



COMFORT AND SECURITY



DZ RIO

Technical Manual

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1 - GATE OPERATOR CLASSIFICATIONS

All gate operators can be divided into one of four classes depending on their design and usage. Install this gate operator only when the operator is appropriate for the construction and usage class as defined below:

Class I Residential Vehicular Gate Operator

A vehicular gate operator intended for use in a home or for one to four single family dwellings with a common garage or parking area associated with these dwellings.

Class II Commercial / General Access Vehicular Gate Operator

A vehicular gate operator intended for use in a commercial location or building such as a multi-family housing unit of five or more single family units, hotel, retail store or other building servicing the general public.

Class III Industrial / Limited Access Vehicular Gate Operator

A vehicular gate operator intended for use in an industrial location or building such as a factory or loading dock area or other location not intended to service the general public.

Class IV Restricted Access Vehicular Gate Operator

A vehicular gate operator intended for use in a guarded industrial location or building such as an airport security area or other restricted access locations not servicing the general public, in which unauthorized access is prevented via supervision by security personnel.

2 - SAFETY ACCESSORY SELECTION

All UL325 PPA compliant gate operators will accept external entrapment protection devices to protect people from motorized gate systems. UL325 requires that the type of entrapment protection correctly matches each gate application. This equipment must be installed with at least two entrapment protection means. Below are the types of entrapment protection systems recognized by UL325 for use on this operator.

3 - ENTRAPMENT PROTECTION TYPES

Type A:

Inherent obstruction sensing system, self-contained within the operator. This system must sense and initiate the reverse of the gate within two seconds of contact with a solid object.

Type B1:

Connections provided for a non-contact device, such as a photoelectric eye can be used as a secondary protection.

NOTE: UL requires that all installations must have warning signs placed in plain view on both sides of the gate to warn pedestrians of the danger of motorized gate systems.

Approved Non-contact Devices (Type B1)

The following non-contact obstruction detection devices have been approved for use with this slide gate operator (or barrier gate operator) as part of a UL325 compliant installation:

Edge Miller 4-wire pulsed (monitored) devices.

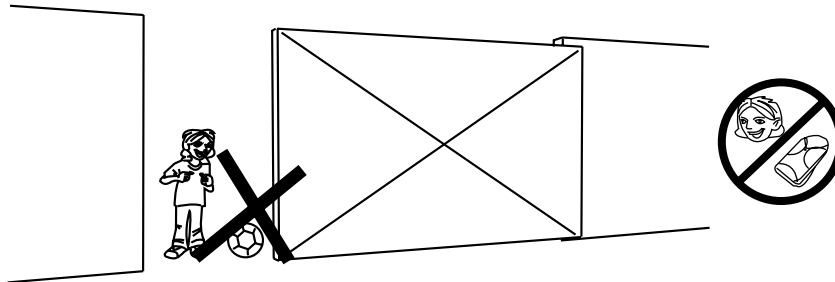
4 - IMPORTANT SAFETY INSTRUCTIONS

! WARNING

This equipment is to be installed and serviced by a professional gate operator technician only. It is important that the specialized installer follow all instructions given in this manual.

To Reduce the Risk of Severe Injury or Death:

1. READ AND FOLLOW ALL INSTRUCTIONS
2. Never let children operate or play with door controls. Keep the remote control away from children.



3. Always keep people and objects away from the gate. NO ONE SHOULD CROSS THE PATH OF THE MOVING GATE.
4. Test the gate operator monthly. The gate MUST reverse on contact with a rigid object or stop when an object activates the non-contact sensors. After adjusting the force or the limit of travel, retest the gate operator. Failure to adjust and retest the gate operator properly can increase the risk of injury or death.
5. Use the emergency release only when the gate is not moving.
6. KEEP GATES PROPERLY MAINTAINED. Read the owner's manual. Have a qualified service person make repairs to gate hardware.
7. The entrance is for vehicles only. Pedestrians must use separate entrance.
8. SAVE THESE INSTRUCTIONS.

4.1 – Safety Installation Information

1. Install the gate operator only when:
 - a) The operator is appropriate for the construction and the usage class of the gate.
 - b) All openings of a horizontal slide gate are guarded or screened from the bottom of the gate to a minimum of 6' (1.83 m) above the ground to prevent a 2 1/4" (6cm) diameter sphere from passing through the openings anywhere in the gate, and in that portion of the adjacent fence that the gate covers in the open position.
 - c) All exposed pinch points are eliminated or guarded, and guarding is supplied for exposed rollers
2. The operator is intended for installation only on gates used for vehicles. Pedestrians must be supplied with a separate access opening. The pedestrian access opening shall be designed to promote pedestrian usage. Locate the gate such that persons will not come in contact with the vehicular gate during the entire path of travel of the vehicular gate.
3. The gate must be installed in a location so that enough clearance is supplied between the gate and adjacent structures when opening and closing to reduce the risk of entrapment. Swinging gates shall not be open into public access areas.
4. The gate must be properly installed and work freely in both directions prior to the installation of the gate operator
5. Controls intended for user activation must be located at least six feet (6') away from any moving part of the gate and where the user is prevented from reaching over, under, around or through the gate to operate the controls. Outdoor or easily accessible controls shall have a security feature to prevent unauthorized use.
6. The Reset switch must be located in the line-of-sight of the gate. Activation of the reset control shall not cause the operator to start.

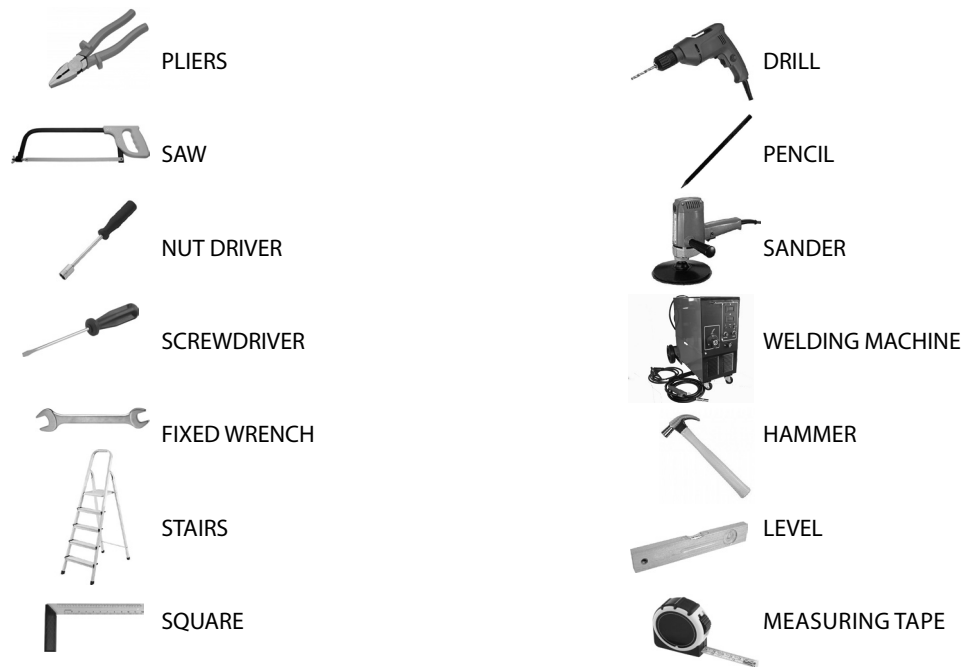
7. A minimum of two (2) WARNING SIGNS shall be installed, one on each side of the gate where easily visible.
8. For a gate operator utilizing a non-contact sensor:
 - a) Reference the owner's manual regarding placement of non-contact sensor for each type of application.
 - b) Care shall be exercised to reduce the risk of nuisance tripping, such as when a vehicle trips the sensor while the gate is still moving.
 - c) One or more non-contact sensors shall be located where the risk of entrapment or obstruction exists, such as the perimeter reachable by a moving gate or barrier.
9. For a gate operator utilizing a contact sensor such as an edge sensor:
 - a) One or more contact sensors shall be located where the risk of entrapment or obstruction exists, such as the leading edge, trailing edge and post mounted both inside and outside of a vehicular horizontal slide gate
 - b) One or more contact sensors shall be located at the bottom edge of a vehicular vertical lift gate.
 - c) A hard wired contact sensor such as the one that transmits radio frequency (RF) signals to the gate operator for entrapment protection functions shall be located where the transmission of the signals are not obstructed or impeded by building structures, natural landscaping or similar obstruction. A wireless contact sensor shall function under the intended end-use conditions.
 - d) One or more contact sensors shall be located on the inside and outside leading edge of a swing gate. Additionally, if the bottom edge of a swing gate is greater than 6" (152 mm) above the ground at any point in its arc of travel, one or more contact sensors shall be located on the bottom edge.
 - e) One or more contact sensors shall be located at the bottom edge of a vertical barrier (arm).

5 - TECHNICAL SPECIFICATION

| Model | DZ RIO 1/4 JET FLEX 60HZ U | DZ RIO 1/3 JET FLEX 60HZ U | DZ RIO 1/2 JET FLEX 60HZ U |
|--|--|--|--|
| Class of Operation | UL325 Class I, II, III, IV | UL325 Class I, II, III, IV | UL325 Class I, II, III, IV |
| Type of Gate | Vehicular Slide Gates | Vehicular Slide Gates | Vehicular Slide Gates |
| Main AC Supply | 120 Vac, 4A (max) | 120 Vac, 3A (max) | 120 Vac, 3A (max) |
| Nominal Frequency | 60 Hz | 60 Hz | 60 Hz |
| Rated Power | 300 W, 120 Vac | 210 W, 120 Vac | 225 W, 120 Vac |
| Maximum Gate Weight | 600 lbs | 900 lbs | 1100 lbs |
| Maximum Gate Travel Speed | 1 ft/s | 1 ft/s | 1 ft/s |
| Maximum Gate Length | 32 feet | 32 feet | 32 feet |
| Cycles | 15 | 25 | 40 |
| Operating Temperature | -4° F to 122° F | -4° F to 122° F | -4° F to 122° F |
| Inherent Entrapment Protection (Type A) | Dual – RPM (Encoder) and Current Sense | Dual – RPM (Encoder) and Current Sense | Dual – RPM (Encoder) and Current Sense |
| External Entrapment Protection (Type B1) | 2 inputs for photoelectric devices | 2 inputs for photoelectric devices | 2 inputs for photoelectric devices |

6 - REQUIRED TOOLS FOR INSTALLATION

Below are some tools necessary to install the operator:



