in the device and then sends it to the Access Controller.

Please try to keep your face centred on the screen during authentication. When registering your face, ensure that you face towards the camera and remain still.

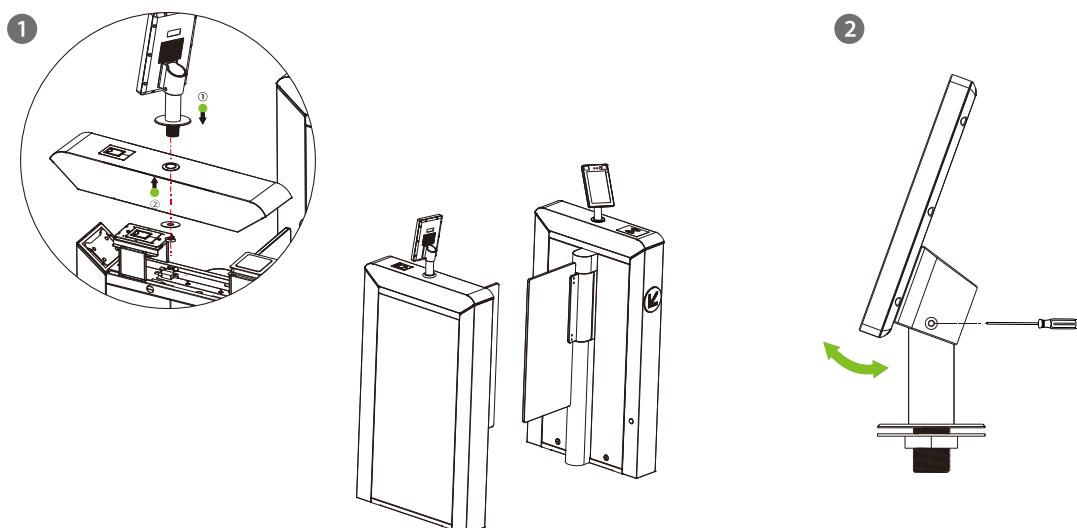
Recommended Standing Posture and Facial Expression:



Note: Please keep your facial expression and standing posture natural while enrollment or verification.

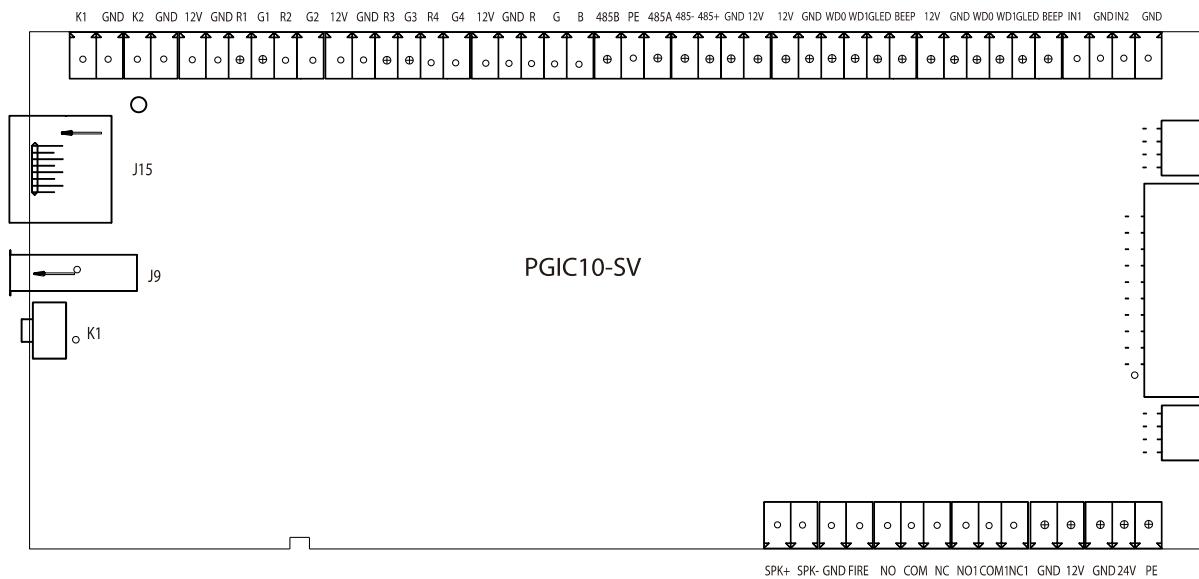
**Installation on the speed gate:**

1. Before installation, please pass the wire through the bracket.
2. Insert the bracket into the hole and fix it with a nut.
3. Adjust the angle of the device.

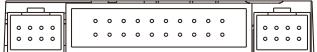
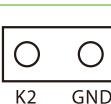


