Manual of Servo Control Driver for 28 Rack-and-Pinion Sliding Door Operator

OB-WSCLCT-01-V1.09

Content

1. Safety Warnings

1.1 Caution! Read the manual before use and operate in accordance with requirement

1.2 Packaging materials with potential hazards must be kept out of the reach of children.

1.3 Keep the manual safely for future use.

1.4 This product is designed and manufactured strictly in accordance with the operating guidelines in the document. Any use or operation not in compliance with the guidelines may cause product damage or hazards.

1.5 The opener bear shall not be liable for any adverse consequences arising from improper use or use beyond the specified scope.

1.6 Do not install this product in explosion- hazardous areas; flammable gases pose serious safety risks.

1.7 Mechanical parts must comply with relevant national standards.

1.8 Supporting products must be designed and manufactured in accordance with the manual's requirements.

1.9 The opener bear shall not be liable for problems caused by neglecting process requirements for precision components during construction or causing deformation of such components.

1.10 Installation must comply with relevant national standards.

1.11 Switch off the power before product maintenance.

1.12 Check whether earthing is correct.

1.13 Safety devices (e.g. magnetic switches, sensors, etc.) shall be protected against damage.

1.14 The opener bear shall not be liable for safety issues or malfunctions arising from supporting products not provided by the opener bear.

1.15 Only original parts shall be repaired.

1.16 Do not make any modifications to components of the system.

1.17 The service staff must fully explain the operation methods and emergency regulations for the user.

1.18 Keep children and other unrelated personnel away during product installation.

1.19 Keep remote controls out of the reach of children to prevent accidents.

1.20 Any operation not specified in the manual is prohibited.

2. Introduction

This product operates at a safe voltage of below 36V, which is harmless to the human body. It will not cause electric shock even when submerged in water, ensuring reliable safety during use.

The **28 Rack-and-Pinion Sliding Door Operator Control Driver** is an electro-mechanical integrated product consisting of a worm reduction sinusoidal motor and a controller. It adopts suspension limit operation to ensure the door runs in a straight line. After connecting limit switches, infrared anti- collision sensors, loop detectors, infrared sensors, remote controls, manual control switches and other signal devices to the suspension door mechanism equipped with this control driver, it can control and drive the suspension door to perform corresponding actions according to control signals, thus realizing the management and control of vehicles and pedestrians at entrances and exits.

The worm reduction sinusoidal motor drive controller features high starting torque, minimal temperature rise, precise control, stable operation, low noise and high safety, making it an ideal control driver for floating door manufacturers.

3. main technical specification

Item	Parameter		Remark
Rated operating voltage	24-36VDC		
Motor operating voltage	24VDC		
Power	550W， Max Overload Power1500W		
Operating current	6A		
Output torque of the worm reduction motor	≥89Nm， Max Overload Torque 260Nm		
Motor output rotation speed	3000rpm		
Running speed of operator	0.2-0.3m/S		
Matching door weight	80L--500KG	90L--1000KG	
Temperature rise	≤15℃		
Running noise	≤60dB		
Controller dimension	219(W)*154(H)*52(H)mm		
Dimension of worm reduction motor	277.2(L)*130(W)*193.2(H)mm		
Operating temperature	-40-70℃		
Operating humidity	≤95%，non-condensing		

4. Main Functions, Performance Description and Product Features

With suspension limit operation, the sliding door is guaranteed to run along the set straight line.

4.1 Main Function Description

●**Anti-collision Function**: The controller can be connected with an anti-collision photoelectric sensor as need. If an obstacle appears in front of the door during closing, the door will stop automatically.

●**Obstruction Detection Function:** When the door encounters resistance during closing and the set current value and duration are reached, the door will stop running.

●**Half-opening Function:** When the wired control signal is connected to the half-opening terminal, the door can open to a preset width (not fully open), then close upon receiving a closing signal or after the loop detector detects a vehicle has passed (this function is mainly used for automatic vehicle access control).

●**Remote Control Function:** The drive controller comes standard with a remote control function, allowing the door to be controlled via the remote control for "opening", "closing", and "stopping".

●**Command Control Function:** The controller can communicate with a host computer through a serial port to realize command-based control of door operation.

●**One-key Reset Function:** One-key restoration to factory default settings is supported.

