

Sliding Gate Operator User's Manual

Model: AR2000



OUTLINE

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1. Important safety information

Carefully read and follow all safety precaution and warnings before attempting to install and use this operator, incorrect installation can lead to severe injury.

- The gate operator should be installed by a qualified technician; otherwise, serious personal injury or property damage may occur.
- The auto-reverse function must be checked during installation to ensure that the gate can auto-reverse in the event of obstruction.
- This auto-reverse function should be regularly inspected and adjusted, if necessary.
- When opening or closing the gate, do not attempt to walk or drive through the gate.
- Children should not be allowed to play near or operate automatic gates.
- Install the gate operator on the inside of the property, DO NOT install it on the outside of the property where the public has access to it.
- Be careful when in close proximity to moving parts where hands or fingers could be pinched.
- Do not allow control devices to be placed so that a person can access them by reaching through the gate.
- In the event of power failure, an emergency release key allows you to operate the gate manually.
- The operator should be switched off before repairing it or opening its cover.
- Please erase and reset the code after installing the operator.

2. Main features

- The device is used to drive the sliding gate.
- For your safety, the operator will stop and reverse if it was obstructed on closing and stop when it was obstructed on opening.
- Supports up to 100 remote controls.
- Infrared terminal (N.C) is supplied to use.
- Auto-close feature is available for this operator.
- Pedestrian mode.
- Manual key release design for emergency purposes.

3. Technical parameters

Table 1

Power supply	AC 110V, 60Hz
Motor speed	1540r/min
Gate moving speed	13 m/min
Output torque (It is adjustable by pressure screw see Fig.2)	14 N · m
Limit switch	Magnetic limit switch
Remote control operating range	30m
Frequency	433.92MHz
Remote control mode	Single-button
Auto-close time	0-44 sec.
Working time	90 sec.
Noise	≤58dB
Environmental temperature	-10° C~+55° C

4. Working principle and main structure

The device is composed of a single-phase motor, worm and worm gear. The main shaft of the motor rotates the worm with the clutch engaged, the worm rotates the worm gear and output gear, which pushes rack attached to the sliding gate, thus moving the gate. The dimension is shown in Fig.1.

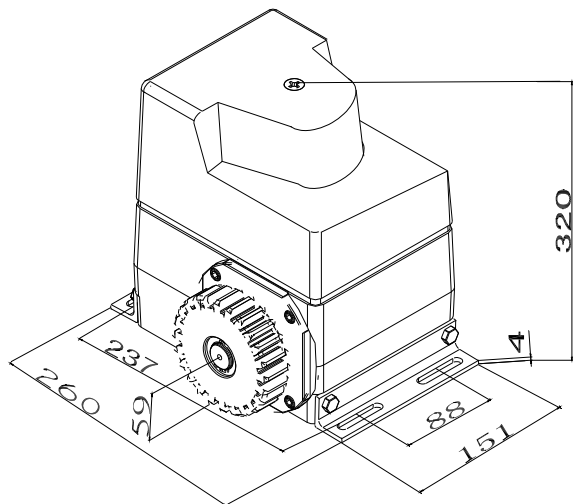


Fig.1

The structure of the motor and worm is shown in Fig2. Output torque can be adjusted by pressure screw, tighten (or release) the pressure screw to increase (or decrease) the output torque.

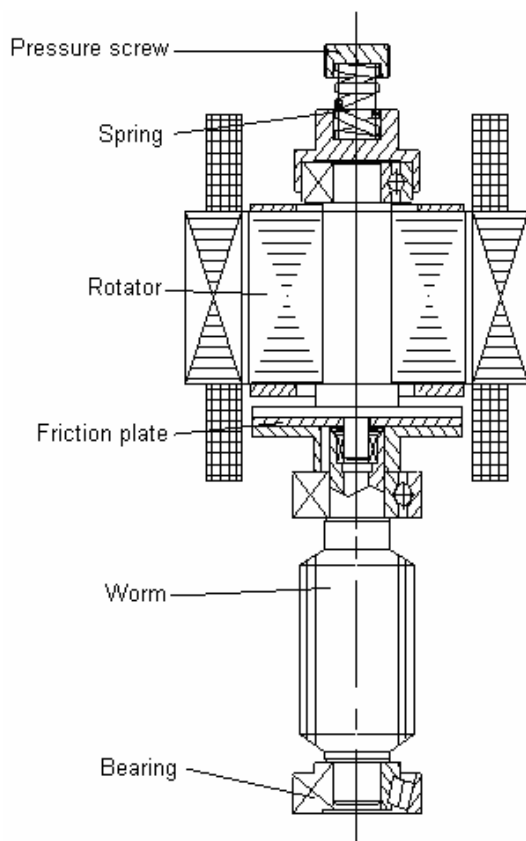


Fig.2

Release function: the worm gear components are shown in Fig.3. It includes a pair of plastic gear clutches. In case of power failure you can use the key to release the clutch, then the gate can be moved manually.

The device is well lubricated and cooled by the cooling oil (#25 transformer oil), which fills the whole device, including the stator, the rotator of the motor, the worm gear and the worm.

