



User Manual

FERN360 Barrier Arm FGES-VBxxx-T

Automatic Lane Barriers



Contents

1.	T Series Automatic Barrier Structure, Functions & Specifications	2
1.1	Structure	2
1.2	Functions	3
1.3	Technical Data	4
2.	Installation Guide	5
2.1	Requirements	5
2.2	Barrier Installation	7
2.2.1	Housing Unit Installation	7
2.3	Arm Installation	8
2.3.1	KB4 Arm Installation Guide	8
2.3.2	KB5 Arm Installation Guide	9
2.3.3	KB7 Arm Installation Guide	9
2.3.4	ZKB13 Arm Installation Guide	10
2.3.5	KB13 Arm Installation Guide	10
2.3.6	Barrier Cover	11
2.4	Electrical Installation	11
2.5	Arm Direction	13
2.5.1	Switching Sides	13
2.6	Safety Precautions	16
3.	Barrier Maintenance	16
3.1	Scheduled Maintenance	16
3.2	Maintenance Methods	16
3.2.1	Buffer Pad Replacement	16
3.2.2	Mechanical Inspection	17
3.2.3	Sensor Inspection	17
3.2.4	Balancing Spring Adjustment	18
4.	Cautions	18

Thank you for selecting our T-Series Automatic Lane Barrier (ALB). Using our cutting-edge control systems, we bring to you a flagship model specifically designed for manual toll lane and carparks. This manual provides the technical specification and detailed maintenance procedure for the ALB.

1. T Series Automatic Barrier Structure, Functions & Specifications

1.1 Structure

T Series Automatic Lane Barrier comprises of 5 main components: Barrier Cover, Housing Unit, Motor Assembly, Control System and Barrier Arm (Fig.1).

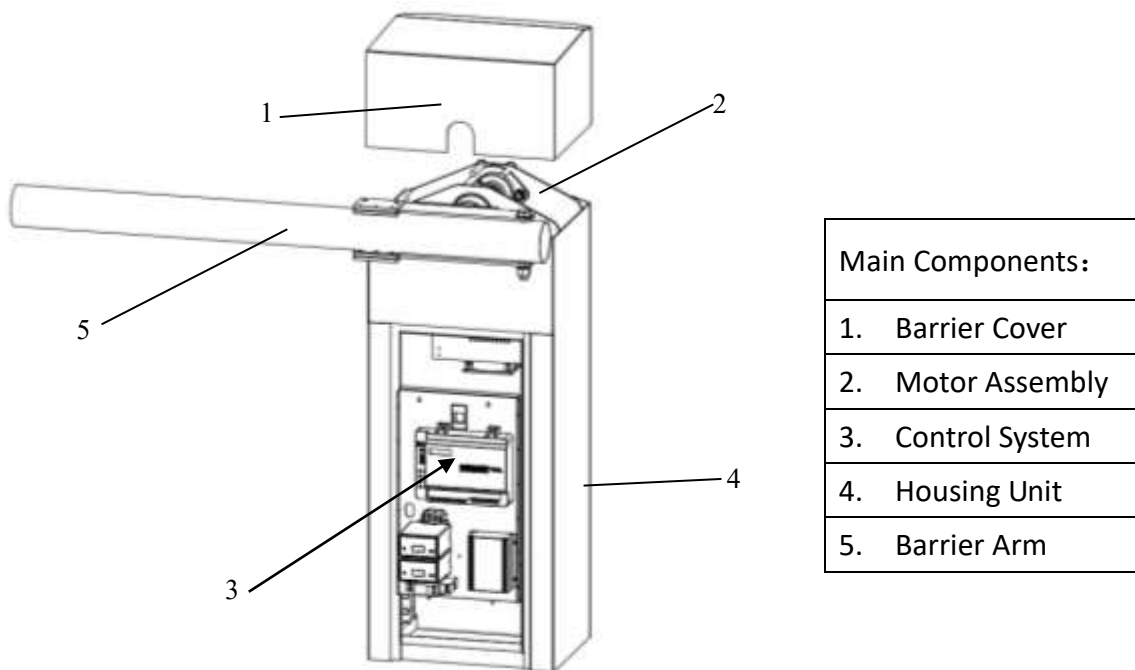


Fig.1 Main Components

- **Barrier Cover:** Water Proof Designed, the cover can be removed via key to allow better accessibility for any installation or maintenance.
- **Motor Assembly:** Driven by high performance Torque motor, the assembly boasts its stability and reliability through a superior balancing spring and output shaft.
- **Control System:** Controlled by an intelligent system on chip, the terminals are mounted on the control panel and snap-fitted onto the chassis for easy access. It is also easily detachable for external wired connections.

- **Housing Unit:** Spray painted with a beautiful finish, the color can be changed to customer preference. The housing is treated for anti-corrosion.
- **Barrier Arm:** This model can be fitted with different barrier arms such as the KB4 (cylinder aluminum arm), KB5 (Octagonal Aluminum arm), ZKB5 (Octagonal Folding arm) and KB7 (Anti-Smashing arm). Customers have the options of choosing their desired length to meet their operation requirements.