●**Power-on and Operation Self-test Function:** The controller can detect the operating status of the operator and issue alarms in time.

●**Anti-freezing Function:** The drive controller supports anti-freezing treatment to ensure stable operation at low ambient temperatures.

●**WeChat Mini Program Remote Control:** Supports remote door opening/closing via WeChat Mini Program. It can count total and daily door operation times, support remote debugging, and actively report various faults. Advanced servo control algorithms are adopted.

●**Time Period Control via WeChat Mini Program:** Users can set opening time period, long-time opening, or the prohibited opening time period via the WeChat Mini Program.

4.2 Main Performance Description

●Provides **3× overload capacity** and supports soft start and soft stop.

●The motor with lower temperature rise supports multi-stage speed regulation.

4.3 Main Product Features

The 36V low-voltage DC servo rack-and-pinion sliding door operator control system has outstanding advantages in safety, functionality and convenience.

●Low-voltage DC 36V power supply: No risk of electric shock even when sub-merged in water, ensuring personal safety.

●3× overload capacity with soft start and soft stop.

●Remote control, fault reporting, application of servo control algorithms, and gate opening time scheduling via WeChat Mini Program.

●No motor thermal protection occurs.

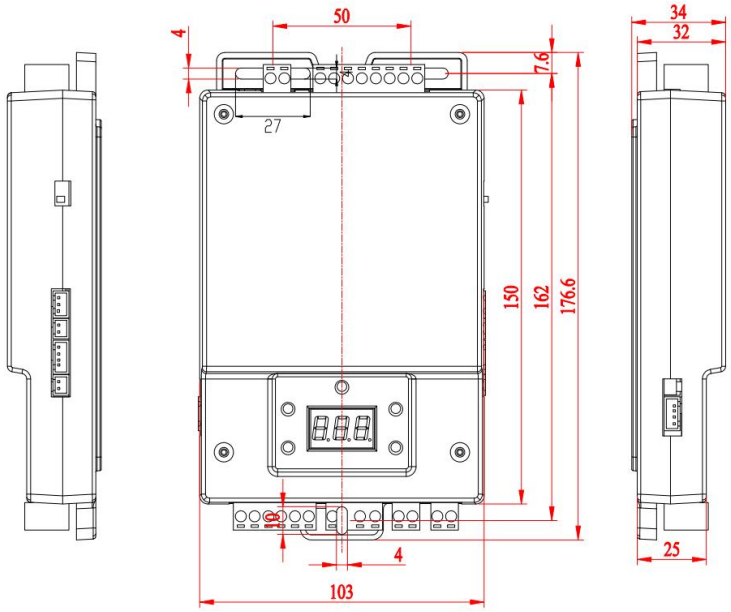
●Multi-stage speed regulation function.

5. Installation Instructions

The installation of the control driver includes the following parts:1.Controller body, 2.worm reduction sinusoidal motor mechanism, 3.Limit magnet, 4.Remote control antenna, detail as follow.

5.1 Controller Body Installation

The controller body shall be installed inside the cabinet of the mechanism. The dimension drawing is as follows:

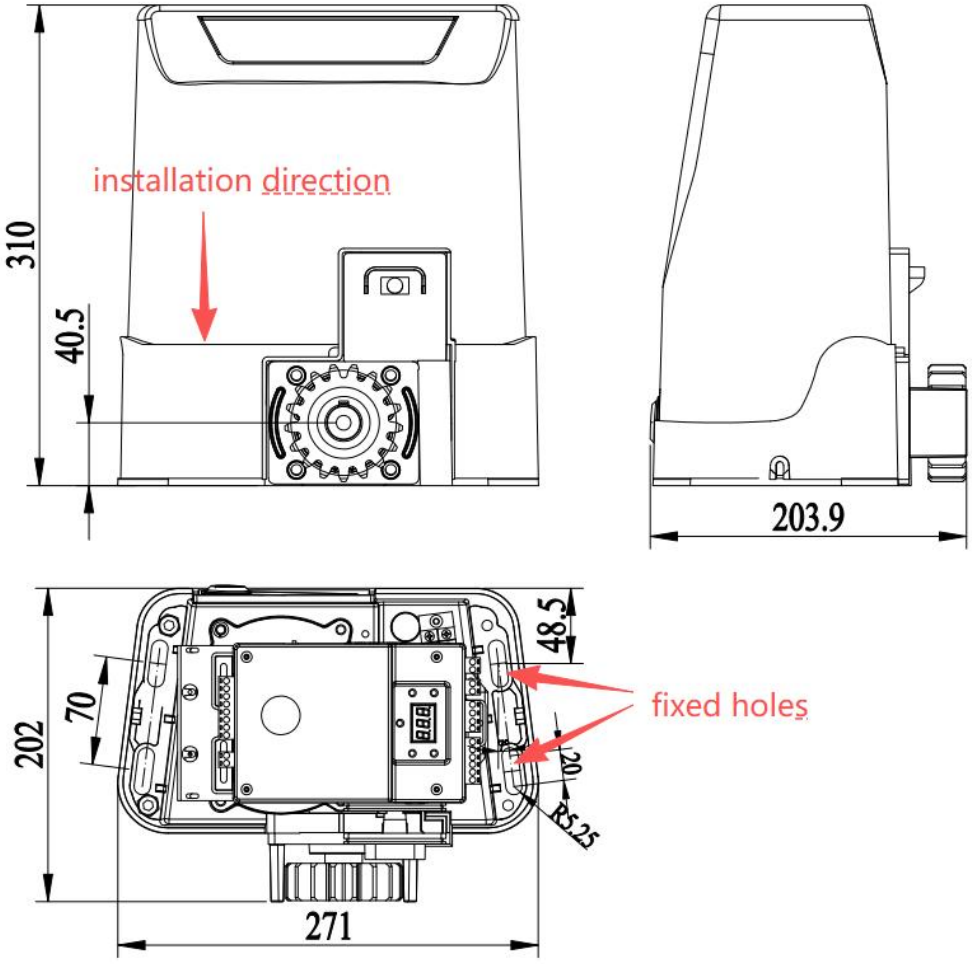


Controller Installation Dimension diagram

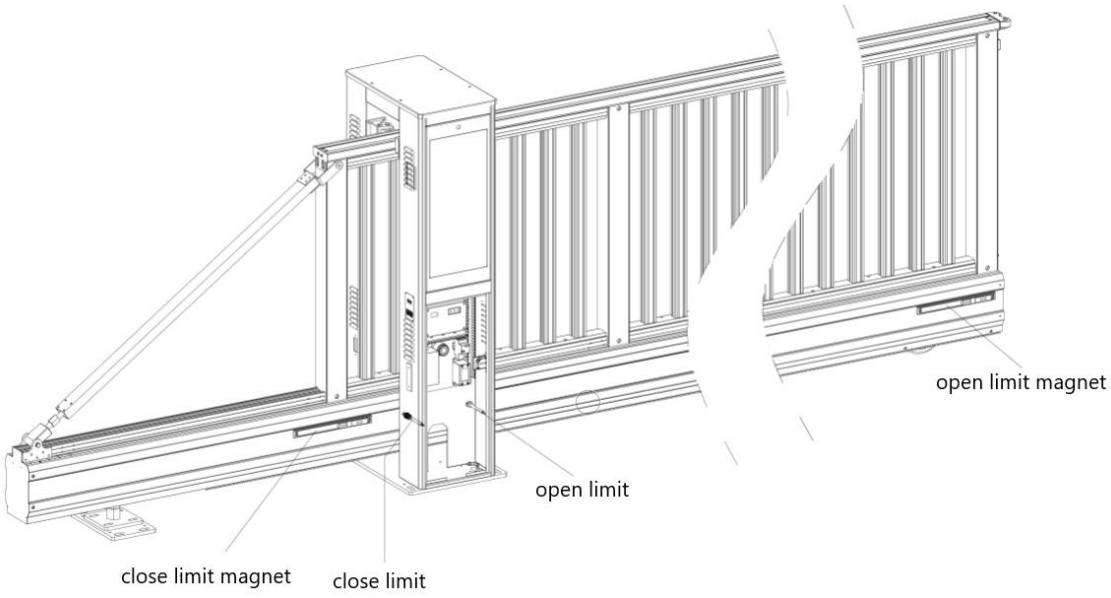
5.2 Installation of worm reduction Sinusoidal Motor mechanism