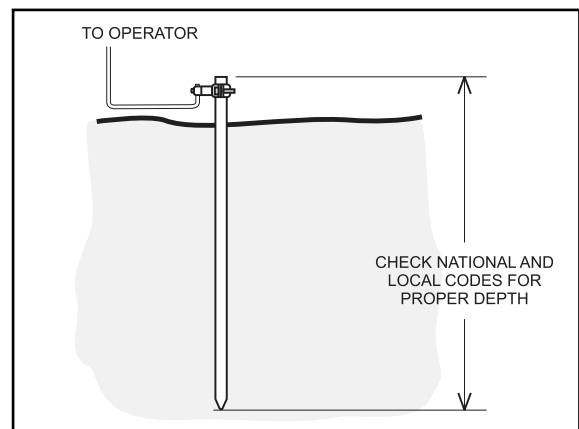
7 - ELECTRICAL INSTALLATION

This equipment must be wired with 120V as specified in the table below (assuming max current consumption).

| AC power | Wire Size (American Wire Gauge) / Max Distance in Feet | | | | | |
|----------------------|--|--------|------------|--------|------------|--------|
| | DZ RIO 1/4 | | DZ RIO 1/3 | | DZ RIO 1/2 | |
| | 14 AWG | 12 AWG | 14 AWG | 12 AWG | 14 AWG | 12 AWG |
| 120 VAC Single Phase | 143 | 227 | 191 | 303 | 191 | 303 |

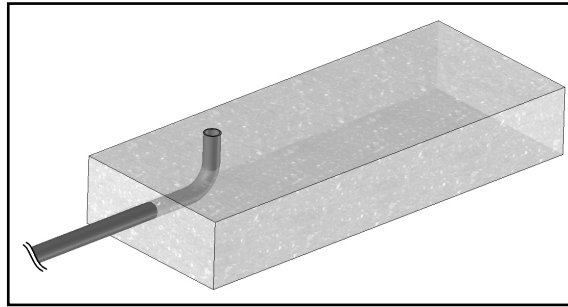
! IMPORTANT

Be sure that the circuit breaker in the electrical panel is in the OFF position before proceeding with the installation.
A separated power disconnect switch may be needed in your area.
Check your local building codes before installing this equipment.
The gate operator must be properly grounded, check your local electrical codes before installing this equipment.
Install the earth ground rod as near as possible to the operator.



8 - PRECAUTIONS FOR ELECTRICAL INSTALLATION

To avoid damage to wiring, it is important that all conduits are properly fixed to the operator. The passage of the wiring must be made through conduits, internally to floor base, ensuring that no wiring conductor is trapped or damaged.



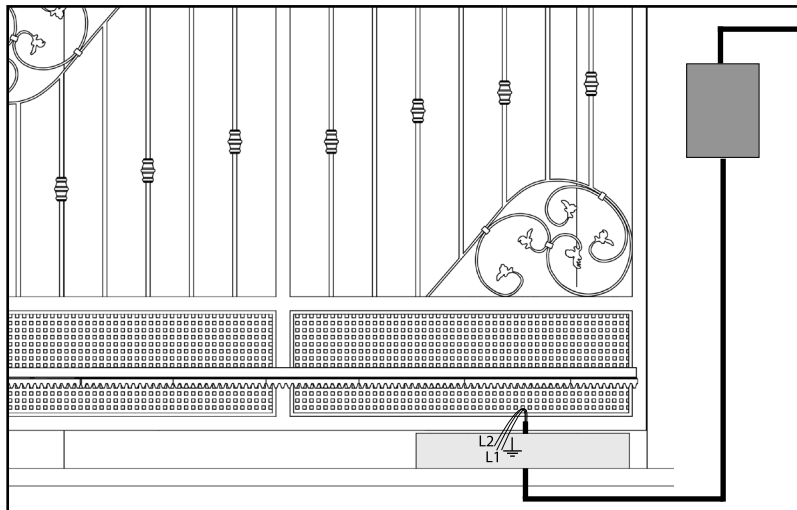
A conduit of 3/4" in diameter must be installed between the power distribution box and the total disconnect device inside the concrete base.

Install conduits for the 120 Vac.

Main power supply **MUST** run in separated conduits.

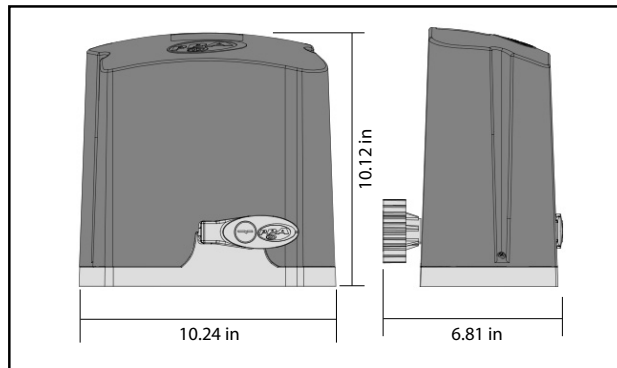
The conduit may be limited to 1/2 " in diameter for external devices like pushbuttons or sensors.

All conduits must be UL approved.



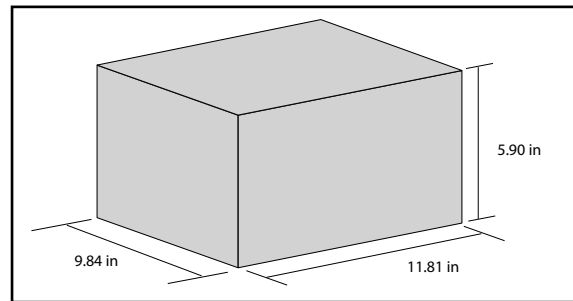
9 - INSTALLING AND FIXING THE OPERATOR

Equipment dimensions

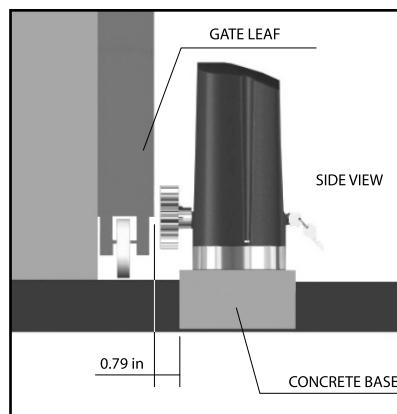


The perfect operation of this equipment depends on the instructions in this manual. To fix the equipment, follow these steps:

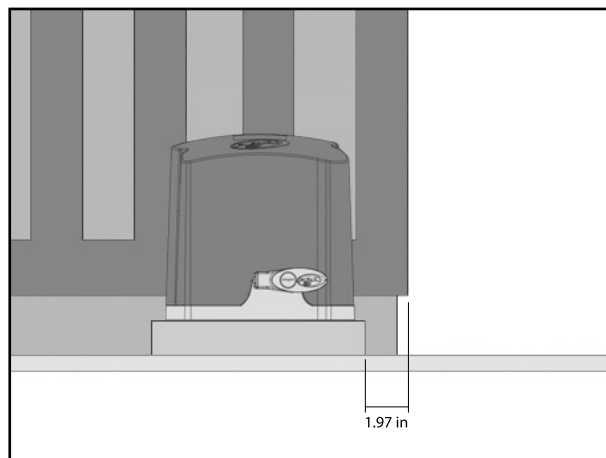
Step 1: Make sure the floor is firm enough so it can be screwed the equipment so that it is on the level. If it not meet the requirement, provide a concrete pad, following the guidelines below:



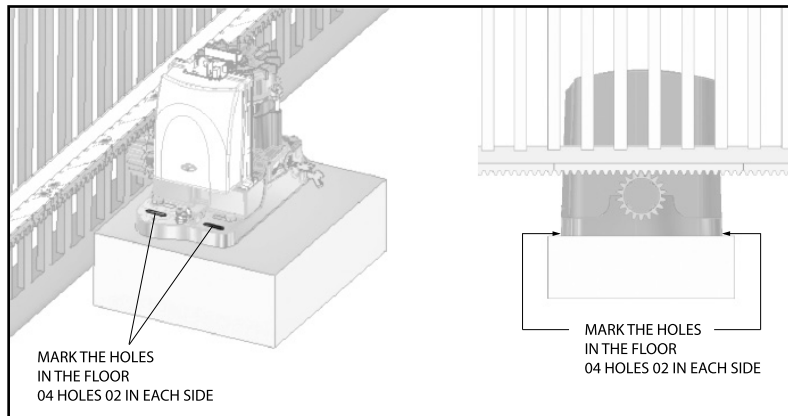
Step 2: The dimensions of the concrete pad shall be appropriate for the operator dimensions. The concrete pad shall be at a distance of approximately 0.79 inches from the face of gate leaf.



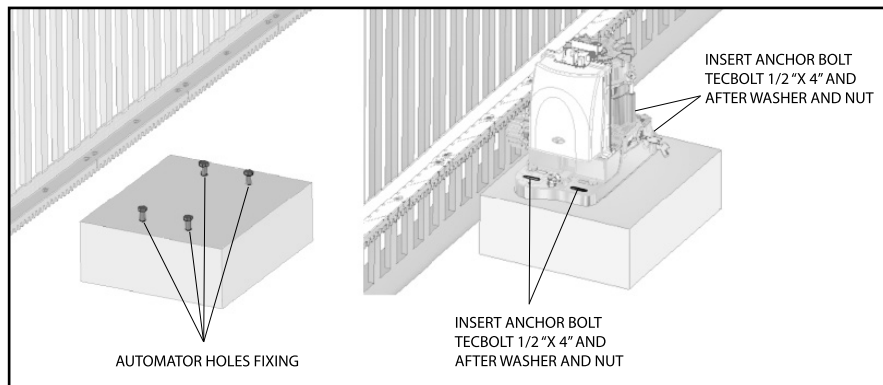
Step 3: After meeting the conditions, open completely the gate and position the operator near the face of the gate leaf, following the measure of 1.97 inches between the end of the gate leaf and operator.



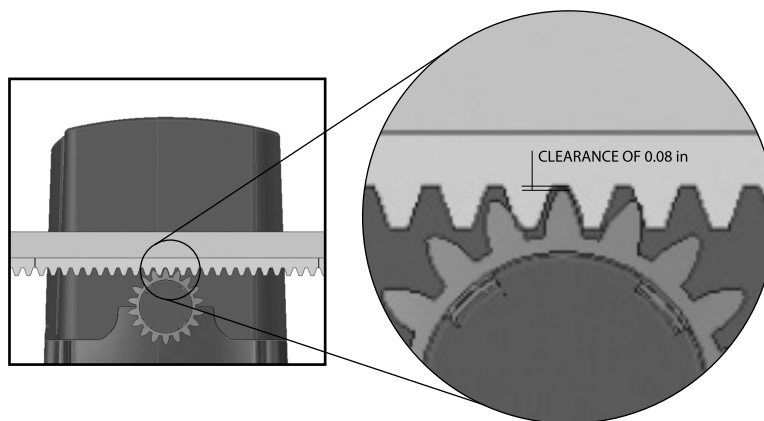
Step 4: Make the pre-alignment from operator to the gate, positioning the rack on the gear and leaning the set the gate. Then, mark the fixing holes in the floor or concrete pad.