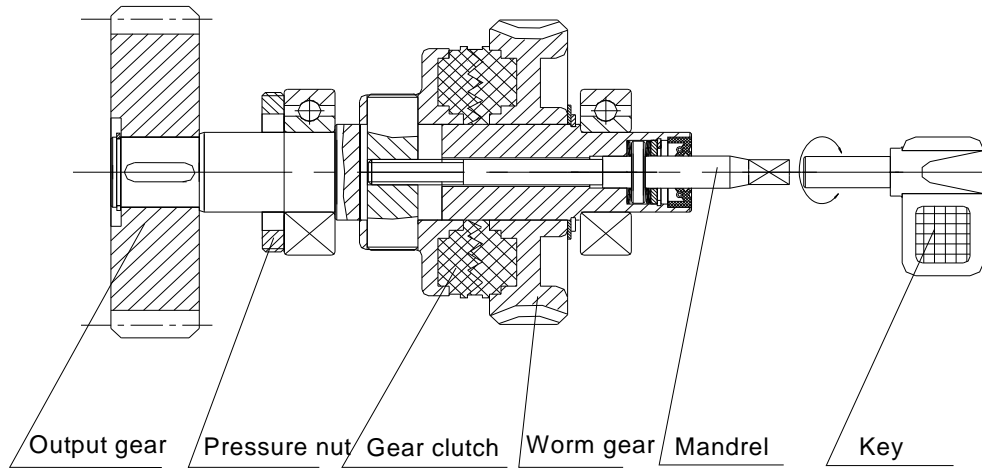


Fig.3

The device is equipped with a thermal protector, the thermal protector will switch off the motor automatically in case of temperature is higher than 95° C and switch on the motor automatically when the temperature is lower than 60±5° C.

5. Installation and adjustment

The AR2000 rack-driven gate operator operates by forcing a drive rack past a drive gear. The entire configuration is shown in the diagram below.

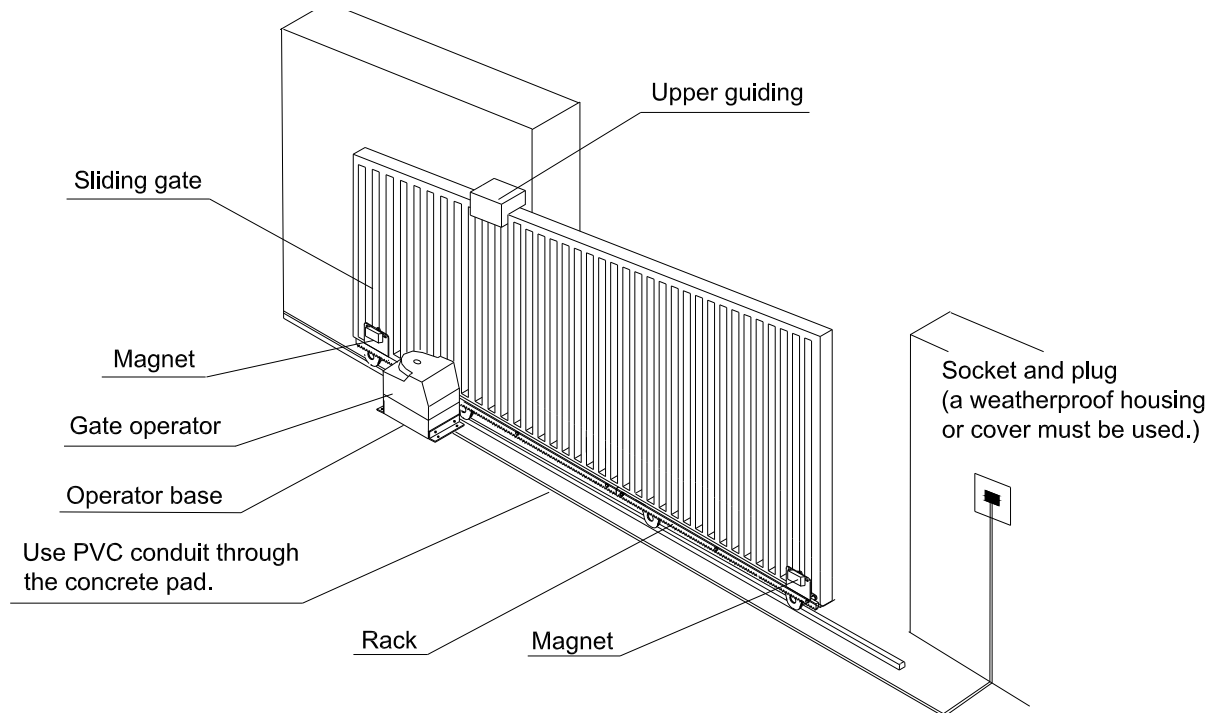


Fig.4

Conduit

In order to protect the wires, conduit must be preset into the concrete when it is poured. Wires within the conduit shall be located or protected so that no damage can result from contact with any rough or sharp part. If you have installed an external button switch, we advise you to use two conduits: one for main power wire, another one for control wire. Always separate power wires from control wires.

Concrete pad

The base unit of the gate operator requires a concrete pad in order to maintain proper stability. The concrete pad should be approximately 400mm x 250mm x 200mm deep in order to provide for adequate operation.