The worm reduction sinusoidal motor mechanism is installed on the frame of the door .worm reduction sinusoidal motor mechanism is fixed with **4 pieces of M8×25**

bolts. A gear is mounted on the output shaft of the reducer with a matching hole diameter of **22 mm**.The dimension drawing is as follows:



5.3 Installation of Rack-and-Pinion Sliding Door operator

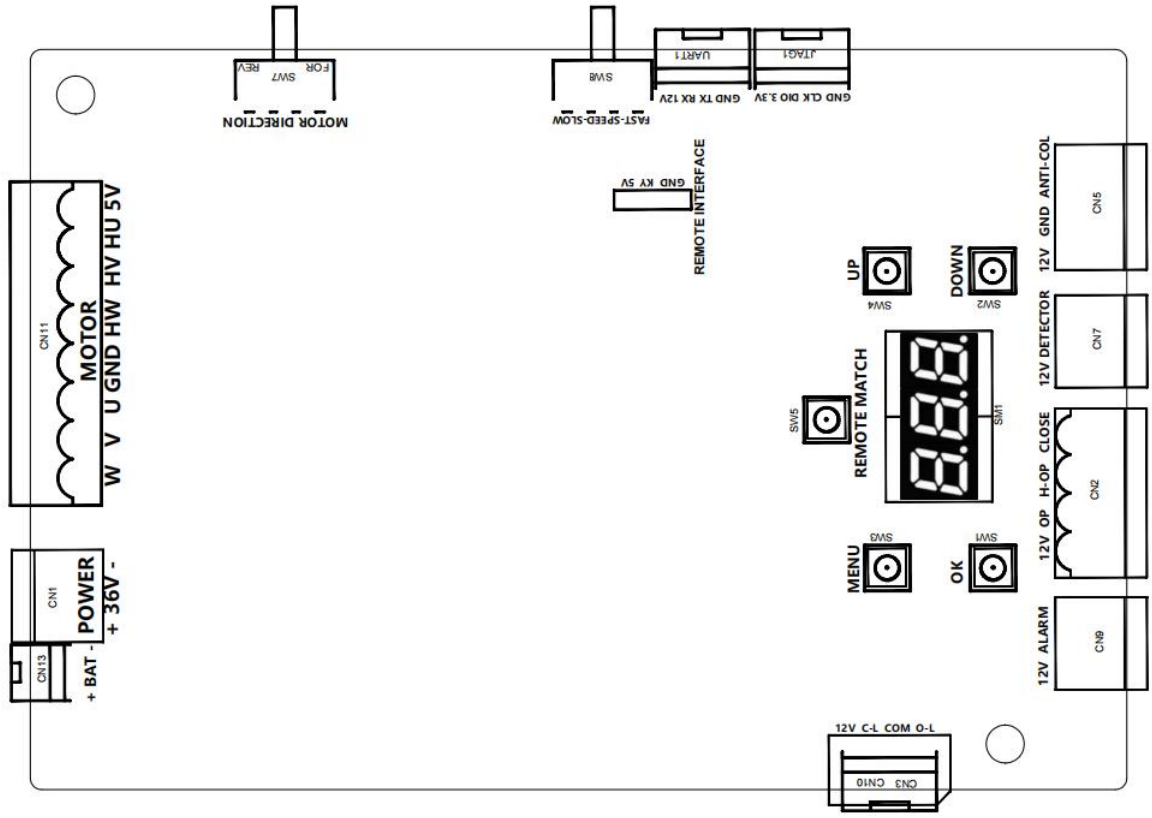


5.4 Remote Control Antenna Installation

The remote control antenna shall be installed at a height of no less than 60 cm from the ground, and the antenna board shall be mounted outside the door operator cabinet.

6. Wiring

The wiring diagram of the controller is as follows:



The wiring diagram of the controller

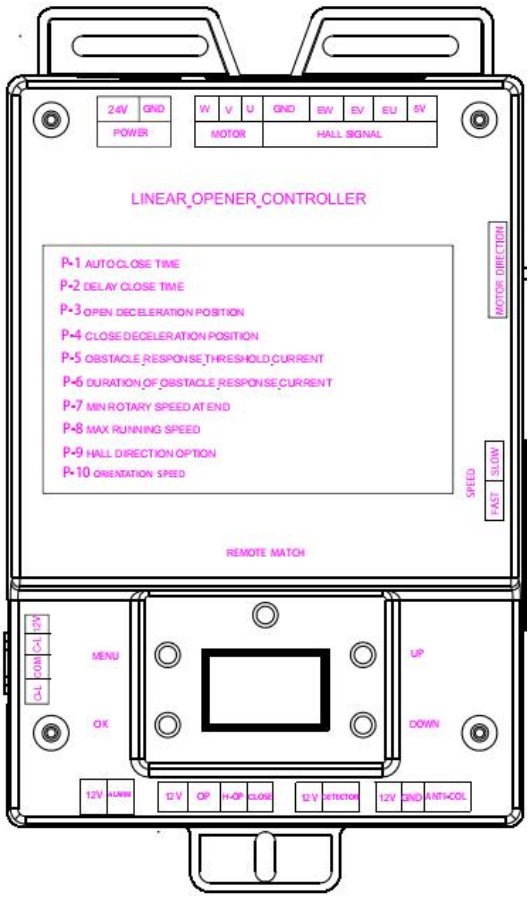
Terminal description：

SN	Terminal definition	Remark
CN13	BAT+ BAT-	Battery
CN1	POWER+ POWER-	Power
CN11	W V U GND HW HV HU 5V	Motor and hall
CN10/CN3	12V C-L COM O-L	Limit-switch
CN9	12V ALARM	Alarm
CN2	12V	Open and close

	OP H-OP CLOSE	
CN7	12V detector	Detector input
CN5	12V GND ANTI-COL	ANTI-Collision signal
JTAG1	GND CLK DIO 3.3V	DOWNLOAD
UART1	GND TX RX 3.3V	RS232 communication
SW8	FAST SLOW	Adjusting speed
SW7	FOR REV	Motor direction
Remote interface	GND YK 5V	Remote controller

7. Parameter Setting and Debugging

The opening and closing running time and other parameters of the rack-and-pinion sliding door operator are set by the setting keys under the seven-segment display. The definitions of the keys are shown in the figure below. The settings include parameter setting, one-key reset and remote control code matching.