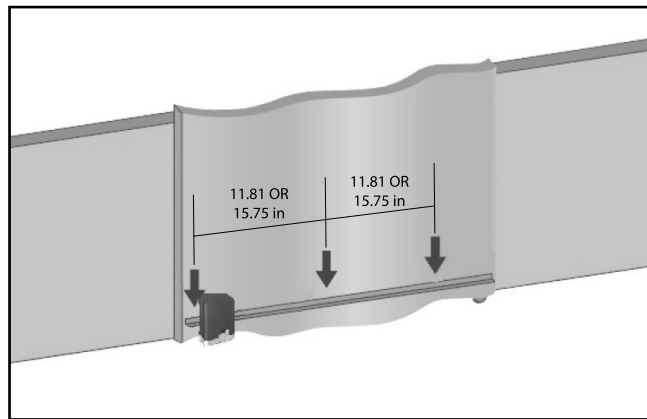
Step 5: Make the hole for fixing, positioning of the aligned operator to the gate and enter the anchor bolts $\frac{1}{2}$ " x 4" without tightening them. Move the gate, check if it does not touch the operator over the course. If this occurs, back off the operator.



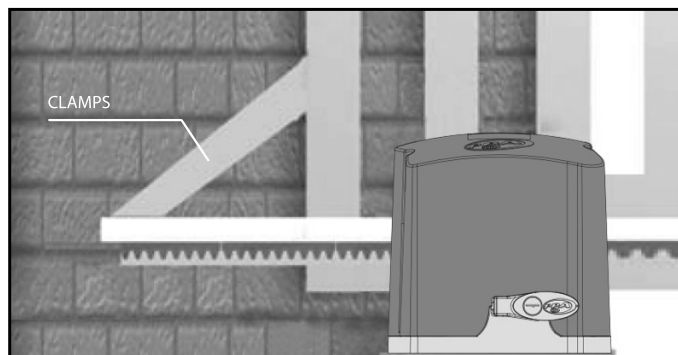
Step 6: With the unlocked operator, position the rack bar on the gear and aligned to the gate. It is necessary to leave a clearance of approximately 0.08 inches between the tooth top of the gear and rack tooth bottom.



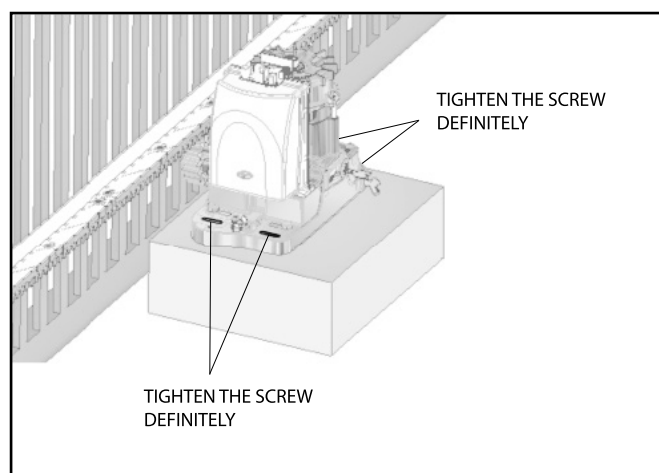
Step 7: Set the rack to the fullest extent of the gate leaf with solder or screw every 11.81 or 15.75 inches.



Step 8: If the gate leaf is warped, provide shims to ensure alignment of the rack. In some cases that the rack must pass the length of the sheet. In this case, it provides a clamps so do not skip teeth in starting the machine.

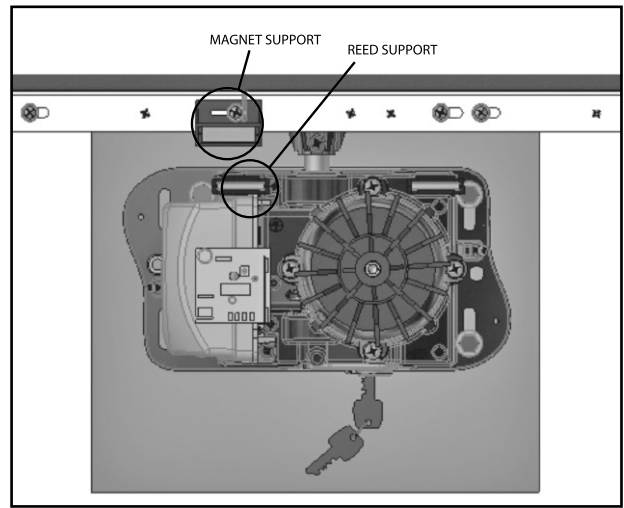
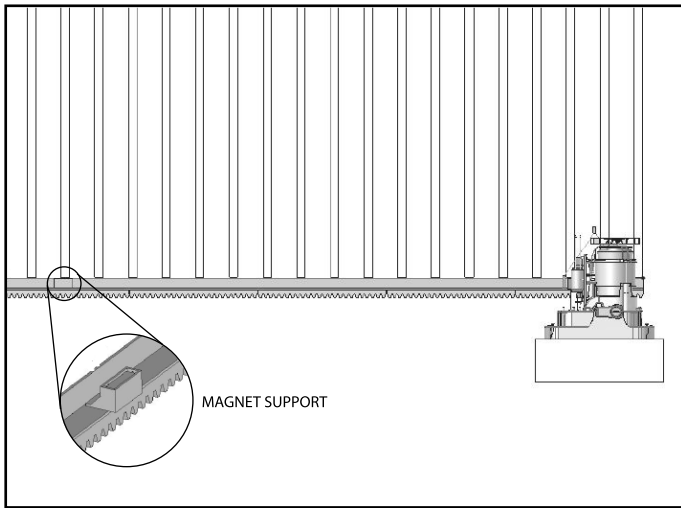


Step 9: After fixing the rack, definitely fix the operator on the floor or concrete base, definitely tightening the screws.

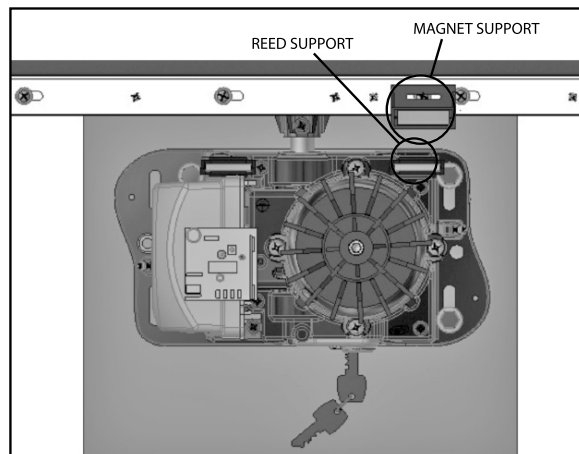


10 - LIMIT SWITCH INSTALLATION

Step 1: With the gate closed, place the magnet support on the rack, positioned in front with Reed's operator. This magnet will trigger the close limit switch.

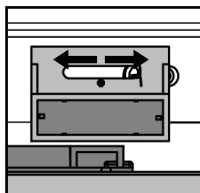


Step 2: Open the gate completely and place the other magnet support on the rack, in front of the operator REED. This magnet will trigger the open limit switch.



Step 3: Trigger the engine and see if the REED's are off properly. If necessary, reverse the board connector.

After the brackets set of magnets, make final adjustments, moving them to the right side or left side, depending on the selected setting.



Step 4: To finish the installation of the operator, is required before the operation, screw the fairings with 1 screw 0.24 x 0.79 inches (now available on the product).

11 - INTRODUCTION: ELECTRONIC SYSTEM'S TECHNICAL FEATURES

"Triflex TOP" Control Board runs with a 32-bit processor able to perform 40 million instructions per second, with features which are specific to electric motors control. Its processor can manage the entire operator setting, such as the motor, the encoder¹ and even receive a radiofrequency code from a transmitter.

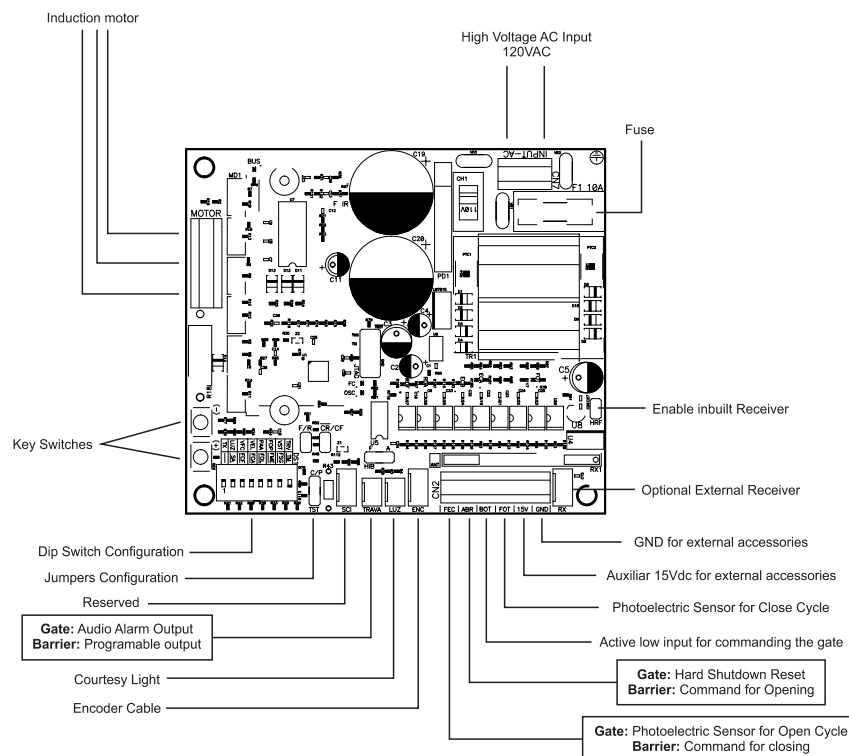
It is endowed with an EEPROM2 memory which stores the acquired remote controls' codes in an encrypted way. This memory can be removed to be used in another compatible PPA product, such as PPA's loose receiver 'Alcance' and vice versa. The control board is also compatible to rolling code remote controls, with PPA's protocol.

The system actuation can be performed via remote control through a embedded radiofrequency receiver, a loose receiver or any other device with an NC (Normally closed) contact, such as a pushbutton.

The gate's position control is performed through a PPA's patented encoder system called "Reed Digital".