Anchors

You can use the anchor bolts, anchors, washers, and nuts. These anchors must be set into the concrete when it is poured, or you can use wedge anchors.

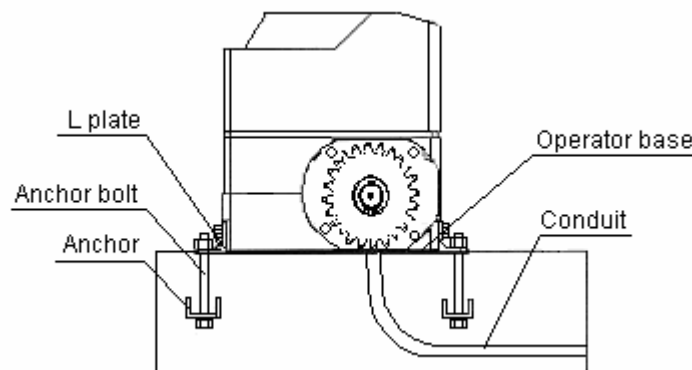


Fig.5

Operator Base

Mount the gate operator base to the concrete pad.

Operator

Mount the gate operator to the base using nuts and washers. Verify that the operator is leveled properly.

Installing the rack (see Fig.6)

Weld the steel rack

- Manually move the gate to its closing position.
- Place the three threaded pawls (in the same package with rack) on the rack element.
- Lay the first piece of rack on the gear and weld the first threaded pawl on the gate.
- Move the gate manually, checking if the rack is resting on the gear, and weld the second and third pawls.
- Bring another rack element near to the previous one. Move the gate manually and weld the three pawls as the first rack, thus proceeding until the gate is fully covered.
- When the rack has been installed, to ensure it meshes correctly with the gear.
- The space between rack and gear is about 1mm.

Screw the nylon rack

- Manually move the gate to its closing position.
- Lay the first piece of rack on the gear and mark the drilling point on the gate, drill a hole and screw the bolt.
- Move the gate manually, checking if the rack is resting on the gear, and repeat the above operations.
- Bring another rack element near to the previous one. Move the gate manually and carry out the securing operations, thus proceeding until the gate is fully covered.

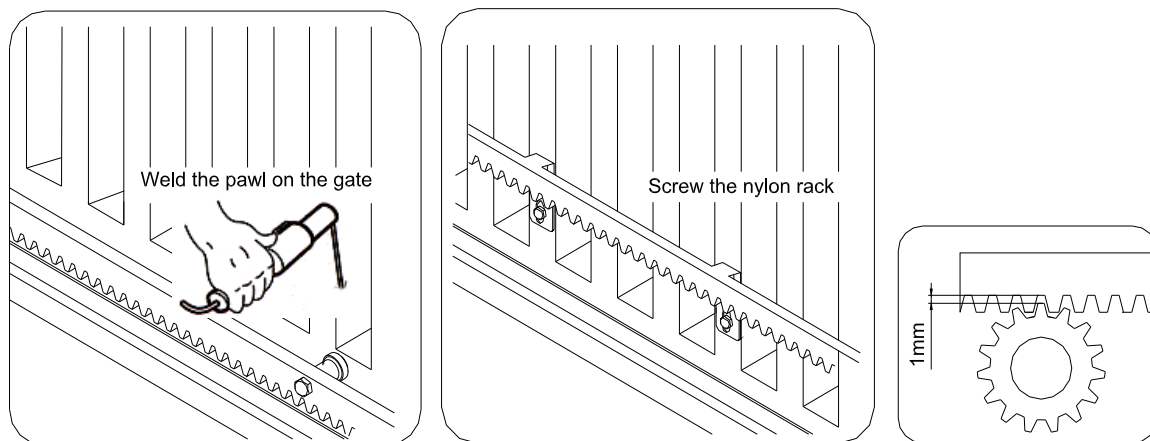


Fig.6

Magnets for limit switch

Install the magnet as shown in Fig.7 and Fig.8 below. The magnet and limit switch are used to control the position of the gate.

When the magnet is installed, release the gear clutch and push the sliding gate manually to pre-determine the position. Fit the magnet bracket to the rack and then tighten the gear clutch. The lower bracket is for open position and higher bracket is for close position. Fix the magnet to the bracket. Finally adjust the magnet to the proper position by moving the gate with the motor. The magnet should be 10~15mm away from the magnetic limit switch. If it is too far away, the switch will fail to work. Adjust the position of the magnetic limit switch until the positions of the opening and closing meet the requirement.