1.2 Functions

- **High Speed:** Barrier arm features high speed capability in raising and lowering its arm.
- **Anti-Collision:** During the lowering of its arm (within 15° to full horizontal position), if the coil detects a vehicle, the arm will reset to its vertical position immediately, avoiding any collision and damage to the arm and vehicle.
- **Anti-Smashing:** Arm is fitted to the body via plastic chuck and swivel (not available to certain type of arms), if any collision occurs, arm will dislodge itself from the chuck and swivel away to prevent smashing into the vehicle.
- **Auto-reset:** During electrical failure, the arm will be reset to its selected positions (can be set to either raised or lowered) so that during a power outage, it would not cause any damage to the arm or vehicles.

1.3 TechnicalData

Model/ Technical Data	T9	T14	T20	T25	T30	T35
Maximum Arm Length	KB4/4M	KB4/4.5M	KB4/5.5M	KB4/5.5M	KB4/6.0M	KB4/6.0M
	KB5/4M	KB5/4.5M	KB5/5.5M	KB5/5.5M	KB5/6.0M	KB5/6.0M
Rising and Lowering Time	< 0.9S	< 1.4S	< 2.0S	< 2.5S	< 3.0S	< 3.5S
Power	< 150W	< 120W	< 120W	< 120W	< 70W	< 70W
Voltage	AC220~240V±15%					
Frequency	50~60Hz					
Dimension	W	356mm				
	L	295mm				
	H	996mm				
Weight (Not including Arm)	55KG					
Motor	AC Powered Torque Motor					
MTBF (Mean time between failure)	5 Million					

2. Installation Guide

2.1 Requirements

Foundation Selection and Construction

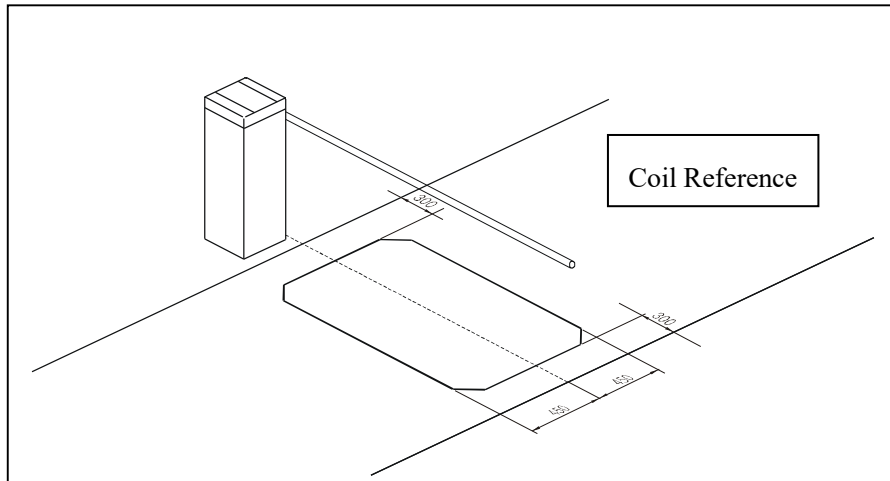


Fig. 2 Coil Placement Reference

- **Coil Requirement:** Recommended to use 2m×2m coil. Its central axis should be directly beneath the Barrier Arm (fig.2) .
- **Selecting a suitable foundation:** Foundation is required to be built 300mm away from the curb, there must be clearance for the arm to swing 90° upwards and away from the oncoming vehicles. (fig.3)

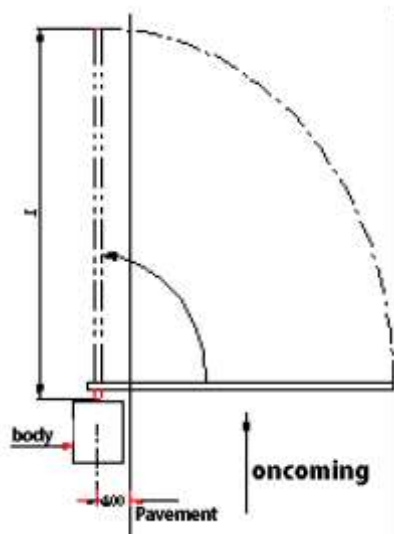


Fig. 3

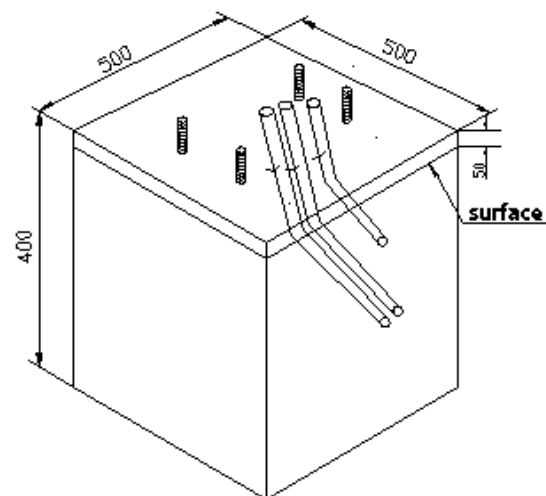


Fig. 4 – Foundation Diagram

- Foundation diameters: 400mm (depth) ×500mm (length) ×500mm (width)
- Foot and Expansion Bolt: (Fig.5)
- To be installed 50mm from foundation; 100mm of bolt thread is required to be exposed.