12 - CONTROL BOARD

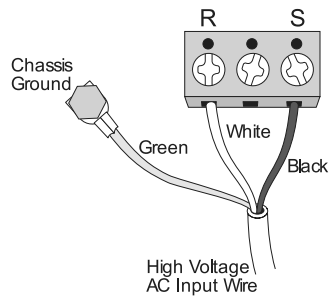
12.1 - Overview

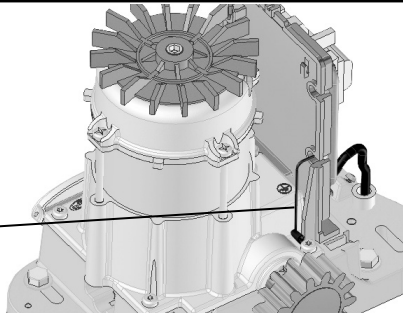


12.2 - Power Supply

The power supply must be connected to the 'R' and 'S' inputs on the power terminal blocks, the CN7 Connector.

| |
|---|
| ! WARNING |
| Be sure that the circuit breaker in the electrical panel is in the OFF position before attempting to connect any wiring to the control board. |



| | |
|---|--|
| ! |  |
| It is required that the ground terminal to be connected to the network grounding cable. | |

12.3 - Induction Motor Connection

The three wires of the induction motor must be connected to the "MOTOR" terminal block. THERE IS NO NEED TO FOLLOW THE WIRES' COLOR SEQUENCE3.

12.4 - 'ENC' encoder connection

It is used to connect, through a proper cable, the motor and the control board. There are sensors inside the gearbox which provides information on displacement direction and position of the gate during operation. Such information is essential to the operator's proper running.

There are two sensors inside the encoder and each one is represented by the ENCA and ENCB LEDs. Each one lits according to the disk position.

12.5 - 'TRAVA' Audio Alarm connection

It is used to connect, through a "PPA Relay Module", the buzzer for audio alarm. This "electronic piezo" will sound when an alarm condition occurred. The operation of this output will be explained in "Inherent Entrapment Protection System".

12.6 - 'LUZ' courtesy light connection

In case one opts to use the courtesy light, the 'Optional Relay Module' must be connected to this connector. The courtesy light will be always enabled.

12.7 - 'RX' separated receiver connection

Input for connecting the separated receiver to the control board through the 'RX' connector. When a command is accepted, the 'CMD' (command) LED is activated. The HRF Jumper must be removed when the separated receptor is added to the system to switch off the incorporated receptor.

12.8 - 'BOT' pushbutton connection

The control board acknowledges a pushbutton command when the 'BOT' terminal block is connected to the GND, i.e., a pulse to the GND.
Terminal block 1: GND (-);
Terminal block 4: BOT (NO Contact).

12.9 - 'HIB' end-of-stroke reeds connection

The control board acknowledges an activated 'reed' when the pin corresponding to it on the HIB pin bar is connected to the GND, i.e., a pulse to the GND.

The only condition that must be followed is that the reed that represents the open gate must be connected in such a way that the 'RDA' LED lights (HIB connector pin marked with an 'A'). And the 'RDF' LED must lit when the gate is closed (HIB connector pin marked with an 'F').

12.10 - 'SCI' connector

Reserved for future use.

13 - ENTRAPMENT PROTECTION SYSTEMS

13.1 - Internal Entrapment Protection System (Type A)

This operator contains an inherent entrapment protection system (position sensor and current sensor) that allows the equipment to detect the presence of obstacles during either the opening or closing cycle.

The gate will reverse direction if an obstruction is detected. The system logic operation complies with following rules:

1. During the closing cycle: If an obstruction is encountered, the gate reverses.
 - 1.1 After complete the reversal cycle, the operator will hold the gate at open position and disable (if enabled) the auto-close function.
 - 1.2 During the reversal, if the equipment encounters another obstruction, the gate will reverse again for 2 seconds and enters in hard shutdown mode (audio alarm) and the operator will need to be reset.
2. During the opening cycle: If an obstruction is encountered, the operator will reverse for 2 seconds and hold the gate at this position and disable (if enabled) the auto-close function.
 - 2.1 If the operator encounters another obstruction twice consecutively, it will enter in hard shutdown mode (audio alarm) and the operator will need to be reset.

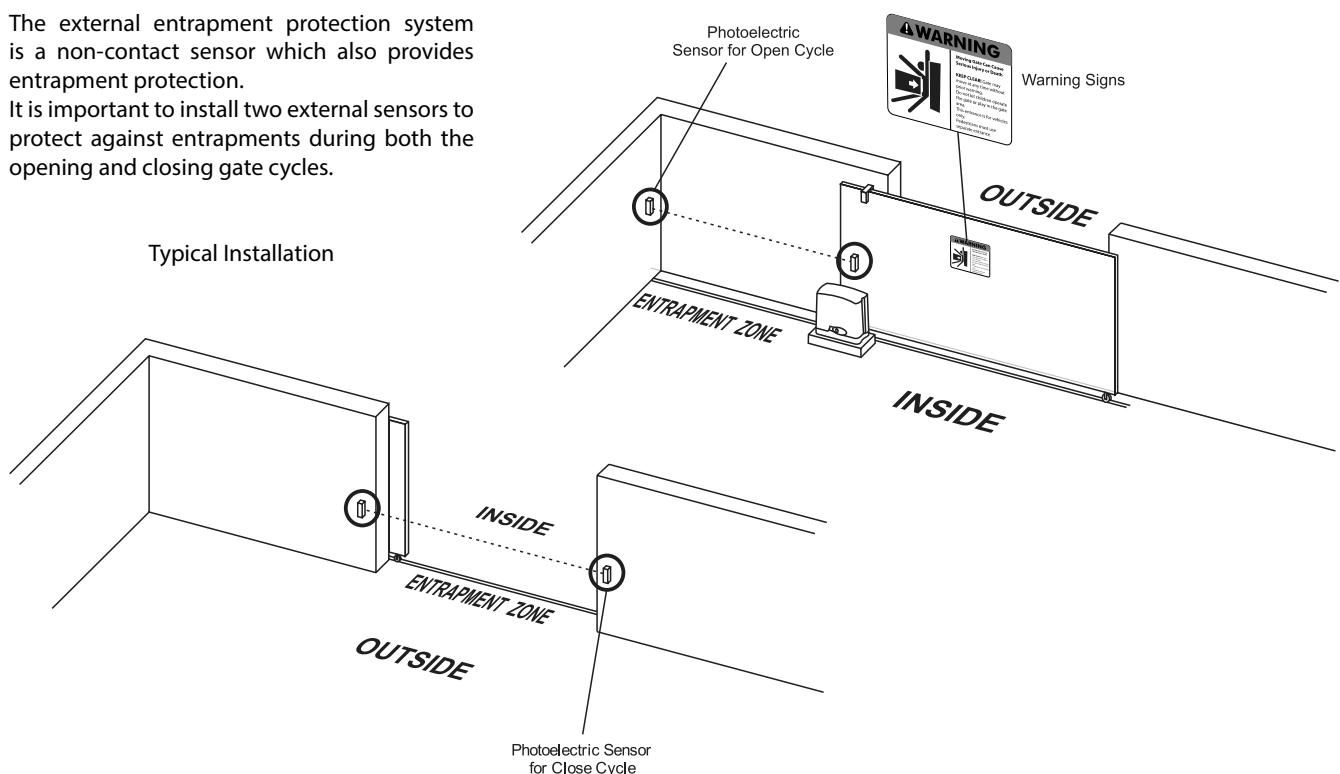
⚠ IMPORTANT

- Note that this is a contact sensor so it will act after “physically” encountering an obstruction. For this protection to function correctly, the operator’s force and limits must be properly adjusted.
- In the storage cycle (limits configuration), the inherent entrapment protection feature only has the function of recognizing the opening and closing cycle limits, that is, the route point where an obstruction is detected during the configuration is interpreted as the gate limit.

13.2 - External Entrapment Protection System (Type B1)

The external entrapment protection system is a non-contact sensor which also provides entrapment protection.

It is important to install two external sensors to protect against entrapments during both the opening and closing gate cycles.

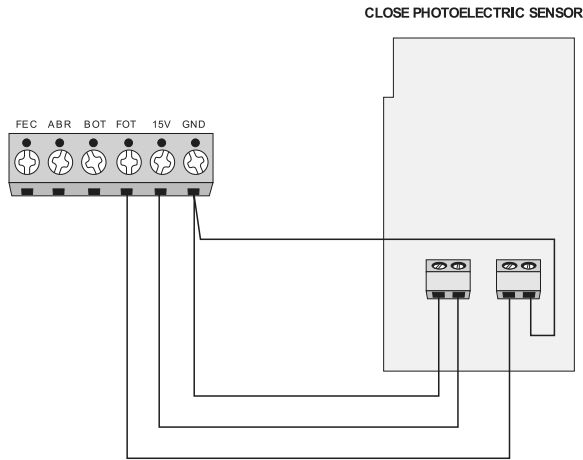


13.3 - 'FOT' closing cycle photoelectric sensor

⚠ WARNING

The control board only starts the closing movement when this sensor is already working properly.

Use only Miller Edge 4-wire pulsed sensors to comply with UL325



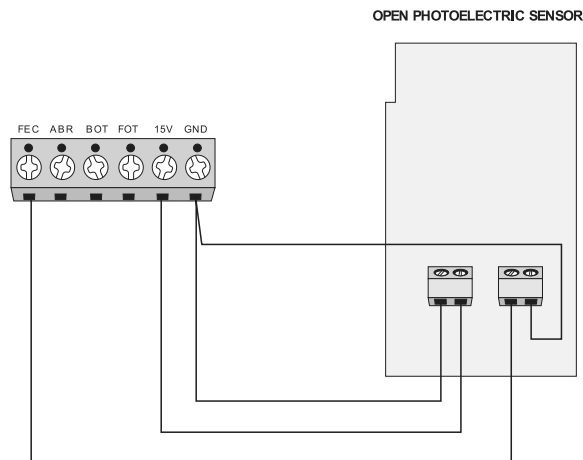
13.4 - 'FEC' opening cycle photoelectric sensor

⚠ WARNING

The control board only starts the opening movement when this sensor is already working properly.

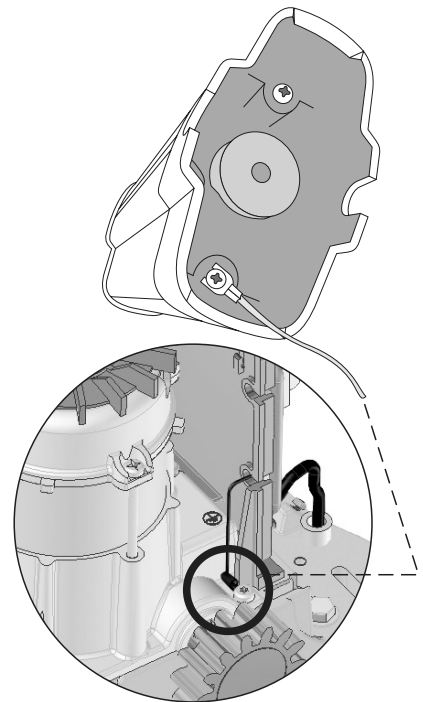
If the gate opening movement does not generate any entrapment situation, it is possible to disable the input for the open sensor (see topic 16.3 "TRV").

Use only Miller Edge 4-wire pulsed sensors to comply with UL325



⚠ IMPORTANT

For proper operation it is important to connect the enclosure of the sensors (photoelectric receiver side) to the chassis ground of the operator.