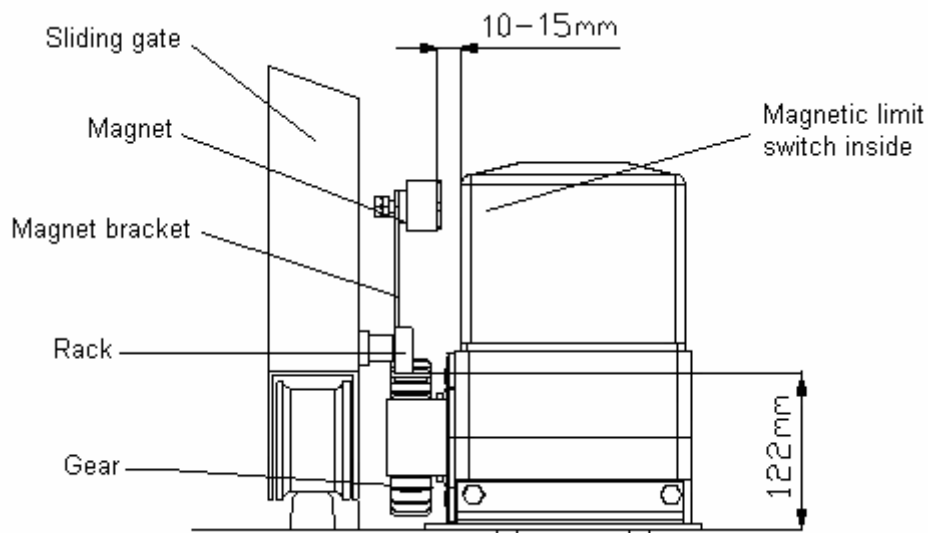


Fig.7

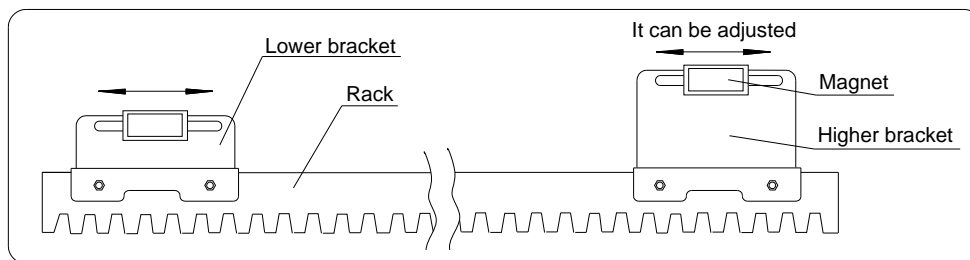


Fig.8

6. Electrical

Make sure that the power is OFF before making any electrical connections. Remove the cover of the control box, perform the wiring and replace the cover again. (Refer to Fig.9 control board scheme and wiring notes)

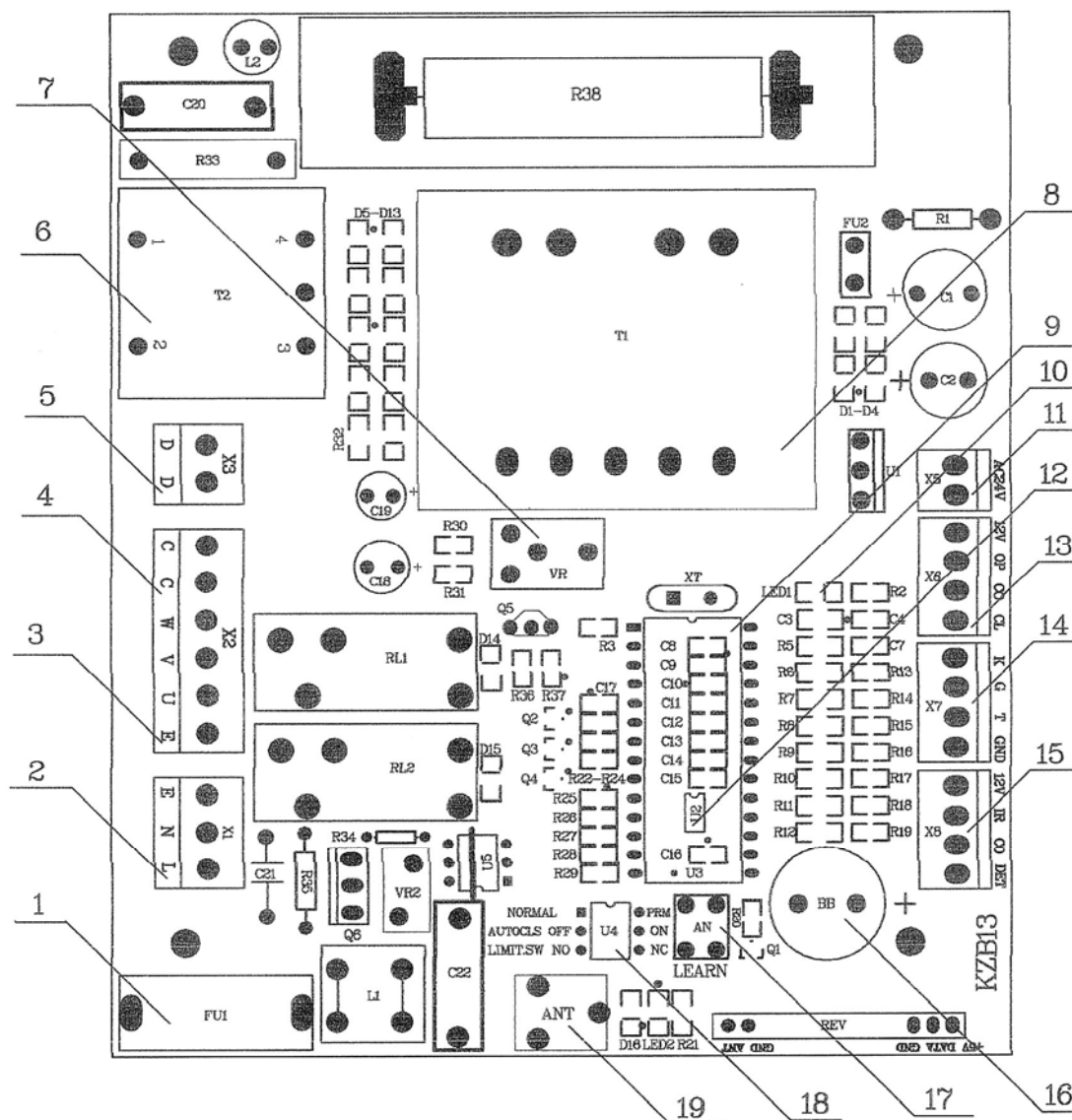
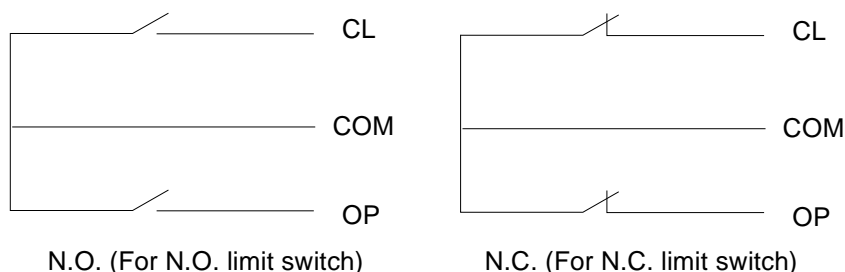