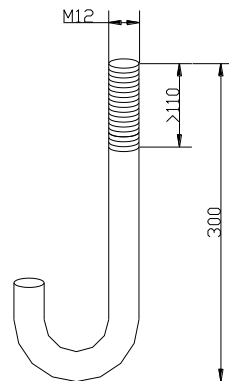


Fig. 5

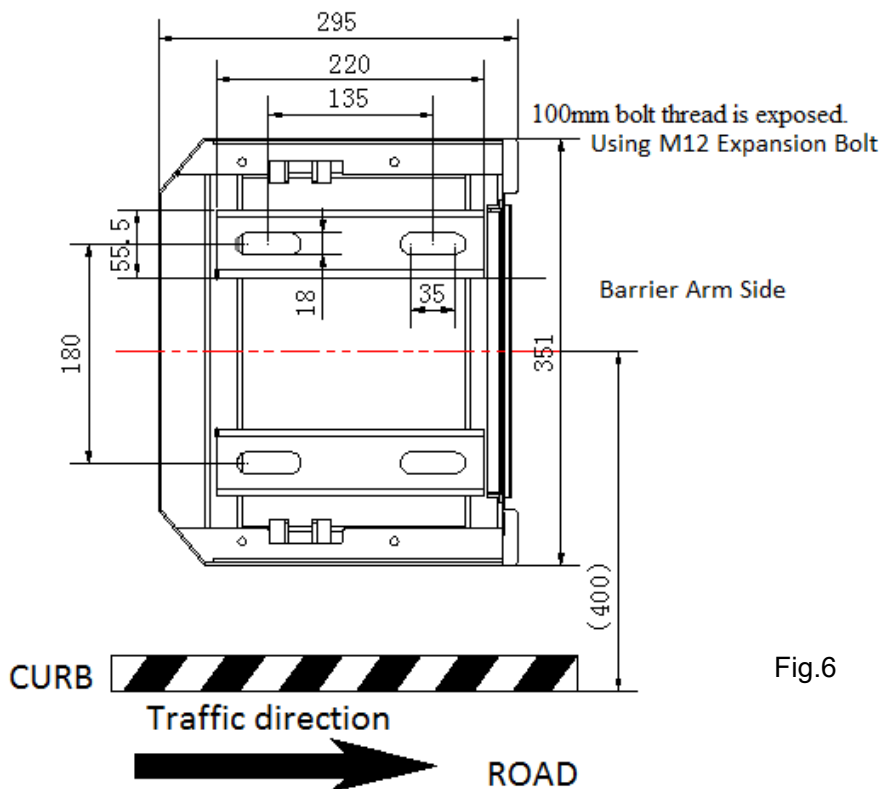


Fig.6

- Foot and expansion bolt are provided with the machine if they are not readily available or no embedded bolts are present on site.
- Foot and expansion bolt should be installed in accordance with (Fig. 6)
- Expansion bolt: M12, 80mm thread, 150mm in length.

- Note: Drilling diameter $\Phi 16\text{mm}$. Drilling can only be done after cement has settled in.
- Cable conduit: Foundation should be embedded with 3 units of 1 inch PVC piping. One pipe specifically for the coil wire, to be guided to the roadside, 50mm below ground. Other two pipes should carry power cables and control wires respectively, leading out to the roadside through cable holes.
- Foundation cement are required to be of grade C15 and above.
- There should not be any obstruction for the arm to be able to fully swing at 90° .

2.2 Barrier Installation

- **User is required to read the manual, fully comprehend the circuitry as well as functions before installation.**
- **Wiring checks: Make sure all wiring are not loose, dangling or damaged within the machine before operation.**

2.2.1 Housing Unit Installation

- Remove all items after unboxing.
- Place housing unit onto foundation, the arm should be in the right position to block oncoming vehicles. Please take note on the arm being perpendicular to the toll lane as well.
- A 3mm thick rubber mat is recommended to be placed between the bottom of the machine and the foundation to increase stability and lessen vibrations for smooth operation.
- Open the housing unit's door using keys provided, lower down the control for a better working space. Place locking bars in position, adjust the vertical levelling of the unit to the ground and tighten nuts into the bolts by using suitable tools to lock the body firmly onto the ground.
- **Best result can be obtained by locking the body firmly so that any vibration and movements from the motors can be reduced. Stability and good foundations will allow the machine to be in optimal operation.**

CAUTIONS:

- * During installation, electricity must be isolated from the machine.
- * Handle machine with care. Prevent scratching the body and damaging the paint.
- * Where aesthetics are concerned, it is best to level the arm with the ground, placing it parallel to the oncoming vehicles and lane.