3 Control System Introduction

3.1 PGIC10-SV★

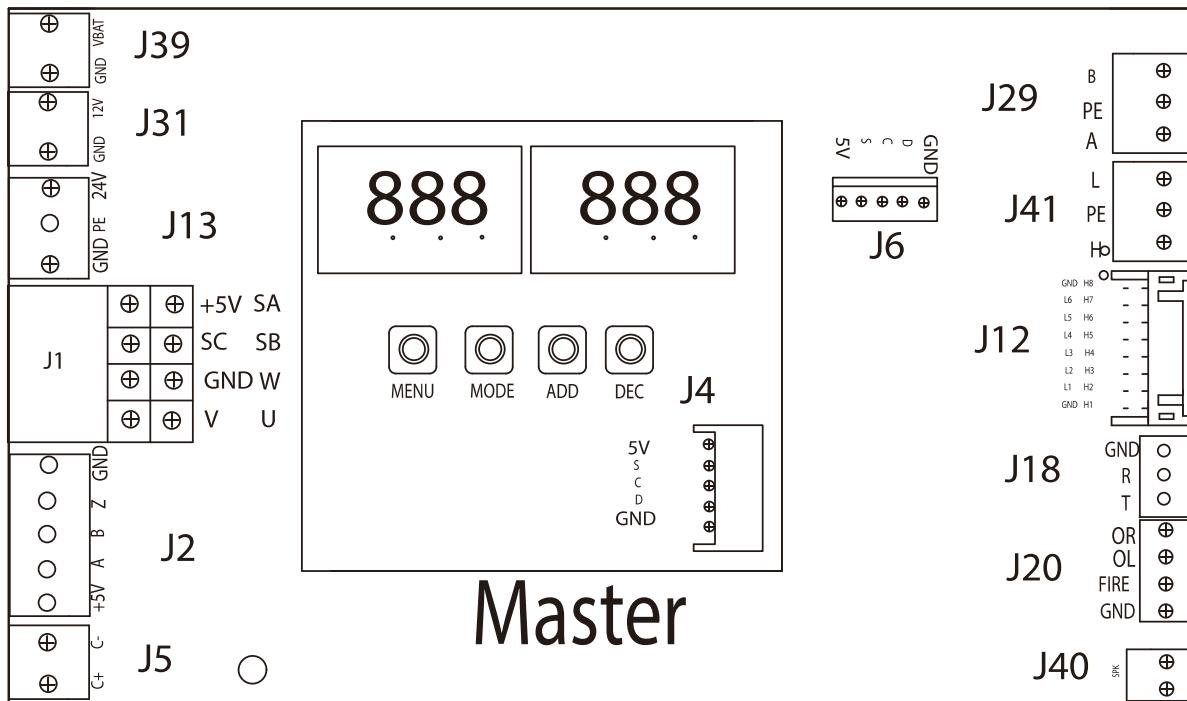


Terminal	Description
J15	Ethernet/POE interface
J9	USB slot
K1	Reset
	Speaker
	Fire signal
	Auxiliary output
	Auxiliary output
	12V DC power supply

	24V DC power supply
	IR sensor
	Auxiliary input
	Wiegand reader
	Wiegand reader
	Exit RS485
	RS485
	Status indicator
	Exit or entry status indicator
	Exit or entry status indicator
	Door
	Door

Embedded linux operating system. It has a 2.8-inch touch screen (the display screen) where the parameters can be set via touch screen.

3.2 Master/Slave Motor Driving Controller



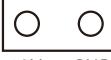
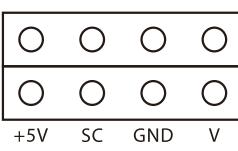
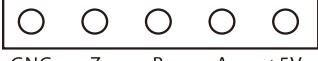
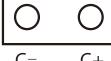
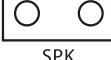
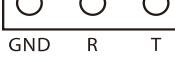
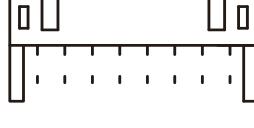
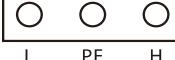
There are 4 keys on the master motor driving controller, "MENU", "MODE", "ADD" and "DEC".

MENU: It is used for enter the Settings menu and to confirm the current modified value.

MODE: It is used to go back to the previous menu and discard the current operation.

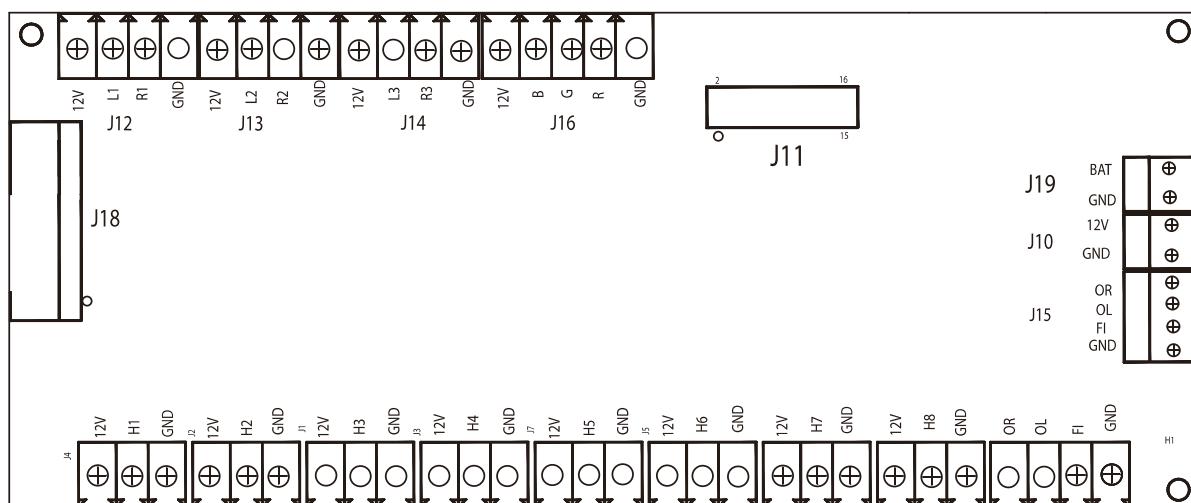
ADD: It is used for navigating to the upper menu item and increasing the value.

DEC: It is used for navigating to the lower menu item and decreasing the value.

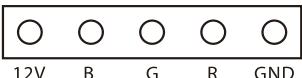
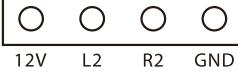
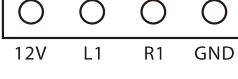
Terminal	Description
 BAT GND	Power out
 12V GND	Power out
 24V PE GND	24V DC power supply
 SA SB W U +5V SC GND V	Motor
 GNG Z B A +5V	Encoder for speed gate
 C- C+	Clutch
 SPK	Speaker
 OR OL FIRE GND	Fire power supply for speed gate
 GND R T	RS232 communication between master and slave drives
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	Infrared sensor receiving port
 L PE H	RS485 communication between master and slave drives

 J29	RS485 communication
 J4	Power supply for master motor driving controller display
 J6	Power supply for master motor driving controller display