Fig.9 Control board scheme

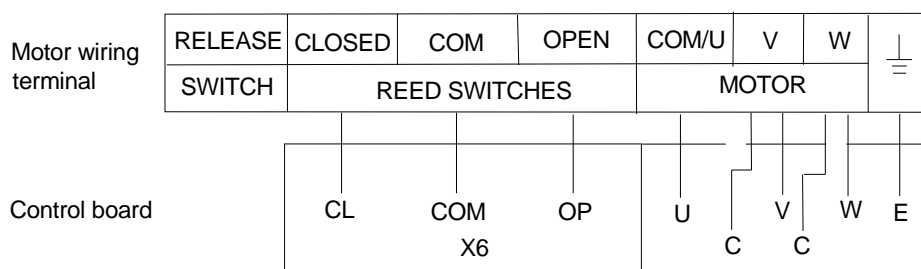
Wiring notes for control board

1. Fuse: 10A, Ø5x20
2. Power Input: E (Earth), L (Live), N (Neutral) AC110V
3. Motor: U (com), V (Positive direction), W (Opposite direction), E (grounding)
4. Capacitor: 14uF
5. Alarm lamp: AC110V
6. Sampling transformer: 220V/12V 1W
7. Force Adjustor (VR): Clockwise +, Counterclockwise –
8. Power Transformer: 110V/12VX12V
9. MCU: PIC 16C57C
10. Power indicator: LED
11. Output power supply: AC24V
12. Memory Card: 93C66
13. Limit switch: CL (Close limit), CO (Com), OP (Open limit), DC12V (Output power supply)



Limit switch mode is adjustable by DIP-switch. (See table 2)

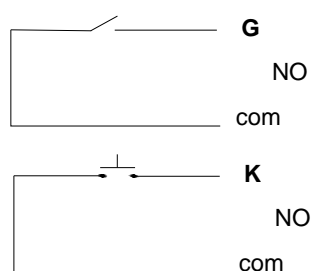
Schematic diagram



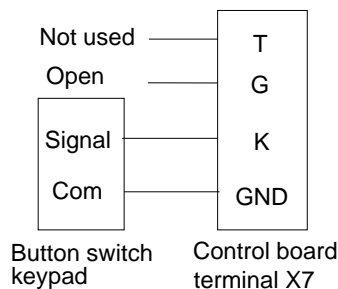
Wiring diagram

14. Single-button switch / Keypad (normally open, single-button mode): T (Not used), G (Open priority), K (Open/stop/close), GND (Common)

To install the keypad attach one lead of your keypad to 'K' of terminal X7 and the other to the 'GND'. The keypad will function in single channel mode.