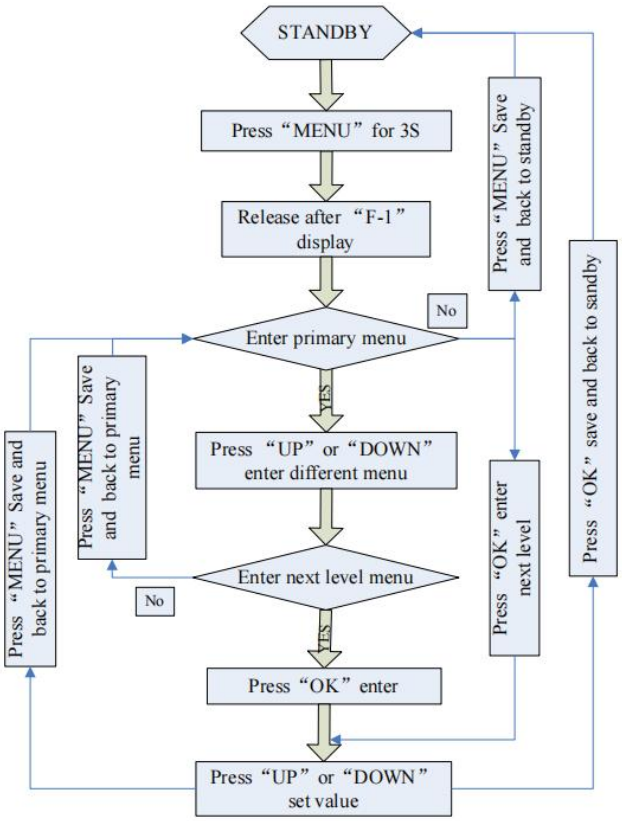


Setting Key Definition Diagram

7.1 Parameter Setting

7.1.1 Function Parameter Setting

Setting Procedure：



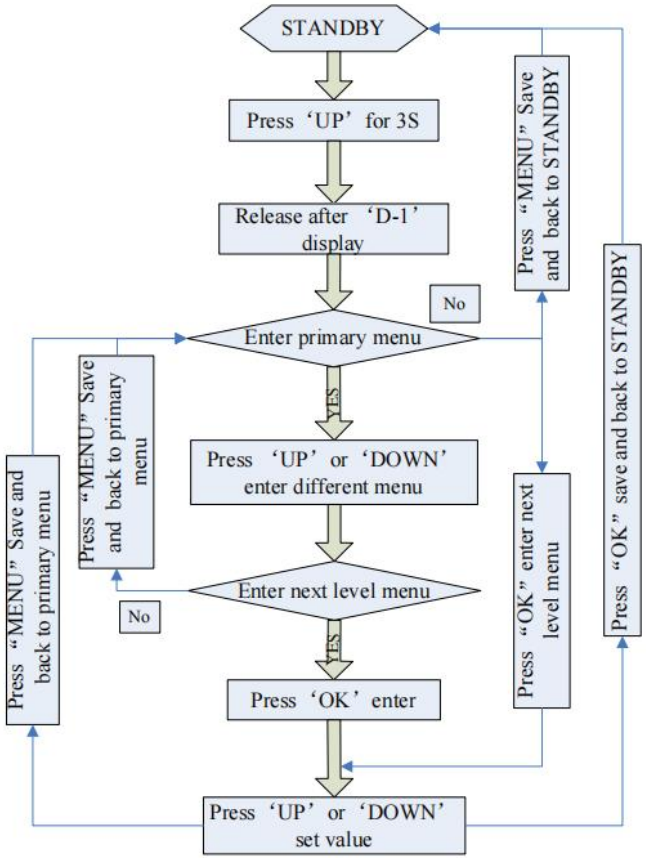
The parameter setting table is as follows：

SN	Parameter	Content	Default setting	Remark
1	F-1	Half-open position: Sets the opening position where the door does not fully open. Setting range: 0–50 meters。	2m	
2	F-2	Opening and closing speed: Only displays the opening and closing speed, which is adjusted by the speed dip-switch. Slow speed is 80, fast speed is 90	80	
3	F-3	Deviation correction range: 1–10 levels, 1-being the minimum，and 10- the maximum	5，5%	
4	F-4	Infrared screen distance: Setting range is 2–15. The larger the value, the longer the distance.The actual distance for screen the anti-collision infrared sensor is: set value × 0.3 meters.	7，represent2.1m	
5ª	F-5	Response threshold current in case of resistance, range: 1.0-15.0A	7.0,represent7.0A	
6ª	F-6	Duration of response threshold current in case of resistance, range: 0.1-5.0S	3.0，represent3S	
8ª	F-8	Auto-close time,range: 0–300 (corresponding to 0–300 seconds)	0，disable	
9	F-9	Brake percentage: Setting range is 0–15 (resistance to external force when the door is stationary)	10	
10	F-10	Brake activation distance: Range 0–100 (not enabled)	10	
11	F-11	Soft start & stop setting: Time to accelerate to the target speed, setting range 1–10	2	
12	F-12	Running protection duration for opening and closing: Setting range is 20–300 (representing 20–300 seconds)	180，represent 180S	
13	F-13	RS485 Communication ID, range: 1–20.	1	
14	F-14	RS485 Baud Rate:Setting range: 0–3,0: 115200 bps,1: 9600 bps,2: 19200 bps,3: 38400 bps	1-19200	

15	F-15	Communication data transmission time interval: Range: 0–10 (representing 0–10 seconds)	0	
16ª	F-16	Delay closing time after vehicle passed, range: 0–10.0S.	0.3S	
18	F-18	Number of forward revolutions after closing to the limit,range: 0–1	0	
19	F-19	Clutch engagement angle,range: 0–30(%), based on the percentage of total travel,0 means the clutch is not locked.	0	
20	F-20	Clutch engagement time, range: 1–20 seconds.	2S	
21ª	F-21	Open deceleration position, range: 0–50 (%), based on the percentage of total stroke. 0 means no deceleration	5，5%	
22ª	F-22	Close deceleration position ,range: 0–50 (%), based on the percentage of total stroke. 0 means no deceleration	5，5%	
23	F-23	Acceleration time, range: 0.1~10.0S, accuracy: 0.1	0.1，0.1S	
24	F-24	Deceleration time,range 0.1~10.0S,accuracy 0.1	1.0，1.0S	
25	F-25	Half-open / stop function selection,range: 0–1,0–Stop, 1–Half-open	1	
26	F-26	Motor revolutions per meter, range: 1–500	75	
27	F-27	Door opening prompt voice selection, range: 0–99	5	
28	F-28	Door closing prompt voice selection, range: 0–99	22	
30	F-30	Door opening deviation correction duration, range: 0–900 ms	20mS	
31	F-31	Door closing deviation correction duration, range: 0–900 ms	40mS	
32	F-32	Closing function selection after vehicle pass,processing mode of the door when the vehicle detector signal disappears during door opening, range: 0–1,0–door continues to open and closes only after reaching the fully open position,1–door closes immediately once the signal disappears	0	
33ª	F-33	Orientation speed,range 10–100 (percentage of the motor rated speed)	50	
Note: Parameters marked with ª are quick-setting parameters.				