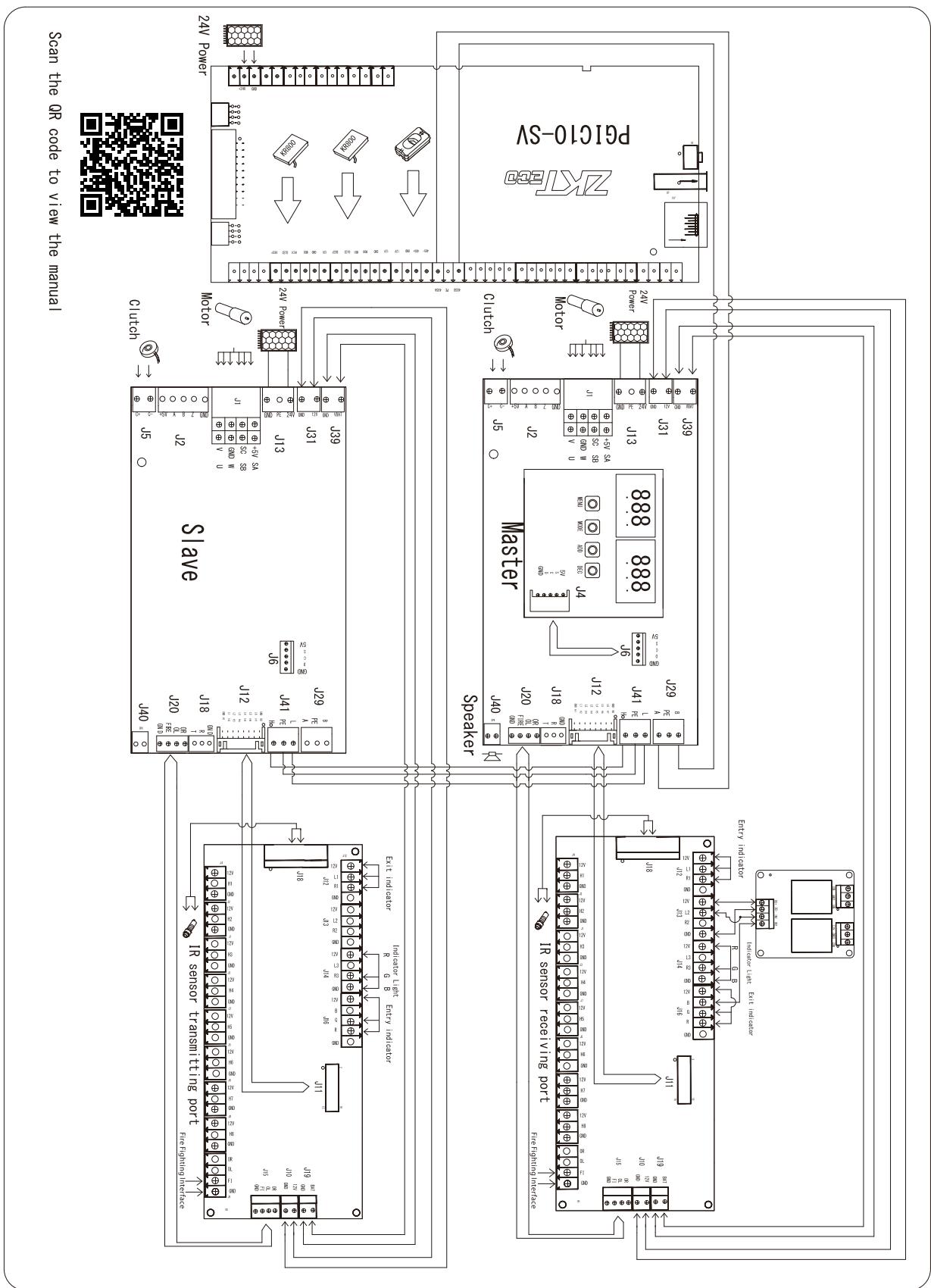
3.3 IR Board



Terminal	Description
 J18	Connecting IR sensor receiving port
 X 8	IR sensor receiving port
 J15	Firefighting interface
 J15	Fire power supply for speed gate

 12V GND	J10	Power in
 BAT GND	J19	Power in
 2 16	J11	Infrared sensor transmitting port
 12V B G R GND	J16	Entry indicator
 12V L3 R3 GND	J14	Indicator Light
 12V L2 R2 GND	J13	Reserved
 12V L1 R1 GND	J12	Entry indicator

3.4 Wiring Diagram



3.5 Menu of Speed Gate

Display Mode (01EXXX)

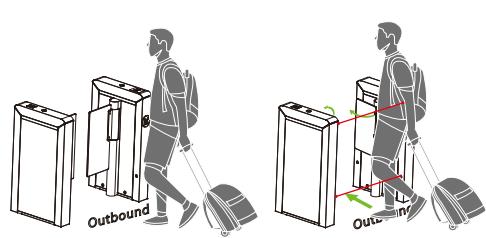
- (01E000) Displays current position of the gate.
- (01E001) Infrared input signal.
- (01E002) Controls input signal.
- (01E003) Test mode (the digital LED displays "___" in the test mode).
- (01E004) Version number. (Default)

Opening Mode Setting (02EXXX)

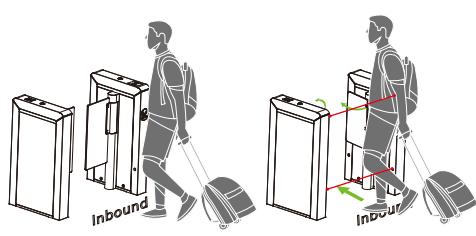
- (02E001) Two-way controlled, both need verification (Default).



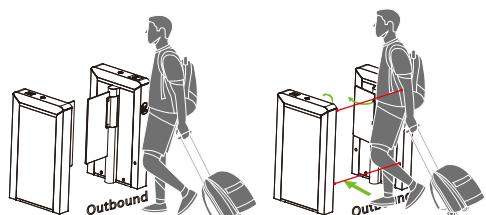
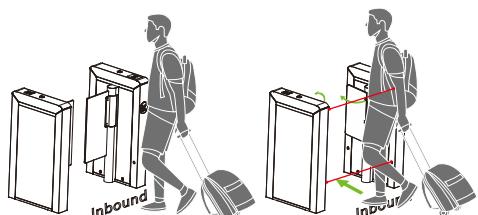
- (02E002) In need verification, out free.



- (02E003) In free, out need verification.



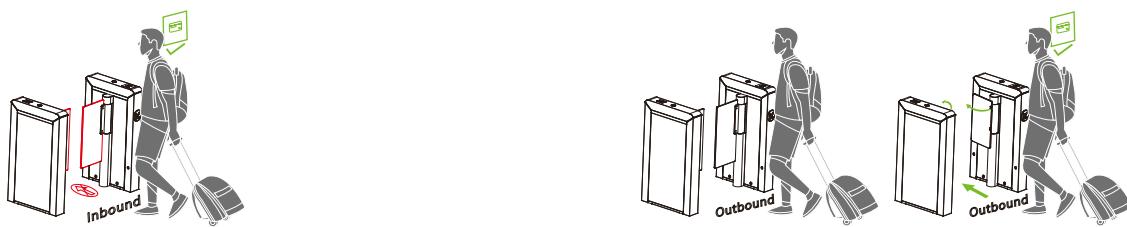
- (02E004) Two-way free.