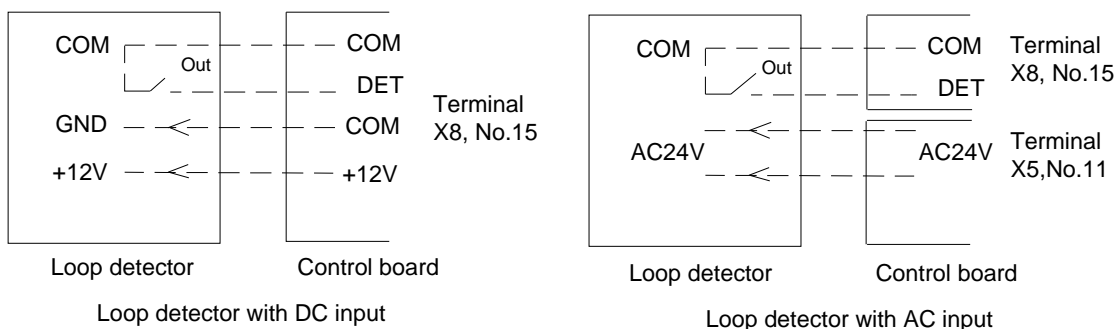
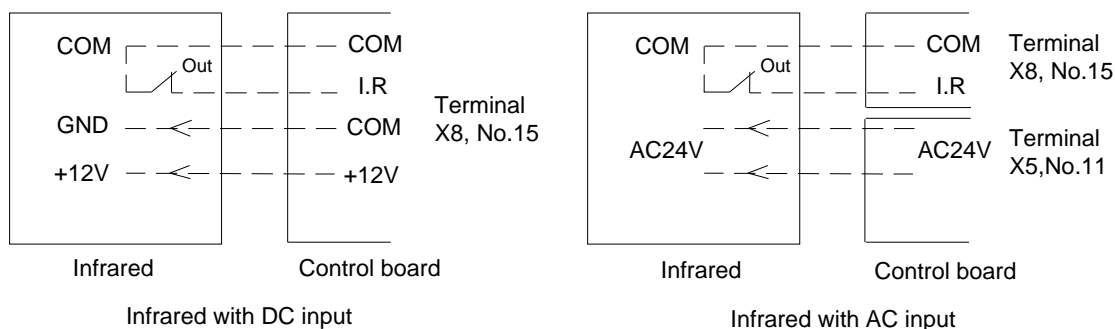


Schematic diagram



Wiring diagram

15. Output power supply: +12V (DC +12V), COM (CO), DET (Loop detector), I.R. (Infrared N.C)



Schematic diagram

- 16. Beeper: DC12V
- 17. Learn button: AN
- 18. Dip-switch
- 19. Antenna: ANT

7. Control

- Remote control: The remote control works in a single channel mode. It has four buttons. See Fig.10 Remote control. The function of button 1, button 2 and button3 are the same. With each press of the remote control button, which has been programmed, the gate will close, stop, open or stop cycle. Button 4 is available to set pedestrian mode. You can program/learn button 1, button 2, button 3 individually. You also can program/learn two buttons or three buttons together, but you need repeat the program/learn process if you want to use more than one button.

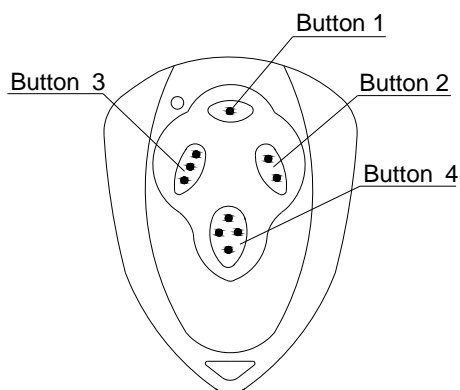


Fig.10 Remote control

- **Adding extra remote controls (Learn):** Press the button 'AN' (See Fig.9 terminal 17) on the control board, then the 'LED2' will be on and turn off, the beeper will ring about 1 second, then press the remote control button which you want to use, the 'LED2' will turn on and then turn off again, the beeper will ring about 2 seconds. The learning process is finished. Up to 100 remote controls may be used.
- **Erase remote controls:** To erase all existing remote controls, press and hold 'AN' button, the beeper will ring, release the button once the beeper stops ringing. This indicates that all the remote controls have been erased completely.
NOTE: For safety and security, we recommend that the factory setting be replaced with a personal code.
- Press the 'OPEN' button of external button switch or remote control button which has been programmed, the gate will open, the motor rotates clockwise, the output voltage between 'D' and 'D' is AC110V, the voltage between 'U' and 'V' is AC110V. Press 'STOP' button or the same remote control button, the gate stops running. Press 'CLOSE' button or the same remote control button again, the gate will close, the motor rotates anticlockwise, the output voltage between 'D' and 'D' is AC110V, the voltage between 'U' and 'W' is AC110V. Press the 'STOP' button or the same remote control button, the gate stops running.
- **Verify open direction:** If the gate does not move in the desired direction, then you will need to reverse the motor operating direction, you can do this by exchanging wires 'V' and 'W', 'OP' and 'CL'.

Table 2 DIP-switch
(See Fig.9 terminal 18)

Position	DIP-switch	Function
1	ON	Programming / In this position the control board is in programming condition, NOT USE condition.
	OFF	Normal / In this position the control board can be normally used.
2	ON	Auto-close function and auto-close function of pedestrian mode are available.
	OFF	Both Auto-close function and auto-close function of pedestrian mode are shut off.
3	ON	Limit switch mode is NC.
	OFF	Limit switch mode is NO.