7.1.2 Advanced Parameter Setting

Setting Procedure：



The parameter setting table is as follows：

SN	Parameter	Content	Default setting	Remark
1	D-1	Motor speed loop KP setting, range: 1–99	10	
2	D-2	Motor speed loop KI setting, range: 1–99	1	
3	D-3	Motor current loop KP setting, range: 1–99	6	
4	D-4	Motor current loop KI setting, range: 1–99	60	
5	D-5	Software current protection value setting, setting range: 5–16	8	
6	D-6	Motor type setting, setting range: 0–3	4	
7	D-7	Anti-freeze revolutions setting, range: 0–10.Used in conjunction with D-8; this parameter takes effect only when D-8 is set to 5 or above	3	
8	D-8	Anti-freeze running time interval setting, range: 0, 5–90 minutes. 0-disables this function. When set to 5 minutes or above, the timer runs at the set time interval.	0	
9	D-9	Vehicle detector signal duration setting, range: 3–30	9	
10	D-10	Door opening and closing rotary speed setting, range: 10–100, representing the percentage of the motor's rated speed during constant-speed operation (expressed as 10%–100%)	80	
11	D-11	Self-test running speed without magnet detection, range: 10–60, representing the percentage of the motor rated speed during constant-speed operation before magnet detection in self-test mode	50	
16	D-16	Door type setting,range: 0–2, defined as follows: 0–Trackless,1 – track type,2 – sliding door	2	
17ª	D-17	Max running rotary speed，range：10-100，aim rotary speed equal to set value*100.	35,i.e3500rpm	
18ª	D-18	Min running rotary speed at end,range:10-100(represent percent of nominal rotary speed)	30	
19ª	D-19	Hall direction option,scope:0-1,0-forward,1-reverse	1	
20	D-20	Locked-rotor detection time, range: 0.0~90.0s, 0-disable this function	10.0S	
Note: Parameters marked with ª are quick-setting parameters.				

7.1.3 Quick Setting Parameters

SN	Parameter	Content	Default setting	Remark
1	P-1	Auto close time,range:0-300S	Default:0	F-8
2	P-2	Delay close time after vehicle passed,range:0-10.0S	Default:0.3S	F-16
3	P-3	Open deceleration position,range:0-50(%),represent percent of total stroke.	Default:5	F-21
4	P-4	Close deceleration position,range:0-50(%),represent percent of total stroke.	Default:5	F-22
5	P-5	Response threshold current in case of resistance, range: 1.0-15.0A	Default:7.0	F-5
6	P-6	Duration of response threshold current in case of resistance, range:0.1-5.0S	Default:3.0S	F-6
7	P-7	Min running rotary speed at end,range:10-100(represent percent of nominal rotary speed)	Default:30	D-18
8	P-8	Max running rotary speed，range：10-100，aim rotary speed equal to set value*100.	Default:35,i.e 3500rpm	D-17
9	P-9	Hall direction option,range:0-1,0-forward,1-reverse	Default:1	D-19
10	P-10	Orientation speed,range:10-100(represent percent of nominal rotary speed)	Default:50	F-33

7.2 One-key Restore Factory Default Parameters

In standby state, press the "OK" key until the seven-segment displays "----". Then press the "UP" or "DOWN" key three times, and press the "OK" key again, it will restore factory settings after power on.

7.3 Remote Control Code Match & Clear

7.3.1 Remote Control Code Match

Press the “REMOTE MATCH” key for 3S. The seven-segment display will show “--0”. Then press any key on the first remote control, and the seven-segment display will show “--1”. Press any key on another remote control, and the display will change to “--2”, and so on until it shows “--N”. Press the “OK” key to complete code matching for N remote controllers.