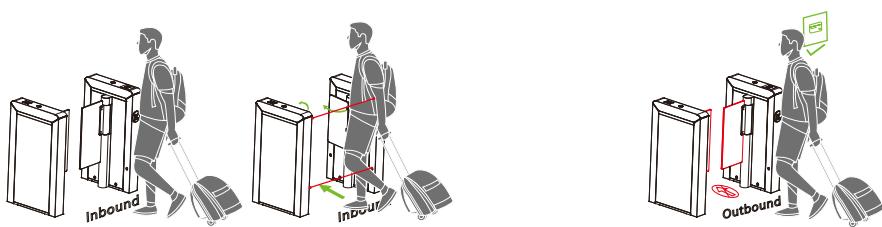
- (02E005) In need verification, out prohibited.



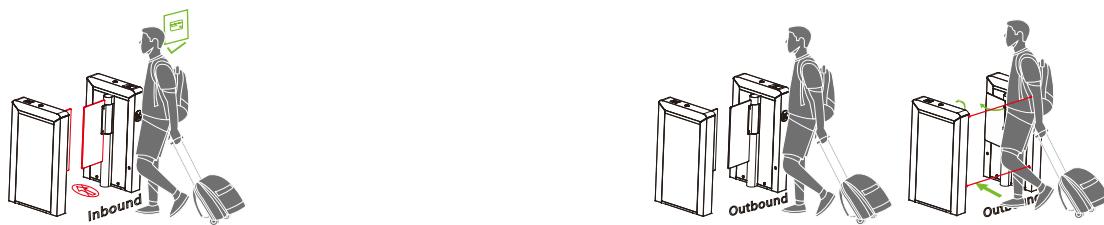
- (02E006) In prohibited, out need verification.



- (02E007) In free, out prohibited.



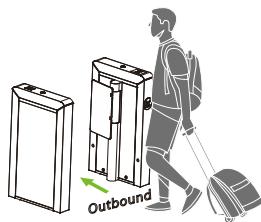
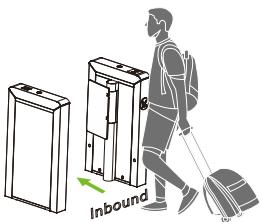
- (02E008) In prohibited, out free.



- (02E009) Two-way prohibited.

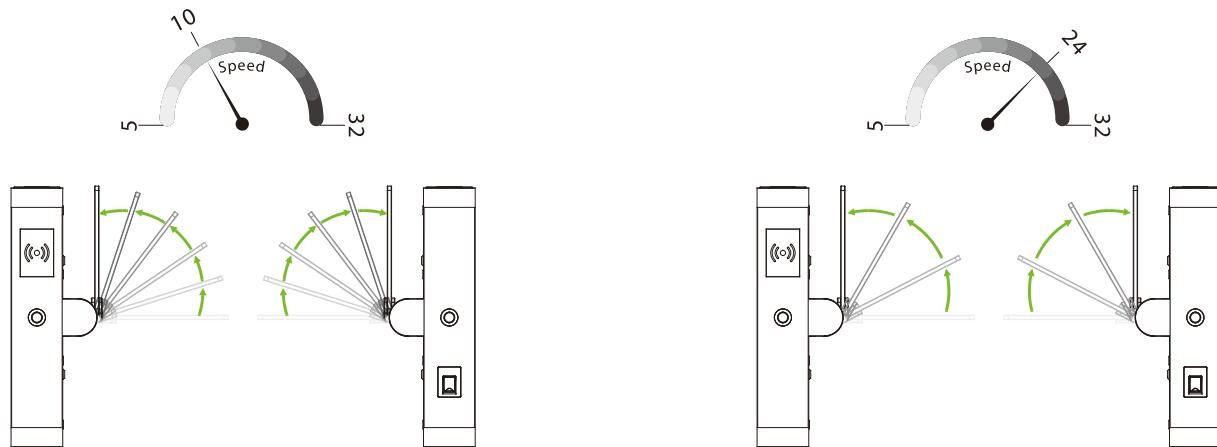


- (02E010) Two-way normally open.



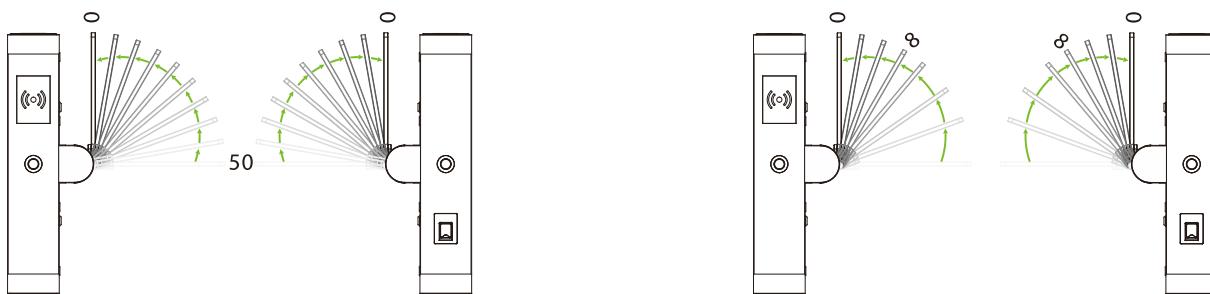
Gate Opening Speed (03EXXX)

To open the gate, you can adjust the gate opening speed. Setting a larger number will result in a faster opening speed. The Gate Opening Speed value can be configured within the range of 5 to 32, and the default value is 24.



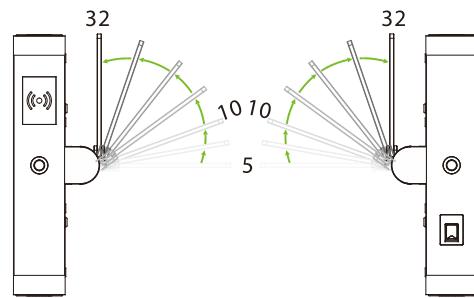
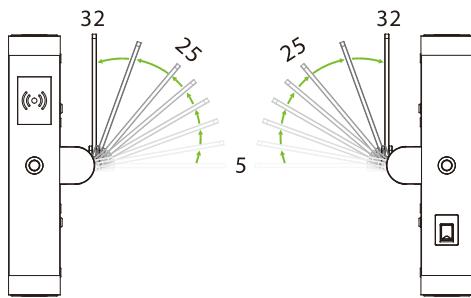
Gate Opening Deceleration Distance (04EXXX)

The larger the number, the longer the deceleration time and the more stable the swing arm operation. The Gate Opening Deceleration Distance can be set between 0 to 50 and the default value is 8.