- Set auto-close function (This feature can be selected to make the gate stay open for some seconds before it automatically closes. The auto-close time can be adjusted to between 0 and 44 seconds.): please turn on the first and the second DIP-switch (See Fig.9 terminal 18) to ON position. Press the remote control button (button 1, button 2 or button 3) that has been programmed to open the gate (see **Verify open direction** section). Stop the gate at any position by pressing the same button, wait for some seconds according to your requirements (the range is 1~44 sec.), this period of time is regarded as 'auto-close time'. Close the gate by pressing the same button. Press the button again to stop the gate or the gate will stop at its closed position automatically if the limit switch is reached. After this setup is complete, return DIP-switch 1 to OFF position immediately. Thus the auto-close function has been set.
 - Cancel auto-close function: please turn on the first and the second DIP-switch (see Fig.9 terminal 18) to ON position. Press the remote control button (button 1, button 2 or button 3) that has been programmed to open the gate (see **Verify open direction** section). Stop the gate at any position by pressing the same button, wait until the gate close automatically (45 sec.). Press the same button to stop the gate or the gate will stop at its closed position automatically if the limit switch is reached. After this setup is complete, return DIP-switch 1 to OFF position immediately. Thus the auto-close function has been cancelled.
 - Pedestrian mode: Pedestrian mode can be used to open gate about 0.3~1.5 meters for people pass through.
 - * Set width of pedestrian mode: Please turn on the first and the second DIP-switch (See Fig.9 terminal 18) to ON position. Press button 4 to open the gate (see **Verify open direction** section), Wait until the gate travels the distance according to your requirements (the distance range is 0.3m~1.5m or wait for 3~10 sec.), it is regarded as 'the width of pedestrian mode'. Then press the same button/button 4 to stop the gate, wait for some seconds (1~ 44 sec.). Close the gate by pressing the same button/button 4. Press the same button again to stop the gate or the gate will stop at its closed position automatically if the limit switch is reached. After this setup is complete, return DIP-switch 1 to OFF position immediately. Thus the **width of pedestrian mode** has been set.

If you open the gate with button 4, the gate will stop at the expected position that you have set.
 - * Set auto-close function of pedestrian mode: Please turn on the first and the second DIP-switch (See Fig.9 terminal 18) to ON position. Press button 4 to open the gate (see **Verify open direction** section), wait some seconds (3~10 sec.). Then press the same button/button 4 to stop the gate, wait some seconds according to your requirements (1~44 sec.), this period of time is regarded as 'auto-close time of pedestrian mode'. Close the gate by pressing the same button/button 4. Press the same button again to stop the gate or the gate will stop at its closed position automatically if the limit switch is reached. After this setup is complete, return DIP-switch 1 to OFF position immediately. Thus the **auto-close function of pedestrian mode** has been set.
- Note: the new width of pedestrian mode has been re-programmed in the device and replaced the original width you have set in **Set width of pedestrian mode** section.
- If you open the gate with button 4, the gate will stop at the new expected position that you have set, after some seconds as what you have set, the gate will close automatically.

- Cancel width / auto-close function of pedestrian mode

* Cancel both width and auto-close function of pedestrian mode: Please turn on the first and the second DIP-switch (See Fig.9 terminal 18) to ON position. Press button 4 to open the gate (see **Verify open direction** section). Wait for more than 15 sec.. Then press the same button/button 4 to stop the gate. Wait until the gate close automatically (45 sec.), press the same button/button 4 to stop the gate or the gate will stop at its closed position automatically if the limit switch is reached. After this setup is complete, return DIP-switch 1 to OFF position immediately. Thus the width and auto-close function of pedestrian mode have been cancelled.

* Cancel width of pedestrian mode, keep auto-close function of pedestrian mode: Please turn on the first and the second DIP-switch (See Fig.9 terminal 18) to ON position. Press button 4 to open the gate (see **Verify open direction** section). Wait for more than 15 sec.. Then press the same button/button 4 to stop the gate. Wait some seconds according to your requirements (1~44 sec.). Then press the same button/button 4 to close the gate, press the same button again to stop the gate or the gate will stop at its closed position automatically if the limit switch is reached. After this setup is complete, return DIP-switch 1 to OFF position immediately. Thus the width of pedestrian mode has been cancelled, the auto-close function of pedestrian mode has been reserved.

Note: the new auto-close time of pedestrian mode has been re-programmed in the device and replaced the original auto-close time of pedestrian mode that you have been set in **Set auto-close function of pedestrian mode** section.

* Keep width of pedestrian mode, cancel auto-close function of pedestrian mode: Please turn on the first and the second DIP-switch (See Fig.9 terminal 18) to ON position. Press button 4 to open the gate (see **Verify open direction** section). Wait some seconds (3~10 sec.), then press the same button/button 4 to stop the gate. Wait until the gate close automatically (45 sec.). Press the same button again to stop the gate or the gate will stop at its closed position automatically if the limit switch is reached. After this setup is complete, return DIP-switch 1 to OFF position immediately. Thus the width of pedestrian mode has been reserved, the auto-close function of pedestrian mode has been cancelled.

Note: the new width of pedestrian mode has been re-programmed in the device and replaced the original width.

If you open the gate with button 4, the gate will stop at the expected position that you have set, but the gate will not close automatically.

- Turn on the second DIP-switch to OFF position (Factory preset: OFF position), both auto close function and auto-close function of pedestrian mode were shut off.

Note:

- (1) You must follow the operating instruction as above, any wrong operation is not allowed during setting. If your device responds to your requested function correctly, you have set the function successfully, otherwise repeat the above setup instruction until your device responds to your expected function.
- (2) If you change any one setting, other settings will be changed.
- (3) If the gate can not be moved, please check whether the gate is obstructed.