2.3 Arm Installation

2.3.1 KB4 Arm Installation Guide

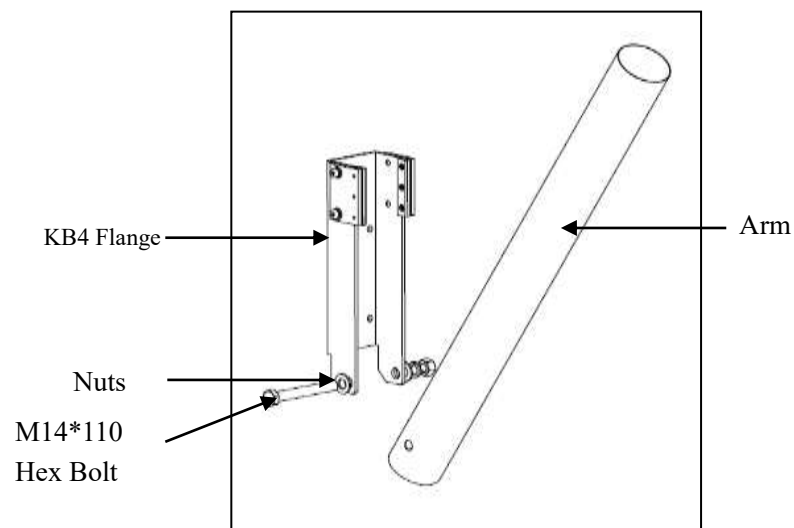


Fig.7-1 Arm Installation

Installation steps: (Fig.7-2, 7-3)

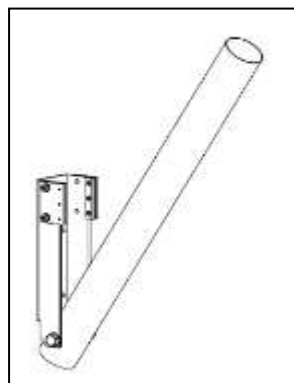


Fig.7-2 Step 1

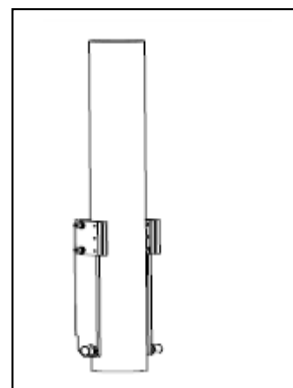


Fig.7-3 Step 2

- Remove arm from packaging.
- Insert the arm diagonally into the flange, aligning to the holes.
- The logo and warning sign should face the oncoming vehicles.
- Insert an M14×110 hexagon bolt through the holes and tighten the bolt with the hexagon nut along with a spring and flat washer.
- Push arm into flange to secure and straighten it.