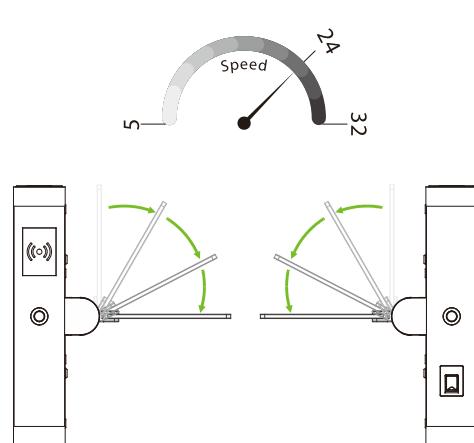
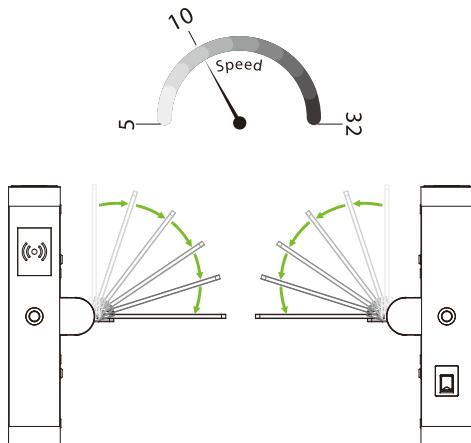
Gate Opening Compensation Speed (05EXXX)

It can be set when the swing arm cannot open to the limit or shakes. The larger the number is set, the faster of the compensation speed. The Gate Opening compensation Speed value can be set between 5 to 32 and the default value is 10.



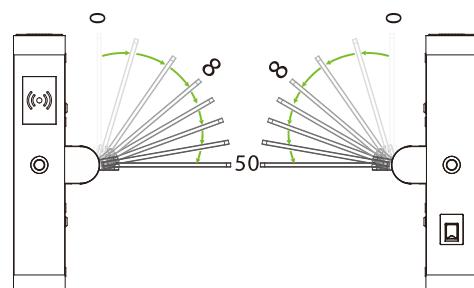
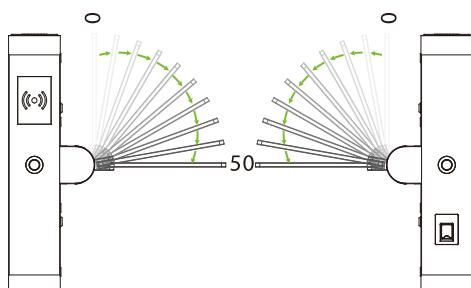
Gate Closing Speed (06EXXX)

Set the gate closing speed to close the gate. The larger the number is set, the faster the speed. The Gate Closing Speed value can be set between 5 to 32 and the default value is 24.



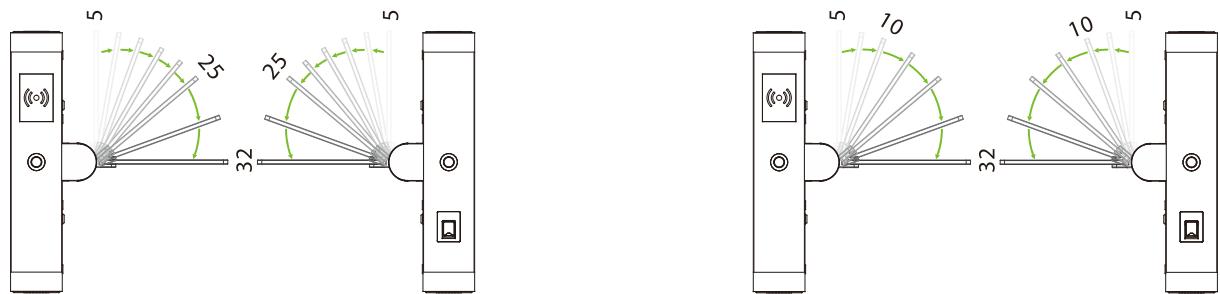
Gate Closing Deceleration Distance (07EXXX)

The larger the number, the longer the deceleration time and the more stable the swing arm operation. The Gate Closing Deceleration Distance value can be set between 0 to 50 and the default value is 8.



Gate Closing Compensation Speed (08EXXX)

It can be set when the swing arm cannot close to the zero position or shakes. The larger the number is set, the faster of the compensation speed. The Gate Closing compensation Speed value can be set between 5 to 32 and the default value is 10.



Master/Slave Setting (09EXXX)

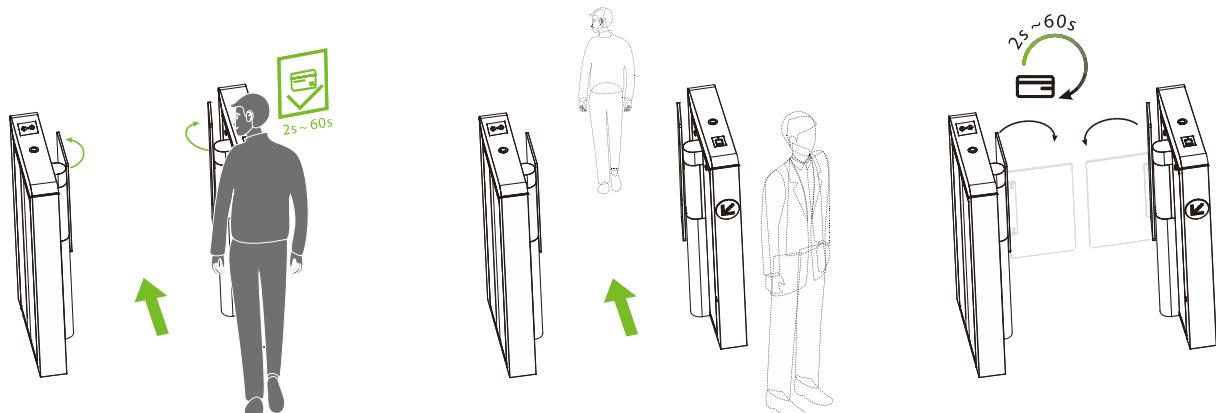
- (09E000) Master
- (09E001) Slave (Default)

RS485 Address (10EXXX)

It can be set between 0 to 254 and the default value is 0.