7.3.2 Remote Control Code Clear

Press the “REMOTE MATCH” key for 3 S. The seven-segment display will show “— — N” (N represents the number of successfully paired remote controls). Then long-press the “UP” key for 3 S until the seven-segment display shows “— — 0”, indicating code clearing is successful. Press the “OK” key to return to normal standby mode.

7.4 Adjustment of motor running Direction

If the door opens and closes in the reverse direction during debugging, adjust the motor direction DIP-switch on the controller wiring diagram and test again.

7.5 Debugging

After the rack-and-pinion sliding door operator is fully assembled and inspected by QC, it can be powered on for testing. After each power- on, the last digit of the seven-segment display shows **7**. Press the “**DOWN”** key to enter the initialization state,The door will run toward the closing direction, but the infrared function disabled.After reaching the closing limit, the door automatically runs toward the opening direction until it reaches the opening limit, the seven-segment display shows:The last digit is **1**,The first digit lights up sequentially from bottom to top,The middle digit is off, represent initialization completation. After initialization, the door can be controlled via the UP, DOWN keys.Remote controllers can also be matched directly to operate the door for opening, closing, and stopping.

After controlling the door opening and closing, you can check whether the anti-collision, obstruction detection, anti- climbing and other functions are working properly.

7.6 Aging

After debugging is completed, the device can be put into aging mode for aging test.Press the "DOWN" key for 3 S to enter aging mode. During aging, the first digit of the seven-segment display moves up and down toward the middle, and the control board drives the motor to run.

During the aging test, if the anti-collision infrared sensor is blocked or obstruction is detected, the operator will pause for 2 minutes, and then resume in the opening direction, running repeatedly.Press the "OK" key again to exit aging mode.

7.7 Operation Status Indication

Operation status indications on the seven-segment display are shown in the table below:

SN	Status code	Definition	Remark
1	☐☐0	Door close limit	
2	☐☐1	Door open limit	
3	☐☐3	Openning	
4	☐☐5	Closing	
5	☐☐7	Initialization	
6	☐☐8	Braking	
7.1	010	Long-time failure to reach limit, stopped	
7.2	110	Button Stop	
7.3	210	External Signal Stop	
7.4	310	Remote Stop	
7.5	410	Stop after Infrared Triggered	
7.6	510	Short-time large current stop (in case of resistance)	
7.7	610	Stop after receive Host Computer command	
7.8	710	Stop after receive bumper strip signal	
7.9	810	Stop after receive vehicle detector signal	
7.10	910	Stop during open/close transition	
8	☐11	Emergency stop in progress	

8. Troubleshooting

Common Fault Codes and Solutions

SN	Symptom	FAQ	Analysis	Solution
1	Motor fails to start		Power failure	Check whether the voltage of the switching power supply is normal
2	Stops immediately when closing the door		1.Obstacle blocking 2.Incorrect output of anti-collision photoelectric switch	1.Clear Obstacle 2.change photoelectric switch
3	False alarm of anti-climbing		1.Anti-climbing probe is misaligned 2.Anti-climbing probe is damaged	1.Adjust the position of the anti-climbing probe 2.change probe
4	The door does not stop after arriving limit position		Limit switch is damaged	Change limit switch
5	The controller don't work	E-1	Hardware Overcurrent Protection	Check the motor circuit for short circuits
6	The motor does not work after receiving command	E-2	1.Motor Hall EU, EV, EW are not connected or have poor contact. 2.Motor is damaged	1.Check whether the control wires and Hall wires of the motor are correctly connected 2.change motor
7	The motor does not rotate after receiv-ing command	E-3	Motor locked	1.Check whether the motor gear is stuck。 2.Check the gearbox of the motor
8	Cannot close the door automatically after a vehicle passes	E-6	The vehicle detector has a constant output signal	1.Check that the loop is connected properly 2.Check if the vehicle detector is crashed 3.Check if the vehicle detector is damaged
9	Exceeds the protect-ion current value	E-7	Abnormal current	Check whether the motor is locked or stuck
10	Door locked	E10	Obstacle blocked	Clear obstacle

9. After-Sales Service

1.Regularly check the terminal connections to ensure they are secure.

2.Check whether the earthing is in good condition.

3.Carefully verify that the power supply is correct before use.