2.3.2 KB5Arm Installation Guide

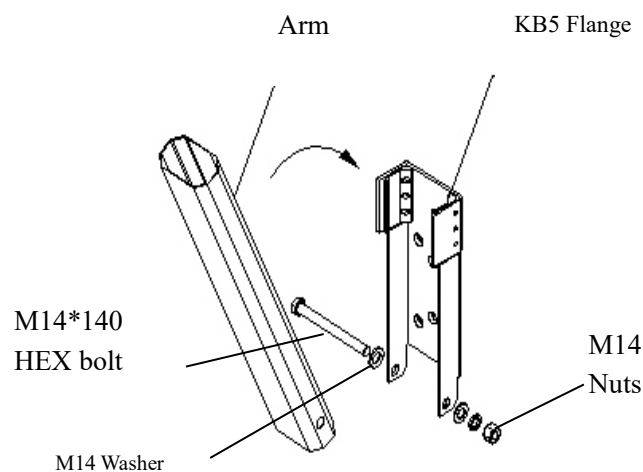


Fig.8 KB5 Installation

2.3.3 KB7Arm Installation Guide

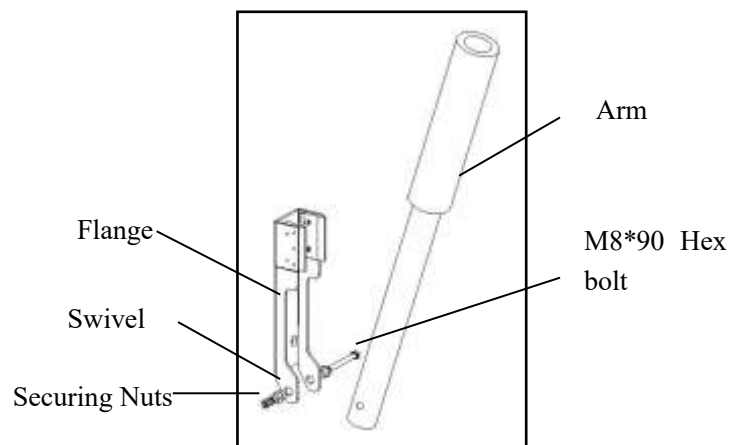


Fig.9 KB7 Installation

2.3.4 ZKB13Arm Installation Guide

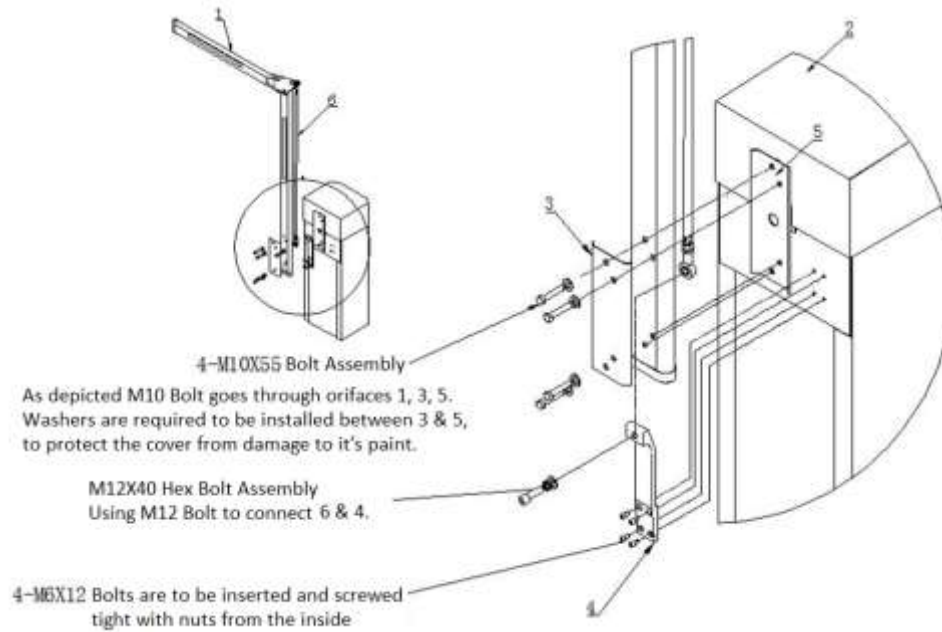


Fig.10 ZKB13 Installation

2.3.5 KB13Arm Installation Guide

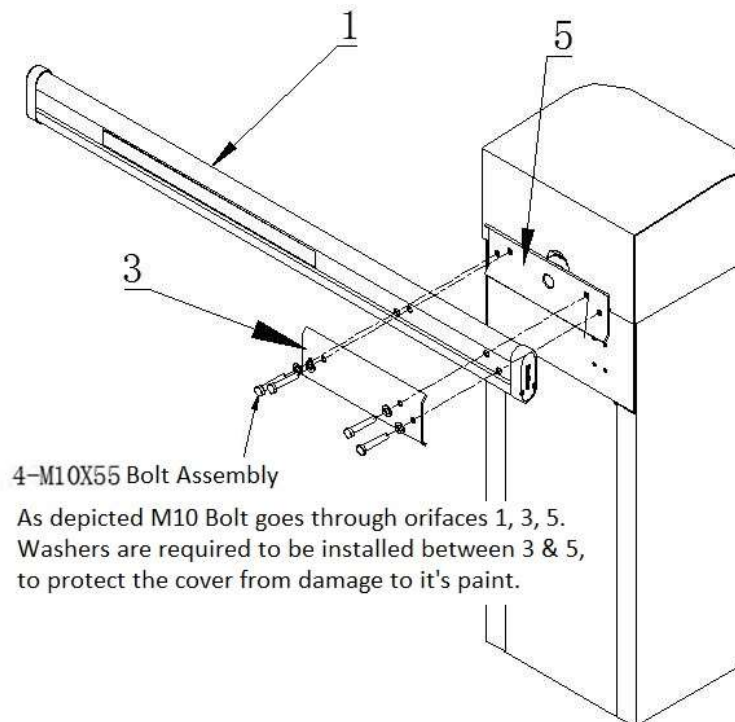


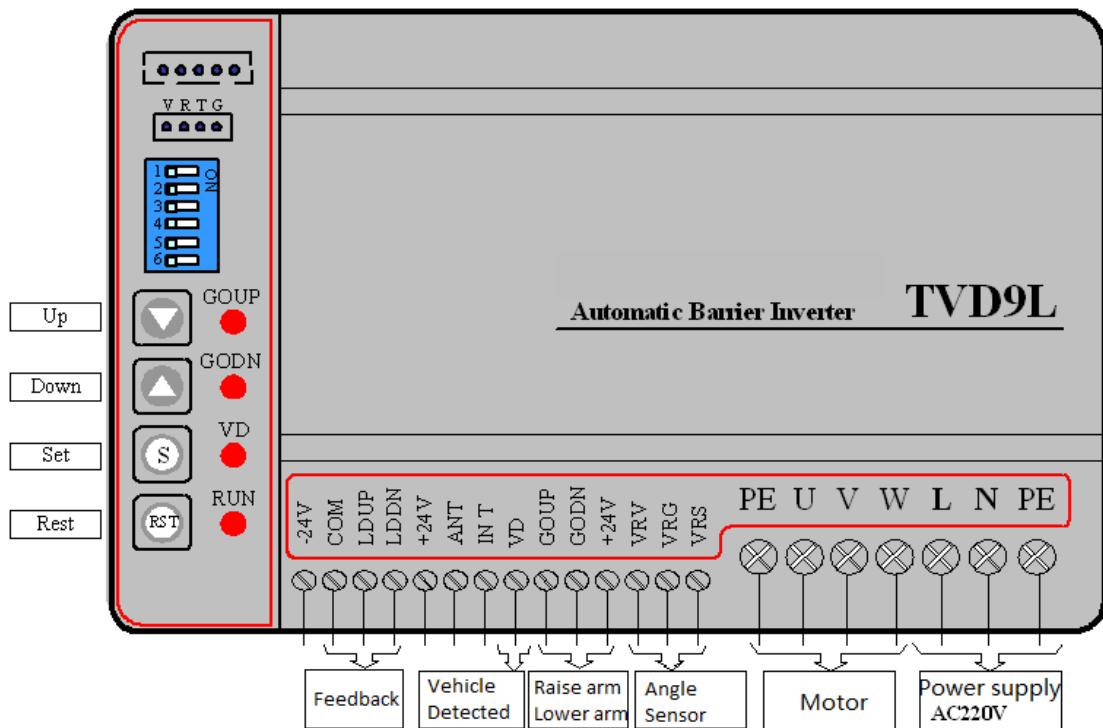
Fig.11 KB13 Installation

2.3.6 Barrier Cover

- Raise the arm to the vertical position
- Use the key supplied to unlock the cover.
- Push forward and lift up the cover to entirely remove it.

2.4 Electrical Installation

TVD9L Automatic Barrier Inverter, frequency controller (Fig.12), is the heart and soul of our integrated T-series barrier. Newly developed, it incorporated many unprecedented features, delivering precision and stable control. TVD9L is the main force that drives this powerful machine. With the option to choose a machine that comes with remote capability, this add-on will allow long distance wireless control. In addition, the device can be hooked up with a network module extension, giving it the ability to be controlled thru wireless networking.



DIP switch controls 1-6:

- Numbers 1, 2 :Arm control mode:

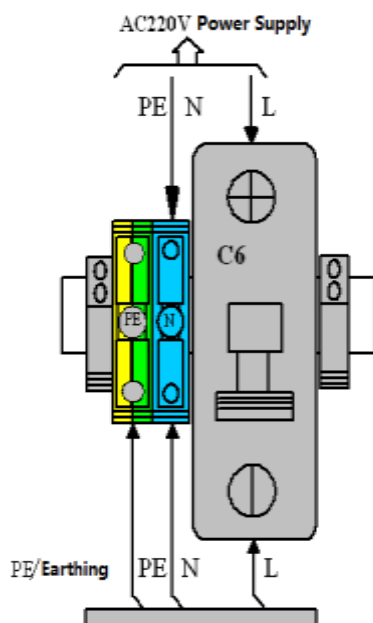
1	2	ARM CONTROL
OFF	OFF	Double signal controls arm.
OFF	ON	Double signal controls arm, Car leaves coil lowers arm.
ON	OFF	Lowering signal controls arm, lowering signal not detected raises arm.
ON	ON	Raising signal controls arms, raising signal not detected raises arm.
Number 3		Vehicle
ON		Present
OFF		Absent

- Numbers 4, 5, 6: Default OFF.

Push Buttons, LED:

UP	Raises Arm	GOUP	ON during raising
DOWN	Lowers Arm	GODN	ON during lowering
RES	Reset TVD9L	VD	On when Anti-smash selected. Vice versa.

- SET: Remote Signal acknowledgment: Quick depress (0.3s), Wait for RUN light to stop blinking, promptly key in UP, DOWN, UP, DOWN on the remote to lock in.