Open Duration Time (11EXXX)

The valid time period after a successful verification can be configured. Once the set time is reached, the gate will automatically close. The longer the number set, the longer the valid time. The valid value ranges from 2 to 60 seconds, with a default value of 5 seconds.



Gate Closing Delay Time (12EXXX)

Set the delay time of gate closing after passing. The valid value for gate closing delay time can be set between 0 to 60s and the default value is 0s.



Correct Barrier Position Adjustment (13EXXX)

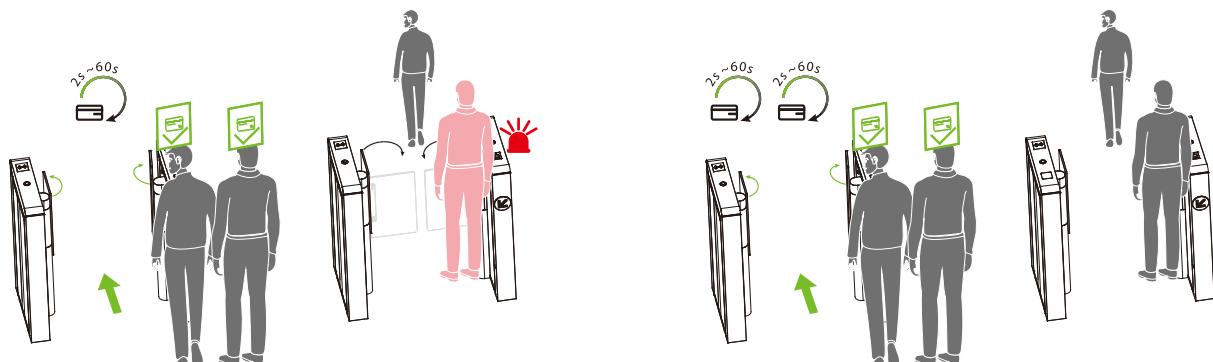
- (13E001) Zero position
- (13E002) Right position
- (13E003) Left position
- (13E004) Slave position

1. Adjust the position only when Mars-S100 series is installed properly.
2. When setting the zero position, you can manually push the swing arm for fine-tuning. If the barrier exceeds a certain angle, it will be invalid. (At this time, the digital LED displays 13E000).

Gate Opening Memory (14EXXX)

- (14E000) Close (Default)
- (14E001) Open

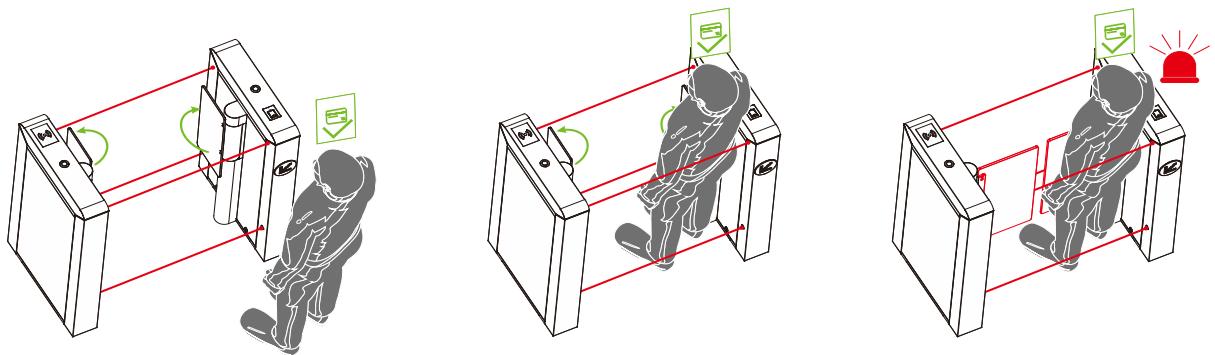
When more than two legal access signals are given at the same time (including the same direction and the opposite direction), the system will remember all pass requests and complete each pass in turn.



Authentication in Lane (15EXXX)

It allows the pedestrian verification during IR sensor triggered.

- (15E000) Allow (Default)
- (15E001) Forbidden



Volume Setting (16EXXX)

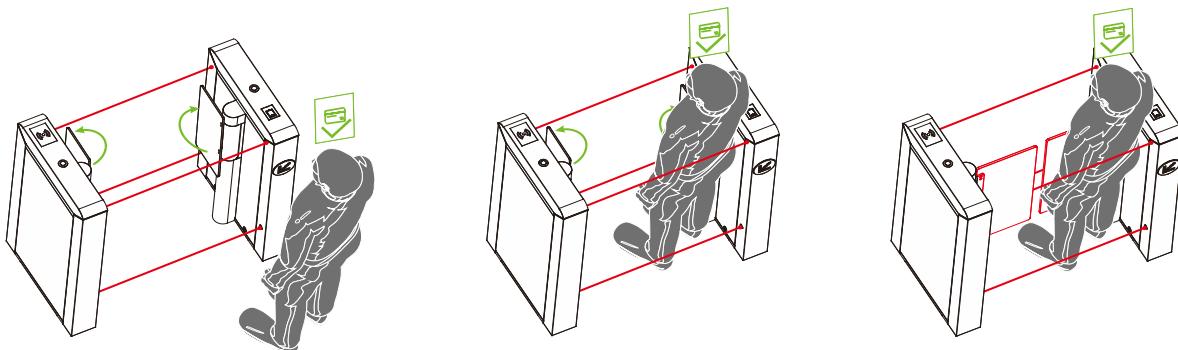
Volume Setting is used for adjusting the volume of the device. The larger the number is set, the louder the volume. The valid value for Volume Setting can be set between 1 to 100 and the default value is 40.