Adjustment of the auto-reverse function: rotate the Force Adj. 'VR' knob (see Fig.9 terminal 7) with a screwdriver, the resistance may be increased or decreased by rotating clockwise or counterclockwise. Note: if the gate fails to reverse in the event of obstruction, then the opening force or closing force should be checked for conformity with requirements and adjusted accordingly. The gate will reverse if obstructed when closing, and will stop if jammed when opening.

If the auto-reverse direction is wrong, please exchange two wires 'V' and 'W'. Exchange wires 'OP' and 'CL' if the limit direction is wrong.

Activities Covered in this section

- **Remote control (Single-button mode):** With each press of the button, the gate will close, stop, open or stop cycle.
- **Single-button/keypad (not supply):** Single-button switch will function in single channel mode.
- **Auto-reverse function:** After adjusting the opening force and closing force, the gate will reverse and go open if obstructed when closing, and will stop if jammed when opening.
- **Auto-close function:** This feature can be selected to make the gate stay open for some seconds before it automatically closes. The auto-close time can be adjusted to between 0 and 44 seconds.
- **Pedestrian mode:** This feature can be used to open gate about 0.3~1.5 meters for people pass through.
- **Safe guard (Infrared photocell):** If infrared beam is interrupted during closing, the gate will reverse and go open immediately. This feature will not function if the gate is in fully opened and closed positions or during opening.
- **Open priority:** The gate will return to open if press 'OPEN' button of external button switch during closing.
- **Loop detector:** If loop detector detects vehicles during closing, the gate will reopen immediately and stay open until the vehicles move out of the loop. After vehicles move out of the loop, the gate will stop and then close after 10 seconds.
If loop detector detects vehicles when the gate stops, the gate will open immediately. After vehicles move out of the loop, the gate will stop and then close after 10 seconds.
- **Limit switch:** The switch is used to accurately stop the gate in the opened and closed positions.
If the gate stops at opened position when the limit switch is reached, the gate will not move if you press 'OPEN' button.
If the gate stops at closed position when the limit switch is reached, the gate will not move if you press 'CLOSE' button.
- Adjust the pressure screw to make the output torque of the operator meet your requirement, that is, the device should be powerful enough to move the gate and capable of making friction plate skidding when it is blocked.
- The motor is only designed to work for less than 5 minutes. If it runs continually for an extended period of time, a thermal protector will stop it because of the high temperature.

8. Maintenance:

Please check and add transformer oil (DB25-GB2536) regularly, you may change the oil according the weather. If the temperature is lower than -20°C , you can select #45 oil.

Table 3 Parameters of DB25 transformer oil

Kinematic viscosity (20°C)	Break down voltage	Solidification point
≤ 30 Centistoke	≥ 35 kV	$\leq -25^{\circ}\text{C}$

Ensure the operator is well earthed, and correctly terminated.

Regularly grease the wheels and axles to ensure the gate moves smoothly.

Ensure the power is switched off before removing the cover.

Keep operator clean at all times.

9. Troubleshooting

Table 4

Trouble	Possible causes	Solutions
Motor only runs in one direction.	The wire connector terminal block becomes loose.	Check wire connector terminal block.
	The limit switch wire connector terminal block becomes loose.	Check limit switch wire connector terminal block. Check the limit switch mode.
By pressing button 1(button 2 or button 3) which has been programmed to open the gate, press the same button again to stop the gate in required position, but the gate will auto-close immediately.	The auto-close time is too short.	Reset the auto-close time. See Set auto-close function section.
When you use button 4 of remote control to open the gate, gate travels too short.	The width of pedestrian mode is too narrow.	Reset the width of pedestrian mode. See Set width of pedestrian mode section.
When you use button 4 of remote control to open the gate, but the gate will auto-close immediately.	The auto-close time of pedestrian mode is too short.	Reset the auto-close time of pedestrian. See Set auto-close function of pedestrian mode section.
The gate will not open or close.	The limit switch wire connector terminal block becomes loose.	Check the limit switch mode (see table 2 DIP-switch).
	Connecting wires or terminal blocks are too loose.	Check the connecting wires and terminal blocks.
	The electric component on the control board such as Q6 may be damaged.	Replace the electric component Q6 or replace the board.
	Power switch is OFF	Make sure power switch is ON.
Remote control does not work	The indicator light of remote control does not light.	Check the batteries on your remote control
	Remote control is not suitable for receiver.	After making sure the codes are correct, erase remote controls and then re-program the codes in the device. See Adding extra remote controls (learning) section.
	Broken receive board	Replace receive board.
When you open the gate by using button 1(button 2 or button 3) which has been programmed, gate will stop in mid-travel or reverse before reaching the fully limit position.	The Force Adj. (VR) is adjusted too small.	Check the Force Adj. (VR). Adjust VR to increase force.
	Gate is obstructed.	Remove the obstruction.
The remote control operating distance is too short.	Signals are shielded by the gate.	Link a new antenna (1~1.2m BVR 0.75mm ²) to the old antenna. Then fix the antenna on the wall vertically, make sure the total height from the top of antenna to the ground is approx. 1.5m.