Long depress (10s) on the SET button will forget the current remote control.



INPUT:

- Power Supply: AC 220V should be connected to the circuit breakers as shown on the figure (fig. 13), then connected to the terminal on the control board.
- Control Signal: Connecting a wire from the +24V Terminal on the control board to either GOUP terminal and GODN terminal to representatively Raise and Lower the

arm.

- External Vehicle Signal (also suitable for using external V.L.D.): Similarly using the 24V+ terminal, it can be used to trigger VD terminal to simulate the automated lowering system and anti-smash control.

OUTPUT:

- Barrier Status Feedback (I/O output signal):

Terminal COM gives a constant feedback signal, terminal LDDN will give a feedback signal when arm is lowered, whereas LDUP will give a feedback signal when arm is raised. When arm is lowered, LDDN and COM will be connected, LDUP and COM will be disconnected. When arm is raised, LDUP and COM will be connected, LDDN and COM will be disconnected.

- Barrier Status Feedback (Active signal):

Connect Terminal COM with a Terminal +24V. Terminals LDUP, LDDP and -24V will output a voltage feedback. When arm is lowered, LDDP and -24V will give a feedback. When arms are raised, LDUP and -24V will give a feedback.

(If this voltage feedback signal is used to drive external relays, current should not exceed 30mA)

2.5 Arm Direction

This Lane barrier supports ambidextrous capabilities. The arm can be switched to two different directions.

2.5.1 Switching Sides

1. Remove barrier cover and open housing unit door. Inside the housing, you will find a balancing spring and the arm should be placed in raised mode (vertical). Please release tension on the spring to its most relaxed state. To do so, you can turn the spring **CLOCKWISE**, to release its tension. After which, please remove the spring by removing the spring locking pin.