Close Alarm Tone (17EXXX)

When the alarm tone is turned off, the Turnstile will not emit an alarm tone when encountering an alarm situation. The following figure shows an example of the prohibition of authentication in lane:

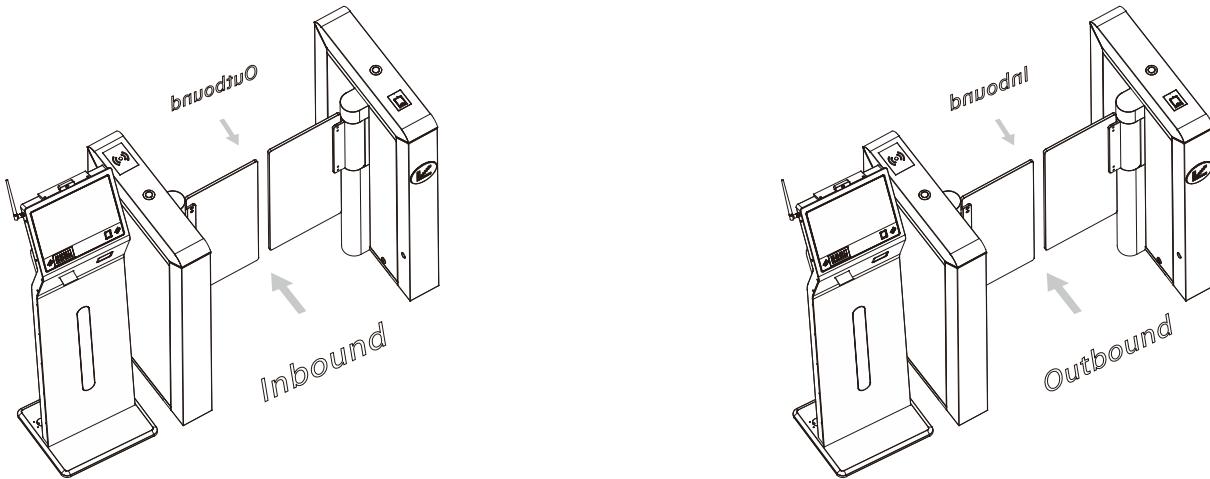
- (17E000) Close
- (17E001) Open (Default)



Exchange Entrance and Exit Voice (18EXXX)

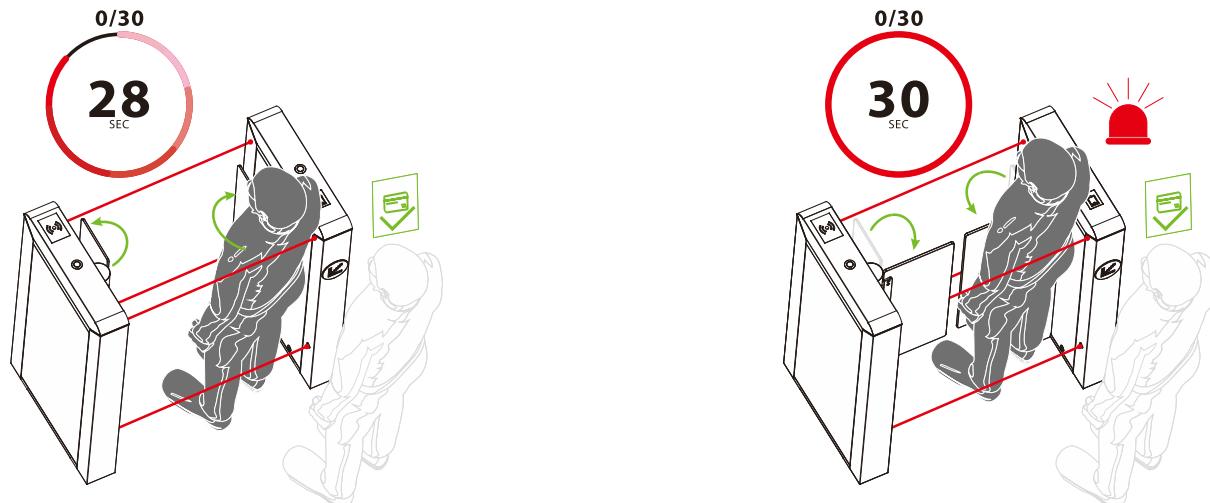
Ordinary alarm sounds do not need to be exchanged.

- (18E000) Right in, left out (Default)
- (18E001) Right out, left in



Stay Duration Time (19EXXX)

Set the duration of stay in the channel after successful verification. The valid value for Stay Duration Time can be set between 5 to 30 seconds and the default value is 10s.



Force Adjustment (20EXXX)

The larger the number, the greater the efficiency of the gate opening and closing force. The valid value for Force Adjustment can be set between 10 to 100 and the default value is 50.

Fire Opening Direction (21EXXX)

According to the external fire device, select the corresponding type of trigger mode.

- (21E000) In open (Default)
- (21E001) Out open



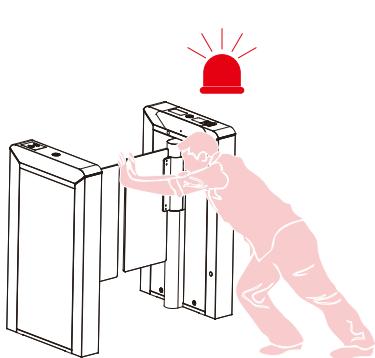
Clutch Start Angle (22EXXX)

Set the angle at which the clutch starts. The larger the number, the bigger the angle. The valid value for Clutch Start Angle can be set between 0 to 99, and the default value is 10.

Clutch Alarm Setting (23EXXX)

When the gate is unlocked in an unauthorized way, the clutch gets locked automatically. The Clutch Alarm Setting can be set as:

- (23E000) Delayed unlock (Default)
- (23E001) Authentication to unlock.

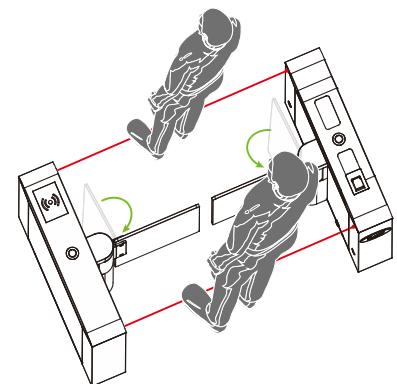
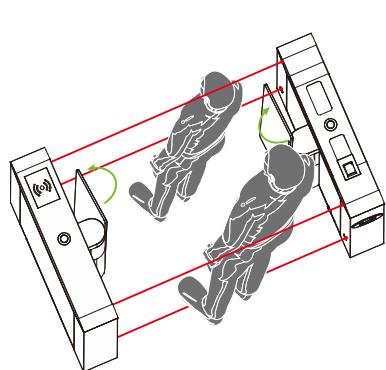


Restore Factory Setting (24EXXX)

- (24E001) Restore factory settings.