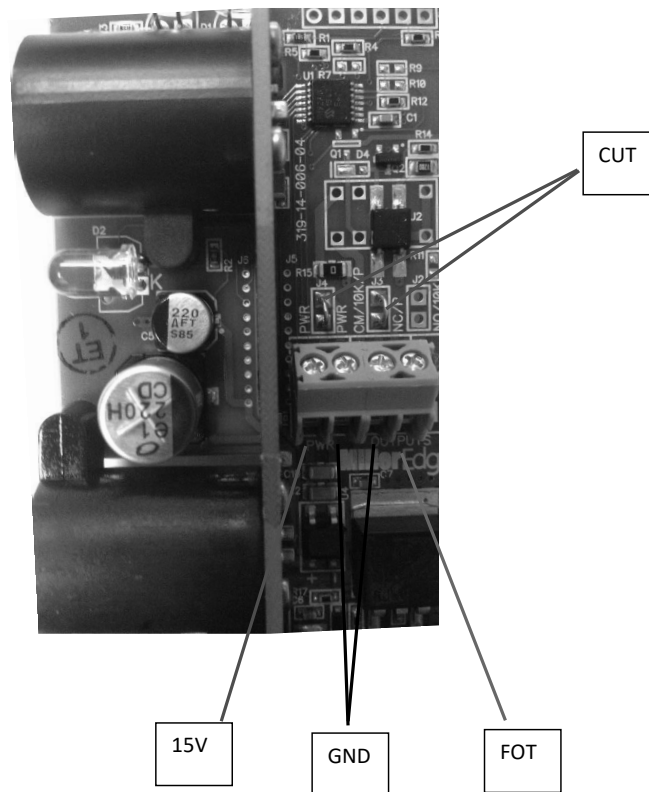


⚠ WARNING

The logic controller supplies 15V (maximum 120 mA direct current) to power photocells and receivers and IT DOES NOT HAVE OVERCURRENT PROTECTION. In case the equipment need a higher voltage or current, a further power supply must be used.

13.5 - Miller Edge reflexi Gard Connection

PREPARING PHOTOEYE



Reassemble the photoeye.

To align the photoeye assemble the hood on then reflector.

Place the photocell directed at the reflector and check the green light below the photocell lens (it will turn solid green when properly aligned).

The red light at the top of the photocell will be off whenever the photocell is aligned and unobstructed, and is on whenever something is between the photocell and the reflector.

TRIFLEX PROGRAM (UL 325 2018)

To **enable** the second photocell:

Put the dipswitch # 8 in On position, press and release the "+" button, return the dipswitch to OFF position.

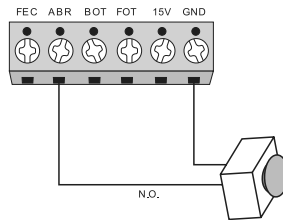
To **disable** the second photocell:

Put the dipswitch # 8 in On position, press and release the "-" button, return the dipswitch to OFF position.

13.6 - 'ABR' audio alarm reset connection

Connection for an external reset button. This button is used to turn off the audio alarm and to reset the operator after a Hard Shutdown has occurred.

Terminal block 1: GND (-);
Terminal block 5: ABR (N.O. Contact).



14 - FORCE ADJUSTMENT

! IMPORTANT

To reduce the risk of SEVERE INJURY or DEATH:

1. Without a properly installed safety reversal system, persons (particularly small children) could be SERIOUSLY INJURED or KILLED by a moving gate.
2. Too much force on gate will interfere with proper operation of safety reversal system.
3. NEVER increase force beyond minimum amount required to move gate.
4. NEVER use force adjustments to compensate for a binding or sticking gate.
5. If one control (force or travel limits) is adjusted, FOP for example, the other control may also need adjustment (FME).
6. After ANY adjustments are made, the safety reversal system MUST be tested. Gate MUST reverse on contact with a rigid object.

14.1 - 'FOP' High Speed Force Adjustment

Before starting the adjustment of the operating force, the operator must be recorded with the limit and operating normally, for more information see topics "10" and "15".

In this condition sets the Dip Switch 6 (FOP) to the ON position and press the ('-') button until the blue LED (OSC) flashes. Return the Dip 6 to OFF position and give a command to move the gate, see if the gate can move. If not, enter the FOP function again (Dip 6 ON position) and press the (+) button. Return the Dip 6 to OFF position and test again. Repeat this procedure until the gate can complete the course of opening and closing. This setting is the same for both opening and closing cycle.

In this condition, the force is the minimum required to move the gate operator. Then enter the FOP function again and increase ('+' button) 1 level to ensure that the gate performs the operation even with debris on the gate's track.

Once configured, return the DIP 6 to OFF position.

14.2 - 'FME' Low Speed Force Adjustment

Before starting the adjustment of the operating force, the gate operator must be recorded with the limit and operating normally, for more information see topics "10" and "15".

In this condition sets the Dip Switch 1 and 6 (FME) to the ON position and press the (-) button until the blue LED (OSC) flashes. Return the Dip 1 and 6 to the OFF position and give a command to move the gate, see if the gate can reach the closing and opening gate catch post. If not, enter the FME function again and press the button (+). Return the DIPs 1 and 6 to the OFF position and test again. Repeat this procedure until the gate can complete the entire travel of opening and closing cycle.

In this condition, the force is the minimum required to move the gate operator. Then enter the FOP function again and increase ('+' button) 1 level to ensure that the gate performs the operation even with debris on the gate's track.

Once configured, return the DIP 1 and 6 to the OFF position.

15 - OPERATOR SYSTEM LOGIC FUNCTION

15.1 – Getting started in gate mode (Gate travel recognition)

When the inverter is powered up, after being properly installed on the operator, the gate should start an opening movement after an external command or if the '+' button is pressed.

If instead the gate starts a closing movement, remove the 'F/R' jumper to change the direction of the motor. After removing the jumper the gate will stop. Press the '+' button again or proceed with an external command. The gate should start opening.

Afterwards, let the gate open until it reaches the opening physical stop or the REED A (magnet limit switch) is activated. Then, it will automatically reverse the movement direction once again to close; let it reach the closing physical stop or activate the REED F.

WARNING

The operator can work only with ENCODER (Digital) or ENCODER + REED (Hybrid), but cannot work only with a REED.

During the travel recognition only the obstruction of the external entrapment protection device can reverse the gate movement direction.

Your automatic gate opener is set and ready to use.

15.2 – Gate Operation after a power cycle (travel recognized)

After the previous operation, the gate does not need to recognize the travel again. When the inverter is powered up, the gate simply closes slowly after a command ('+' button or external one), until it reaches the closing physical stop. The motor will turn off and the operator is ready to use again.

During this first closing cycle, only the photocell obstruction can reverse the gate movement direction (any other command will be ignored). In this case, when gate is fully opened the operator is ready to use.

In summary, after a reset occurs (with travel recognized – '15.1') the operator just need to get a reference of its position (fully closed or fully opened).

IMPORTANT

When the Hybrid (ENCODER + REED) mode is used, if the gate is located in one of the magnets, it will start with full speed since it already has a reference of its position.

WARNING

It is important to properly install a physical stop for both open and close cycle so that the control board can self adjust (minor corrections) the travel of the gate after every cycle.

16 - INVERTER PARAMETERS PROGRAMMING

16.1 - Operator model selection

The control board can operate, by using the same firmware, in both gates / doors and barriers.

To select the model, just remove the TST jumper and close the pines C/P (Cancel/Gate). When the function is selected the led "OSC" flashes fast for a certain period of time and then indicates its value,

The following table shows the number of flashes for each function:

| Numbers of flashes | Referent Model |
|--------------------|---------------------------------|
| 1 | Nexus 600 / 900 / 1300 SL (SLS) |
| 2 | Nexus 2600 SL (SLS) |
| 3 | Dz Rio |
| 4 | Dz Predial / Condominium / 1500 |
| 5 | Dz 2500 / 1500 HW |
| 6 | Barrier 14 |

The pause between flashes is three seconds and flashes occur every half second, so they are very different.

To increase the values, just press the plus button "(+)" and to decrease just press the button less "(-)".

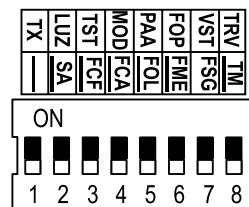
When you reach the desired template, return the jumper C / P to the TST position. Done that the plant is ready to operate in the chosen gate operator model.

16.2 - JUMPER TST

When the TST jumper is removed, the control board enters in a mode that allows to position the gate operator at a given point of its travel to set limits or to verify the mechanical part.

In this mode, pressing the (-) button starts the motor clockwise rotation while the button is pressed, and when the (+) button is pressed the motor rotates in direction counterclockwise in the same manner.


16.3 - Adjustment of other parameters



The control board also has other functions controlled by the DS1 DIP switch. When one selects one function, the 'OSC' LED rapidly blinks for a specific period of time and then indicates its parameter. When the 'OSC' LED blinks each half second (0.5s), the minimum value is selected; when it is off, an intermediate value is selected and when it keeps lit, the maximum value is selected. In order to increase the values, just press the '+' button; to decrease the values, just press the '-' button when the desired function is selected.

When leaving the function, the 'OSC' LED rapidly blinks again for a specific period of time, and then blinks in a one-second interval again.

Programming functions chart:

| Function | Description |
|----------------------------|---|
| "_ " or "TX" (Switch #1) | <p>Function selector. It selects the underlined functions and selects the function to add and erase transmitters (TX).</p> <p>Function: Add and erase transmitters (TX)</p> <p>1 – Add: When this only switch is on 'ON" position, the control board is ready to add or erase transmitters (TX). In order to add a TX, press the transmitter button after activating the aforementioned switch. Observe that the 'OSC' LED blinks rapidly if it is receiving a signal. Press '+' button of the board to add it. Observe that the 'OSC' LED keeps lit when the board receives a signal already added.</p> <p>2 – Erase: In order to erase the transmitters added to the memory, press both '-' and '+' button at the same time for 10 seconds; observe that the LED will blink once per second; after the 10-second period is over, all transmitters have been erased from the memory.</p> |
| "SA" (Switches #1 and #2) | <p>Push-to-close function / Pause time on auto-close mode.</p> <p>Press "+" button for incrementing the pause time.</p> <p>Press "-" button for decrementing the pause time.</p> <p>Each button pressed increment or decrement the pause time from 2 seconds (1 seconds if in barrier mode).</p> <p>After the pause time, the operator will close automatically.</p> <p>To disable the auto-close function, set the pause time to zero (Led OSC blinking).</p> <p>The maximum pause time allowed is 240 seconds (Led OSC ON).</p> |
| "FCF" (Switches #1 and #3) | <p>Closed end-of-stroke.</p> <p>Increases or decreases the distance in which the operator starts to slow down when closing.</p> |
| "FCA" (Switches #1 and #4) | <p>Open end-of-stroke.</p> <p>Increases or decreases the distance in which the operator starts to slow down when opening.</p> |
| "FOL" (Switches #1 and #5) | <p>Gates:</p> <p>HOW TO ADJUST THE GAP BETWEEN THE GATE AND ITS STOP.</p> <p>If necessary, one can adjust the gap between the stop and the gate when th operator stops its opening / closing cycle. One can make it closer or more distant from the stop.</p> <p>The minimum level is 0 (LED blinking); it increases and decreases one level at a time up to its maximum 10 level (LED lit).</p> <div><div> IMPORTANT</div><div>To test the changes, it is necessary to activate the gate operator once so that it performs an opening / closing cycle.</div></div> |
| "FME" (Switches #1 and #6) | <p>HOW TO DECREASE OR INCREASE THE FORCE OF THE MOTOR DURING TRAVEL RECOGNITION.</p> <p>If necessary, it is possible to decrease the motor force during the travel recognition, for example, to avoid that the rack bar breaks. You can also increase the strength, in case it is necessary.</p> <p>Press '+' button to increase the strength and the '-' button to decrease it.</p> <p>The minimum level is 40% (LED blinking) and it increases four levels at a time (4%) up to the maximum 100% level (LED lit).</p> <p>This is the same force that will be used in the limits of the gate travel ("Low Speed Force"). This is a very important configuration because it is related to entrapment protection adjustment. For more information see topic '14.2'</p> |