2. Remove two of the INNER M10 HEX screws. Remove the swing and its balancing spring. Reinstall to the desired direction. Remove two of the INNER M10 HEX screws. Remove the ARM and its spring. Reinstall to the desired direction by replacing the swing and M10 HEX screws, but do not tighten yet, then reinstall the spring, replace the arm to the other side of the same mounting holes. Tighten screws afterwards. (To face the arm to the left, swing and balancing spring is mounted on the right side of the chassis body. To face the arm to the Right side, swing and balancing spring is mounted on the left side of the chassis body.)

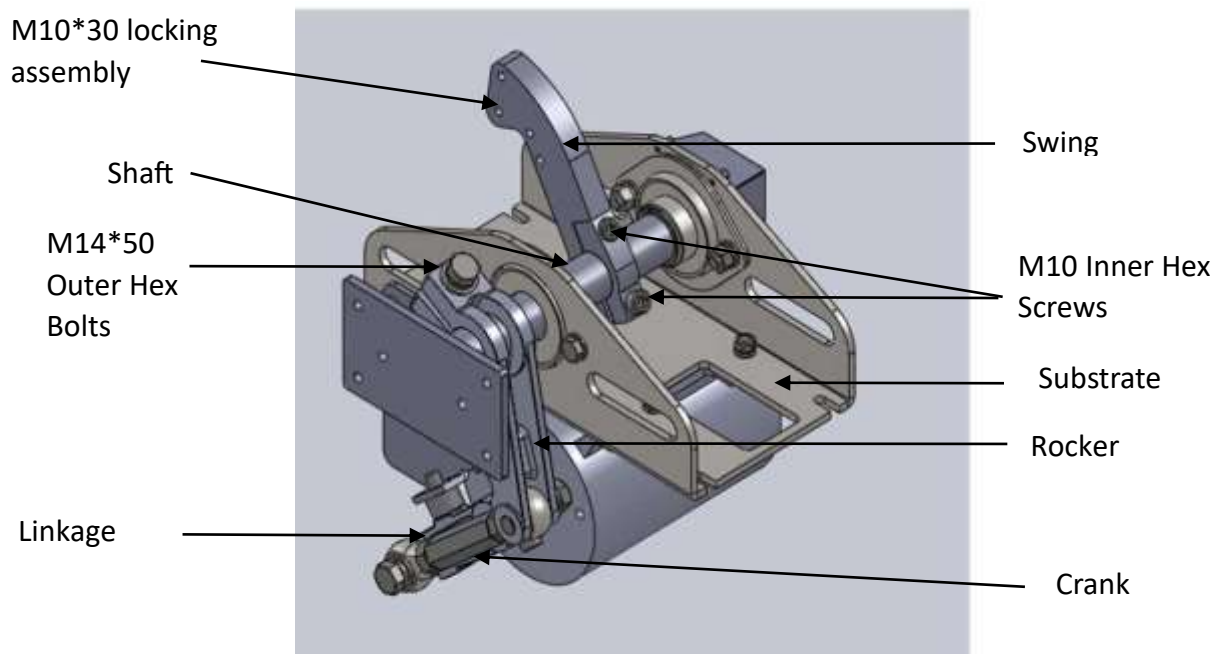


Fig.14 Mechanical parts breakdown

3. Loosen M14*50 Hex bolts on the Rocker.
4. Adjusting the Shaft position:
 - Right to left: The crank and linkage is in a stretched state, adjust the swing, turning the arm plate to a horizontal position and tighten the M14*50 Hex screw. The crank and linkage is in a folded state, adjust it by moving the swing and turning the arm plate into the vertical position. (Fig 15)
 - Left to right: The crank and linkage is in a folded state, adjust the

swing, turning the arm plate to a horizontal position and tighten the M14*50 Hex screw; The crank and linkage is in a stretched state, adjust it by moving the swing and turning the arm plate into the vertical position. (Fig 16)

Note: when locking the shaft, one should keep the crank, connecting rod, rocker in the same line, so that there will be no misaligning, which will cause the machine to work abnormally.

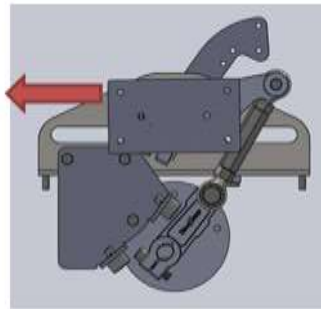


Fig.15--1 right to left

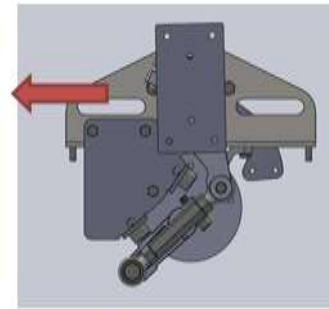


Fig.15--2 right to left vertical

(The arrows in the figure indicate the direction of the arm)