Anti-pinches Area Setting (25EXXX)

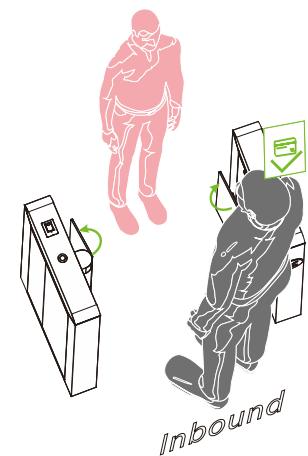
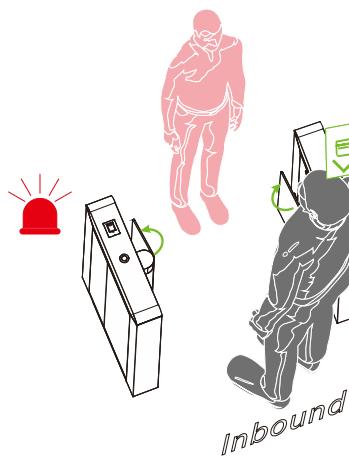
- (25E000) All Infrared anti-pinches (Default)
- (25E001) First and last pair are not anti-pinches.



False Direction Entry (26EXXX)

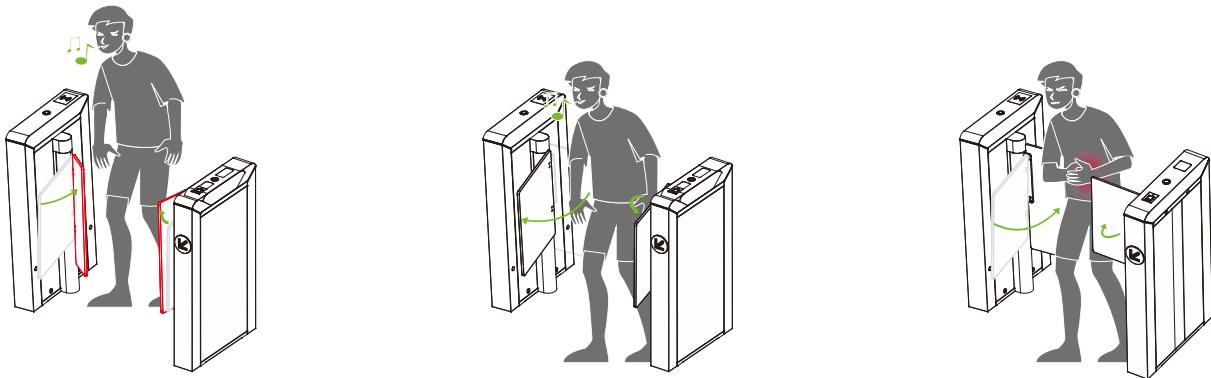
When the Anti-pinches Area Setting needs to be set to (25E001) only, the False Direction Entry (26E000) is effective.

- (26E000) Close
- (26E001) Only alarm (Default)
- (26E002) No detection



Anti-pinches Action Setting (27EXXX)

- (27E000) Stop
- (27E001) Open (Default)
- (27E002) Close the function.



Voice Tone Switching (28EXXX)

- (28E000) Voice playback (Default)
- (28E001) Alarm

Motor Installation Direction (29EXXX)

- (29E000) Inverted
- (29E001) Upright (Default)

Note: First power up is Inverted.

Swing Arm Type (30EXXX)

- (30E000) Ordinary swing door (Default)
- (30E001) Larger swing door

Right Synchronous Adjustment (31EXXX)

You can adjust the synchronization of the Master through this menu, the larger the value, the faster the response of the Master to open the gate, the setting range lies between 30 to 200, and the default value is 100.

Left Synchronous Adjustment (32EXXX)

You can adjust the synchronization of the Slave through this menu, the larger the value, the faster the response of the Slave to open the gate, the setting range lies between 30 to 200, and the default value is 100.

Entrance Direction Voice (33EXXX)

Select the voice to entrance the direction, there are 30 voices to choose from, and the default value is 0. Currently only support Chinese, voice in other languages needs to be added

Exit Direction Voice (34EXXX)

Select the voice to exit the direction, there are 30 voices to choose from, and the default value is 17. Currently only support Chinese, voice in other languages needs to be added

3.6 Error Code for Turnstile

Error Code	Cause
ER0002	Power-on Self-test failure, Hall Limit Detection Error
ER0004	Run Timeout
ER0008	Clutch Locked
ER016	The code disk detection failed.
ER032	Electric Motor Shaft Lock Protection failure

4 Maintenance

4.1 Chassis Maintenance

The chassis is made of SUS304 stainless steel or cold rolled sheet steel. If it has been used for a long time, the surface may have rust stains. Clean the surface thoroughly with a clean cloth on a regular basis. Coat the surface with anti-rust oil, but do not cover the infrared sensor.

4.2 Movement Maintenance

Before doing maintenance, turn off the power. Open the door, wipe the surface dust, and apply lubricant for smooth movement.

4.3 Power Supply Maintenance

- Switch off the power supply before maintenance.
- Check the power plug connection, if found loose, fix it properly.
- Do not change any connection position randomly.
- Check the external power supply insulation periodically.
- Do periodic check for any kind of leakage.
- Check if the technical parameters of interface are normal.
- Check the service life of the electronic components and replace accordingly.

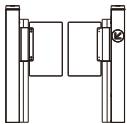
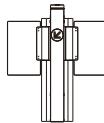
Caution: All the above-mentioned maintenance methods for speed gates are must be carried out by a professional technician, especially the movement and the electric control part. To ensure operational safety, it is important to first switch off the power supply when the speed gate is not in use.

5 Troubleshooting

No.	Failure Descriptions	Analysis and Solution
1	The mode indicator light does not respond or the indication is incorrect.	Check that the control panel mode indicator wiring is correct or that the contact is poor.
2	After swiping the card, there is only a speed gate unlocked.	Check the mode setting of the master and slave devices and the 8-core, 2-core connection lines. See the wiring diagram for the specific connection circuit.
3	The speed gate doesn't close when the opening delay time is ended.	Check to see if the opening delay time is too long or whether the IR sensor is covered.
4	When the gate is self-tested, the swing arm is not in the normal closing position!	In the process of self-test, there are obstacles, please remove the obstacles, restart the self-test after power-on!

6 Packing List

The package consists of the following items:

	Mars-S100	Master: 1 Slave: 1
	Mars-S120	1
	Card★	1
	Expansion Screw M12*100	8 (Mars-S100)
		4 (Mars-S120)
	Stainless Steel Maintenance Wipes	1
	Hex wrench	1
	Allen Screw	4
	Key	2
		8 (Mars-S100)
	Washer	4 (Mars-S120)

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