| | |
|----------------------------|---|
| "FSG" (Switches #1 and #7) | <p>ENABLING FOLLOWER (MIRRORED) PHOTOCELL.</p> <p>In some facilities, such as gated communities, it is necessary to the gate to close automatically as soon as the vehicle gets out from the gate path. In order to do so, one must install one photocell and enable the 'follower' (AKA mirrored) function.</p> <p>Press '+' to enable it and include the period of time allowed before the automatic closing.</p> <p>The minimum level is zero (0 – LED blinking) and it increases one level at a time (1) up to its maximum 60-second level (LED lit).</p> <p>Example: LED blinking (function disabled). When pressing the '+' button once, the LED is turned off and the 'follower' function is enabled. The pause time before the automatic closing begins is zero (0) second. If one presses the button once more, the pause now is one (1) second. And so on, up to sixty (60) seconds, when the LED lits.</p> |
| "TM" (Switches #1 and #8) | Reserved for future use. |
| "LUZ" (Switch #2) | <p>Courtesy light timing.</p> <p>Selects the time interval the 'LG' output is kept activated after the gate closing. It increases ten seconds at a time (10s), from zero (0s) up to two-hundred forty seconds (240s). This output is automatically activated when a switch from the DIP switch is activated or the acquiring process begins.</p> |
| "VFC" (Switch #3) | <p>Speed at the travel's limits</p> <p>Speed adjustment for starting and stopping region</p> <ul style="list-style-type: none"> • Dip 3 to "ON" ("VFC"); • "+" Button increases the speed; • "-" Button decreases the speed; <p>In gates, the adjustment is from 5 of 5 Hz, from 15Hz up to 30Hz.</p> |
| "VEL" (Switch #4) | <p>Gate: Adjust the speed of opening and closing Gate.</p> <ul style="list-style-type: none"> • Key 4 to "ON" ("VEL"); • "+" Button increases the speed; • "-" Button decreases the speed; <p>The adjustment is from 10 to 10Hz, from 60Hz up to 150Hz.</p> |
| "PAA" (Switch #5) | <p>Gate: TURN THE PAUSE OFF THROUGH A COMMAND DURING OPENING.</p> <p>When the operator is installed on gated communities, it may be necessary to turn the function which 'stops' (pauses) the gate off when receiving a command during opening.</p> <p>Press either the '-' button to turn the opening pause off (LED blinking) or the '+' button to turn it on (LED lit).</p> |
| "FOP" (Switch #6) | <p>ADJUST OPERATOR "STRENGTH".</p> <p>The operator, by default, has its strength on maximum level. One can decrease it in case it is necessary. Press '-' button to decrease the strength and '+' to increase it.</p> <p>The minimum level is 40% (LED blinking) and increases four levels at a time (4%) up to the maximum 100% level (LED lit).</p> <p>If the strength is in a very low level, the gate operator won't work with maximum speed.</p> <p>For more information see topic "14.1"</p> |
| "VST" (Switch #7) | <p>Gate's start speed.</p> <p>To change it: press '-' button to decrease and '+' to increase.</p> <p>Minimum 20Hz (OSC LED blinking) increasing from 10Hz up to 60Hz ('OSC' LED lit).</p> |

| | |
|-------------------|--|
| "TRV" (Switch #8) | <p>Photoelectric Sensor Configuration.</p> <p>"OSC" LED lit: The control board is configured to operate with both closing and opening photoelectric devices.</p> <p>"OSC" LED flashing: The control board is configured to operate with only a closing photoelectric device.</p> <p>Use the "+" and "-" button to make configuration changes. For more information see topic 13.</p> |
|-------------------|--|

17 - ERASING THE RECOGNIZED GATE TRAVEL

In order to erase the acquired path, one must simply press both '+' and '-' buttons at the same time and keep them pressed until 'OSC' LED lits. When the buttons are released, the acquired path is already erased.

Note: All switches on the DS1 DIP Switch must be on 'OFF' position.

18 - APPLYING THE DEFAULT STANDARD SETTINGS

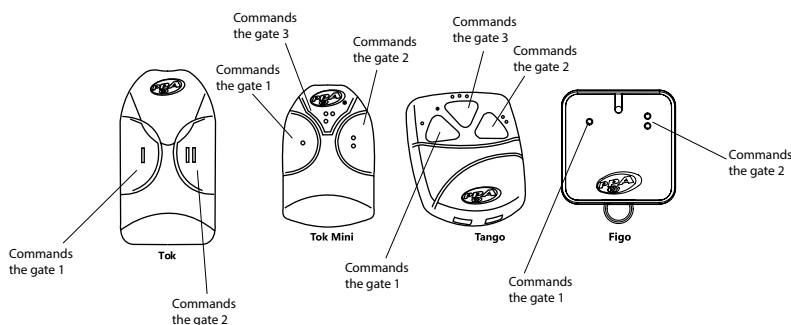
To set all patterns to the factory standard, one must simply press both '+' and '-' buttons at the same time and keep them pressed until 'OSC' LED lits; after it lits, do not release the buttons; keep them pressed until 'OSC' LED starts blinking. When the buttons are released, the acquired path is already erased and the settings are back to the default.

19 - ADDING A REMOTE CONTROL

In order to add an RF transmitter, slide the key #1 of the DS1 DIP Switch to 'ON' position; then, press the button of the transmitter one wants to add and keep it pressed for at least two seconds. Afterwards, press the '+' button of the TriFlex control board. Observe that before the transmitter has been added, the 'OSC' LED blinked rapidly; after the addition process, 'OSC' LED keeps lit during transmission. 328 transmitters can be added.

19.1 – Remote control functions

Depending on the model, PPA remote controls have two or three buttons. Thus, a single control may open two or three different gates. Below, the functions of the remote controls are described:



Note: To make the encoding of the remote control, call a gate operator qualified technician.

19.2 - The remote control battery



WARNING

To prevent possible **SERIOUS INJURY** or **DEATH**:

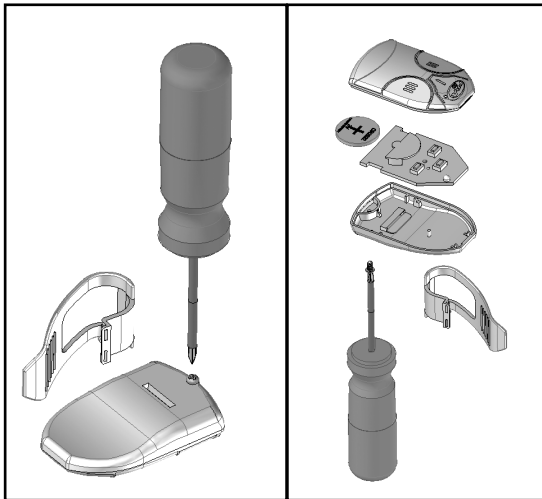
- NEVER allow small children near batteries.
- If battery is swallowed, immediately notify a doctor.

To reduce risk of fire, explosion or chemical burn:

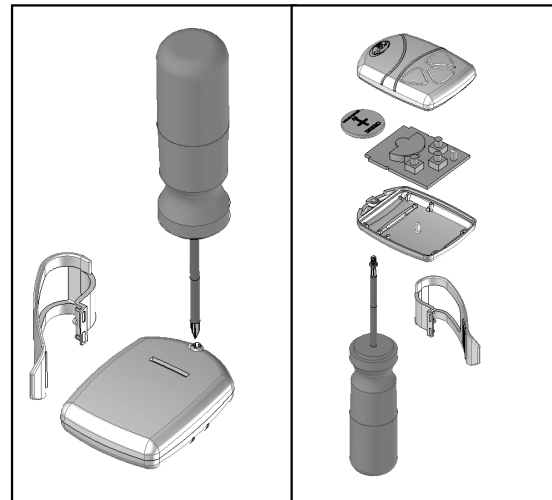
- Replace **ONLY** with 3V CR2032 coin batteries.
- Do **NOT** recharge, disassemble, heat above 212°F or incinerate.

The lithium battery should produce power for up to 1 year. To replace battery, remove the clip, use the philips screwdriver to remove the screw (FIGO controller doesn't have screws) and open the case as shown. Insert battery positive side up (+) for TOK, MINI TOK and TANGO controllers and positive side down for FIGO. Dispose of old battery properly. Replace the battery with only 3V CR2032 coin batteries.