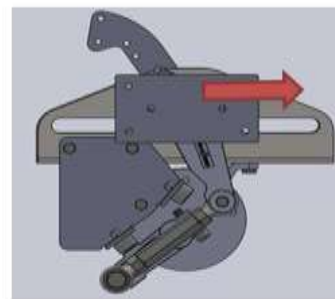


Fig.16-1 left to right

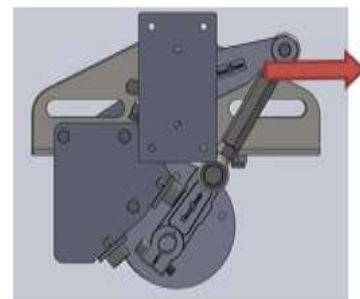


Fig.16-2 left to right vertical

5. Securing the swing: When the arm is in the raised state (vertical), the swing should be in its lowest state, there should be a 1cm gap between the swing's hex bolts and the substrate.
6. Adjusting position of balancing spring: After setting the shaft into position, there is a need to set to the balancing spring. In cases where the balancing torque cannot be measured accurately, it can be easily adjusted so that the spring will pull the arm into a vertical position (see 3.2.4 Balancing Spring Adjustment).

7. Reinstall Barrier cover and lock the housing unit door to complete the process.

2.6 Safety Precautions

- Because the system uses high voltage up to 220-240V, non-qualified personnel are advised to refrain from maintaining or working on the equipment.
- All electrical power should be cut and equipment to be isolated during maintaining and installation.
- Any metallic objects should not be placed within the area of 500mm by 500mm loop coil; else the V.L.D will not be accurate.
- V.L.D loop coil wires leading out from the ground should not be too long or coiled.
- Twisting of the Coil can only be allowed every 10 cm.

3 Barrier Maintenance

3.1 Scheduled Maintenance

The barrier should be maintained every 3 months. The followings are to be performed:

- Rubber buffer inspection
- Mechanical drive inspection
- Noise inspection while machine is in operation
- Cable connection and earthing inspection.
- Machine housing check – to look for any loosen connection/part

3.2 Maintenance Methods

3.2.1 Buffer Pad Replacement

The buffer pad is subjected to wear and tear after prolong usage of the barrier. Therefore, it is important to change the rubber buffer once it is damaged. This will prevent shortening the life span of the barrier.

Changing Procedures:

- Switch off the barrier's power supply.
- Open the housing door and lower the control board.
- Remove the cover.
- Remove the damaged rubber buffer. Insert a new rubber buffer before fixing it into position.

Note: When changing the rubber buffer, do not insert or remove the rubber buffer ring. After changing the rubber buffer and replacing the cap, it is advised to manually test the barrier's operation by moving the arm up and down. Resume power supply only after smooth movement of the arm is confirmed.

3.2.2 Mechanical Inspection

- **Inspect and check if any loosen moving parts are disrupting the machine drive.**
If found, adjust the part back to its original position.
- **Inspect whether any abnormal sound can be heard while the machine is running.**
If there is any noise, please kindly contact the company.

3.2.3 Sensor Inspection

The angle sensor and the crankshaft are connected to synchronously detect the position and speed of the arm in real time. During the course of operation, if there is obvious jittering whilst the arm is moving, there will be a need to check the angle sensor.

Angle sensor inspection method:

Turn off the barrier and isolate the machine. Remove contacts of terminals, VRV, VRG, and VRS. Using an electrical multimeter, switch to the Ohmmeter and measure across VRV and VRG. Slowly move the arm from raised position to lowered position. The resistance measured by the ohmmeter should transit between $5K\Omega \pm 2\% \sim 7.4K\Omega \pm 2\%$. Raising the arm will lower the resistance, while lowering the arm it will raise the resistance.

There should be no jittering when the arm is moving, if there is; please readjust the resistance using the method above to fix the problem.

3.2.4 Balancing Spring Adjustment

When changing to a different barrier arm, adjust the tension spring to adapt the machine to its new arm, the new adjustments should leave the barrier arm at an angle of about 5 ° when measured against the horizontal plane (Fig.17). Release the barrier arm, it must be able to lift itself back to the raised position (vertical).

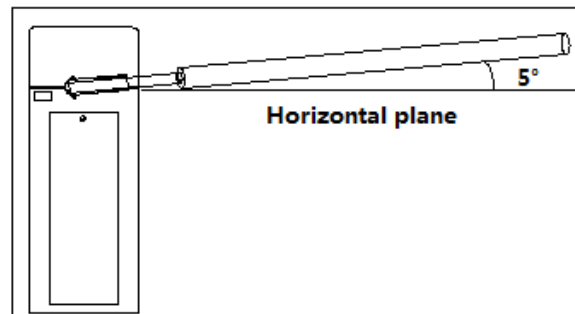


Fig.17

4. Cautions

Checksto perform in the event of boom arm smashinginto objects/vehicles:

- Flange: Please replace if found damaged.
- Integrity of the arm (whether it is bent after smashing)
- Any noises that can be heard during operation after the smashing, if so, please contact supplier.

We encourage users to refrain from using non-factory approved barrier arms to ensure the integrity and lifespan of the machine. Any aberrant damages and mechanical failures will not be covered under the warranty.

Product specifications subject to change without prior notice in order to accommodate the rights of the latest technological developments. FERN360 will be happy to provide any information of the existing operating manuals and any relevant changes or expansions.