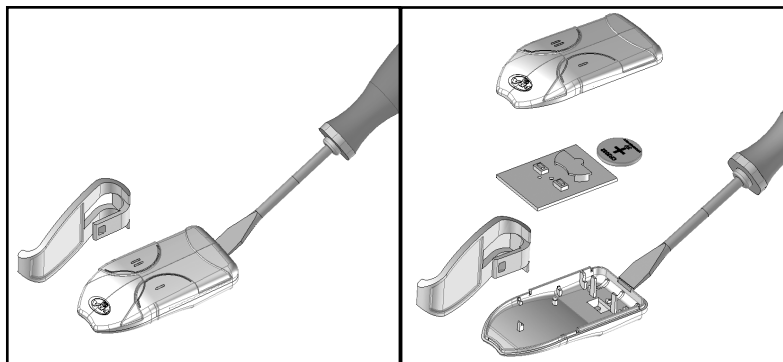
THE REMOTE CONTROL BATTERY – MINI TOK



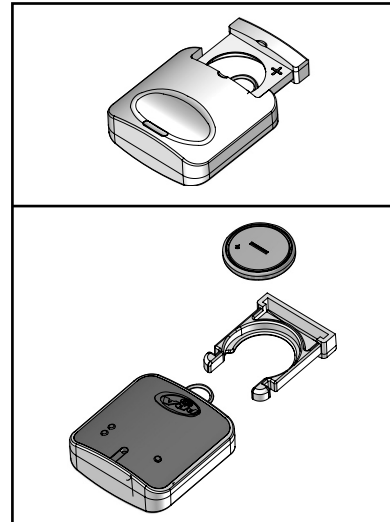
THE REMOTE CONTROL BATTERY - TANGO



THE REMOTE CONTROL BATTERY - TOK



THE REMOTE CONTROL BATTERY - FIGO



20 - SELECTION OF RF RECEPTION PROTOCOL (CR/CF JUMPER)

Jumper Closed: Fixed Code Protocol

Jumper Open: Rolling Code Protocol

! IMPORTANT

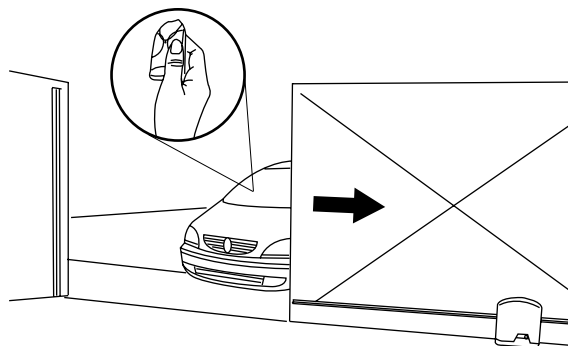
Every time this configuration (reception protocol) is changed, ALL the recorded remote controls MUST be erased. For more information see topic '21'.

21 - ERASING ALL STORED REMOTE CONTROLS

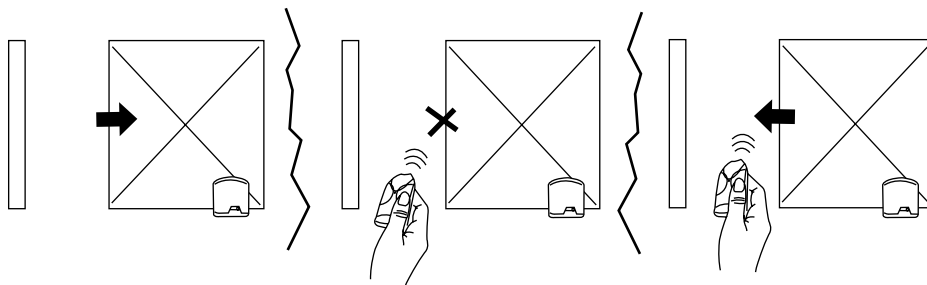
In order to erase all remote controls stored on the board memory, slide the #1 switch of the DS1 DIP switch to the 'ON' position; press both '-' and '+' buttons of the control board at the same time for 10 seconds, observe that the 'OSC' blinks once per second and after the 10-second period, the LED stops counting the time; this means all added transmitters have been erased.

22 - USER OPERATION

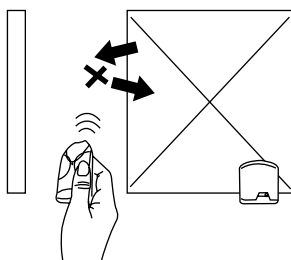
To activate your operator, press for 1 second, the PPA remote button with the machine.



If the remote control is operated while the gate is opening, the gate operator will stop and will remain that way until the remote control to fire again. When this happens, the gate will close.



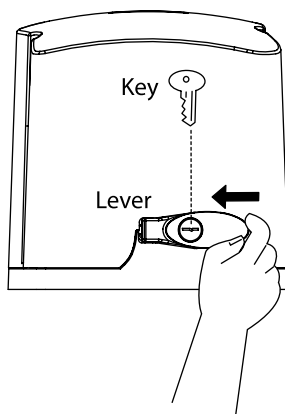
If the remote control is activated while the gate is closing, for security reasons, the gate will stop and automatically open.



22.1 - Unlocking (manual release and operation)

In case of power failure, the equipment has an unlocking system to open and close the gate manually.

- 1) To operate the gate in manual mode, turn the key counter-clockwise;
- 2) Move the lever to the left;
- 3) Move the gate leaf;



- 4) To operate again in automatic mode, return the lever to the starting position and turn the key clockwise.

23 - ACCESSORIES

The electronic control unit allows the installation of other accessories (NOT INCLUDED) that add functions to operator and give more comfort and safety to the user:

23.1 - Garage Light

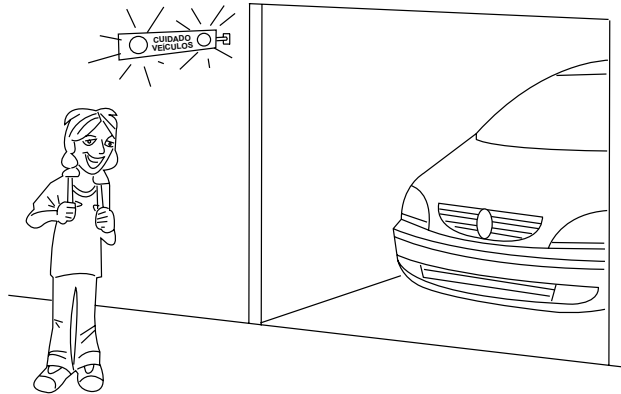
Turns the light from the garage where the operator is installed, so that it is activated to open, allowing check for any individual near the residence.

The light goes out only after the complete closure of the gate with adjustable time delay (this accessory not included).

23.2 - Flashing lights

Alert the pedestrian exit or driveway in a particular location.

The flag comes into operation when the gate is activated to open and off so that it is fully closed and off (this accessory not included).



24 - EVENT / FAILURE INDICATION

24.1 - Microcontroller functioning indication

The main function of the 'OSC' LED is to indicate if the board's microcontroller is properly running (it blinks with a stable frequency (~1Hz), since it is connected to a power supply).

24.2 – Indication of over current or short circuit on the motor

'OSC' rapidly blinks in 0.1-second intervals, to warn that the capacitors have been disarmed due to over current or short circuit on the motor. The board can normally run 10 seconds after the over current.

24.3 – Overheating indication

'FC' LED rapidly blinks in 100-millisecond intervals to warn that the capacitors have been disarmed due to heat sink or environment overheating. The operator can only work again if the temperature decreases to less than 100°C.

24.4 – EEPROM fault indication

'OSC' LED blinks twice when there is no memory inserted.

24.5 – EEPROM invalid data indication

'OSC' LED blinks three times when there is an available memory, but it has a content that the microcontroller does not identify as a Valid Transmitter Code.

24.6 - Open end-of-stroke indication

'FC' LED blinks when the gate is on an open end-of-stroke area.

24.7 - Close end-of-stroke indication

'FC' LED keeps lit when the gate is on a closed end-of-stroke area.

24.8 - Capacitor load indication

'BUS' LED indicates that the high voltages capacitors are charged. Do not touch them while this LED is ON (even when the control board is disconnected from the power supply).

24.9 – Encoder Test

It is possible to test the operator's encoder; to do so; simply connect it to the control board and check if the 'ENCA' and 'ENCB' are blinking when the operator runs. Each LED corresponds to a specific sensor; for example, 'ENCA' LED corresponds to the 'A' sensor inside the gear motor.

24.10 - Thermal Protection

The operator has a thermal protection device that shuts off the motor when it reaches a temperature above 310 °F. The control board receiving two consecutive commands during this period, it will enter in hardshutdown mode (Audio alarm will sound) and the operator will need to be reset. For more information see topic 13.5.

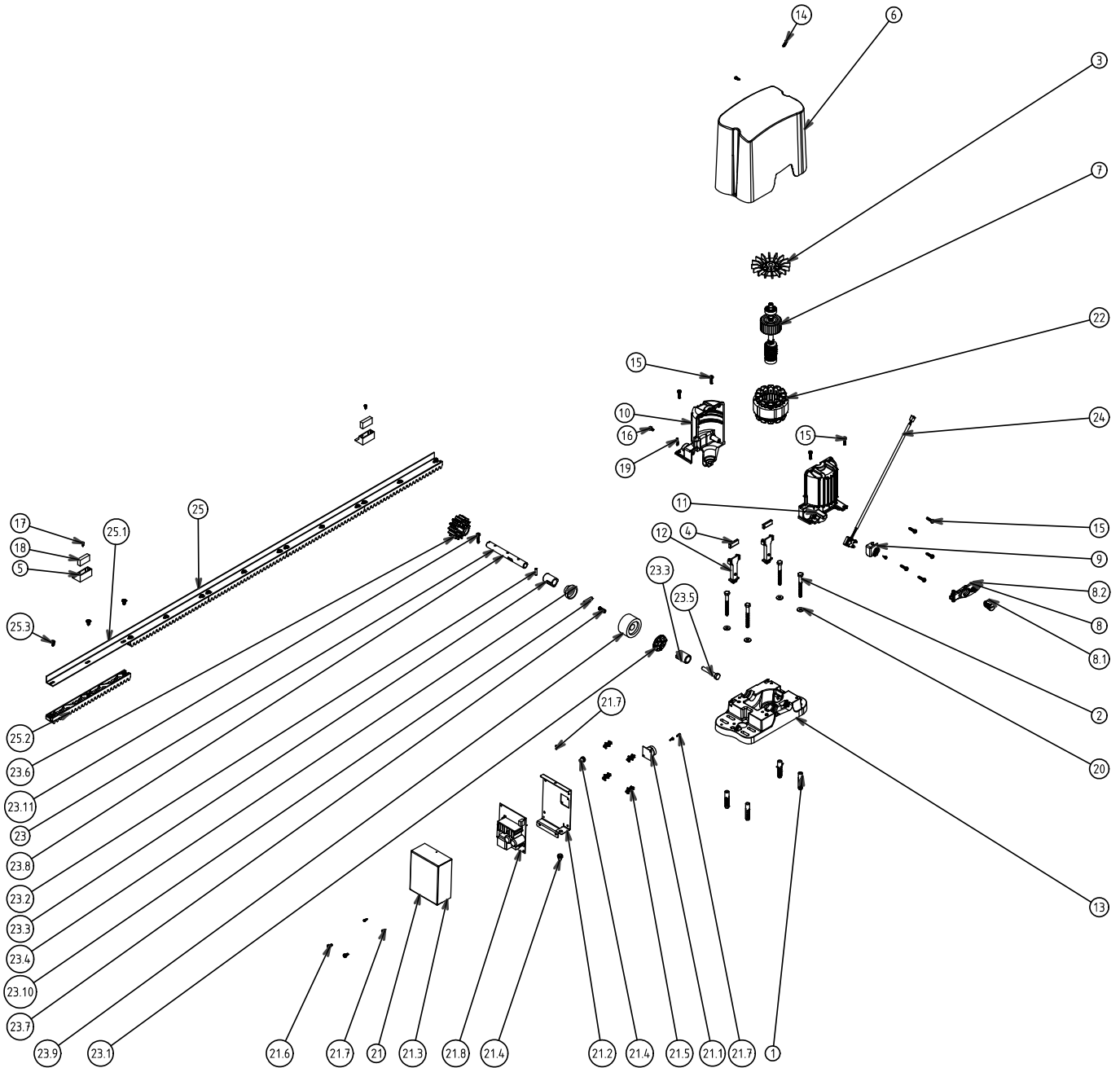
25 - MAINTENANCE

On the table below, are cited some PROBLEMS - FAULTS, POSSIBLE CAUSES AND CORRECTION - which may occur in your operator. Before any maintenance, the total disconnection from the mains is required.

| FAIL | CAUSE | SOLUTION |
|---|---|---|
| The gate does not correspond to the path of the place where the operator has been installed (It breaks before it reaches the stop or slams when closing). | There is an acquired path different from the place where the operator has been installed. | Press both '+' and '-' buttons at the same time and keep them pressed until 'OSC' LED lits. |
| Gate keeps open and whenever it receives opening commands, it closes. | Acquiring was not properly performed. | Refer to item 'First operation after a frequency inverter is installed on the operator (Acquiring). |
| 'OSC' LED blinks rapidly and the motor turns itself off. | Current sensor activated. This may happen when the motor has a malfunction. | Check stator resistance. Check the motor current (It must be less than medium 3A RMS and 5A RMS peak current (2s maximum)). |

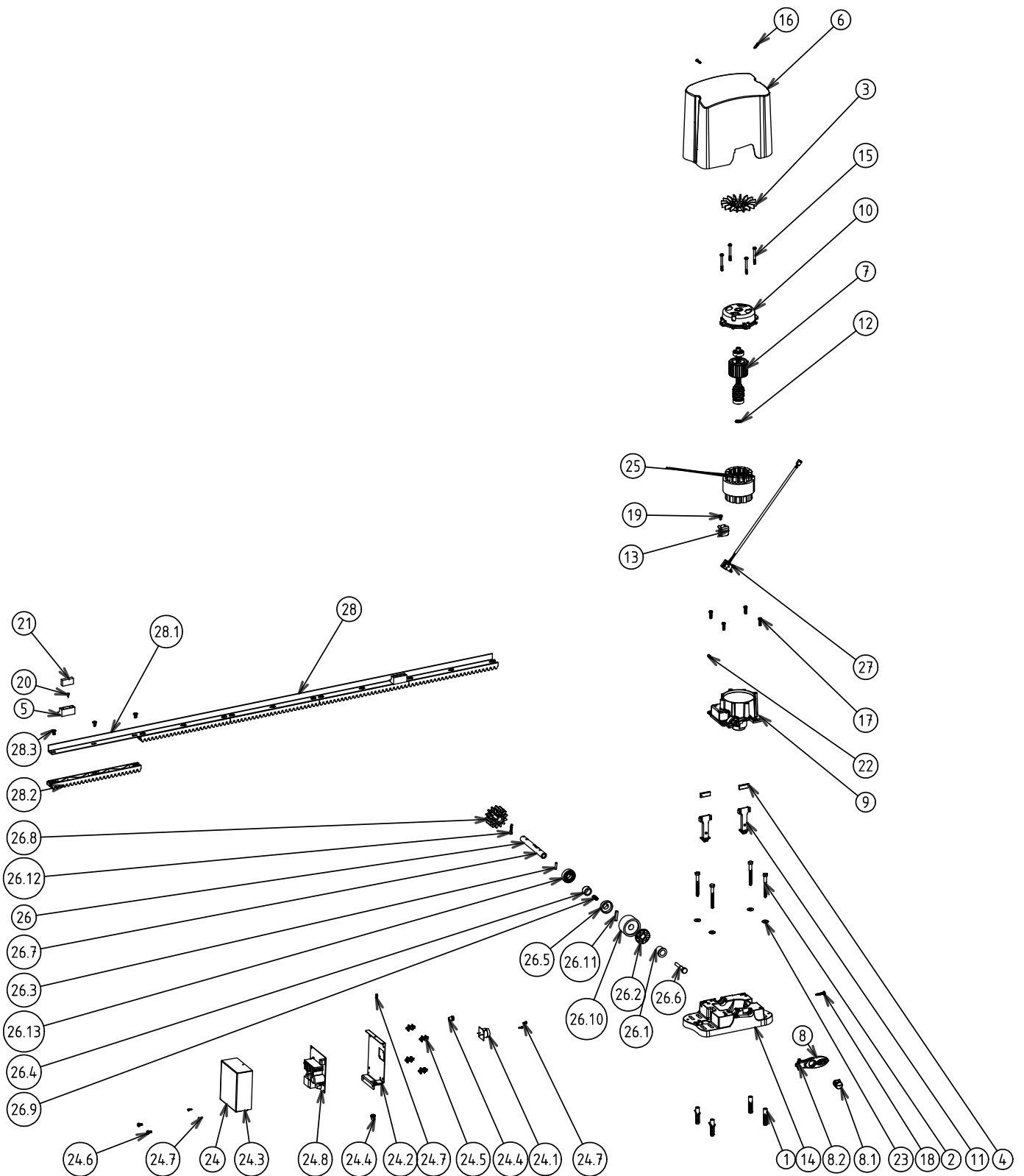
26 - REPAIR PARTS

DZ RIO 1/4 JET FLEX 60HZ U



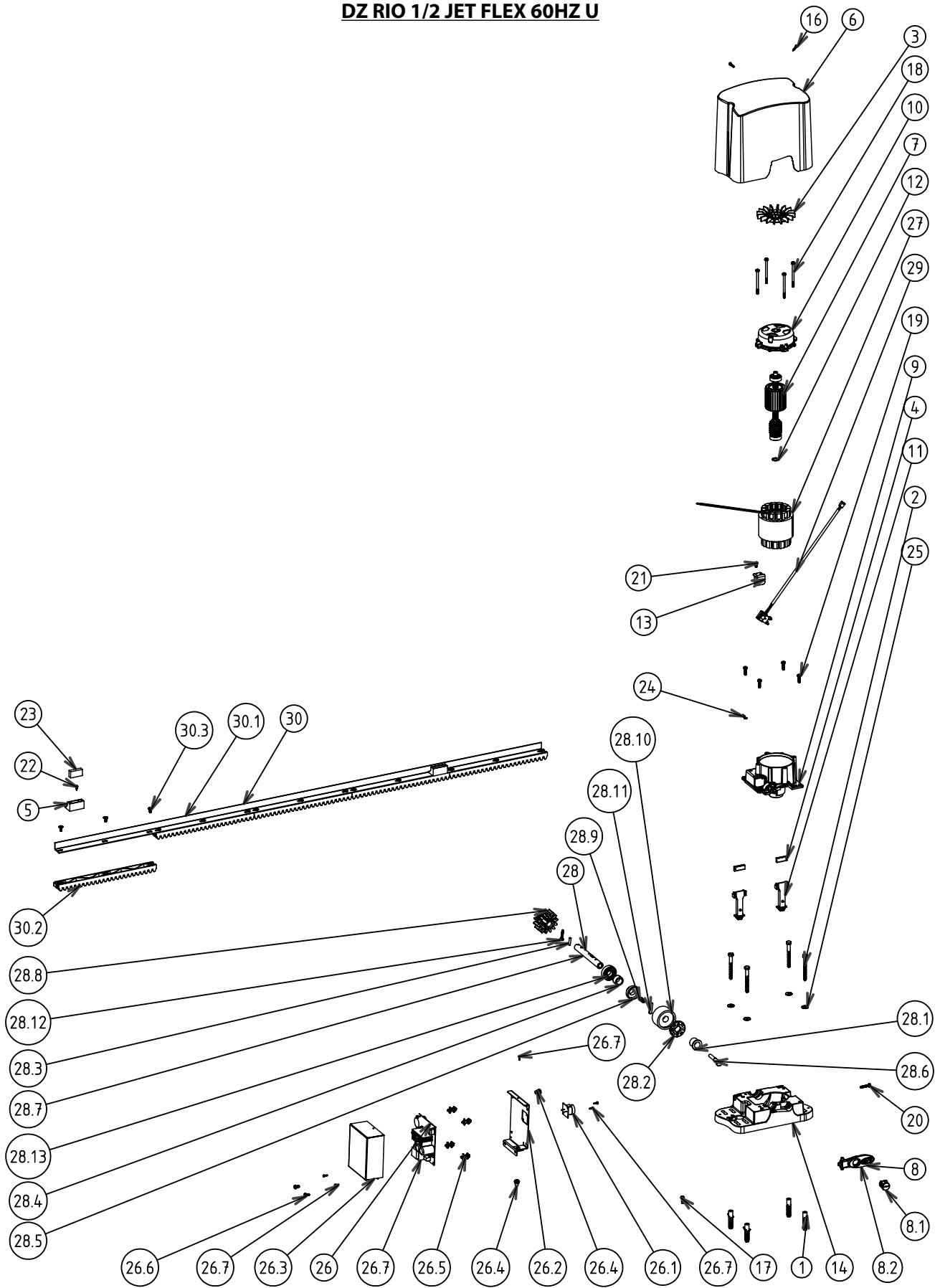
| SLIDING GATE OPENER - DZ RIO 1/4 JET FLEX 60HZ U | | | |
|--|---------|-----|-------------------------------------|
| REF Nº | PART Nº | QTY | PARTS DESCRIPTION |
| 1 | P14200 | 4 | S10 BUSH |
| 2 | P14199 | 4 | 1/4" X 2.1/2" HEX SCREW |
| 3 | P10670 | 1 | MOTOR FAN |
| 4 | P10526 | 1 | LIMIT REED |
| 5 | P10518 | 2 | MAGNET BRACKET |
| 6 | P03569 | 1 | PLASTIC COVER PROTETION |
| 7 | P03089 | 1 | 30MM ROTOR SHAFT |
| 8 | P01541 | 1 | UNLOCKING HANDLE SET |
| 8,1 | P03497 | 1 | LOCK |
| 8,2 | P01444 | 1 | UNLOCKING HANDLE |
| 9 | P01450 | 1 | ENCODER COVER |
| 10 | P01448 | 1 | LEFT MOTOR CASING |
| 11 | P01446 | 1 | RIGHT MOTOR CASING |
| 12 | P01264 | 2 | REED BRACKET |
| 13 | P01192 | 1 | REDUCER BASE |
| 14 | C10938 | 2 | 3,5 X 16 PHILIPS SCREW |
| 15 | C10833 | 9 | M5 X 20 TORX SCREW |
| 16 | C10778 | 1 | M5 X 10 TORX SCREW |
| 17 | C10254 | 3 | 3,9 X 9,5 PHILIPS SCREW |
| 18 | C10083 | 2 | 10 X 18.8 X 36.3 MAGNET |
| 19 | C10066 | 1 | GROUND TERMINAL |
| 20 | C10003 | 4 | 1/4" FLAT WASHER |
| 21 | A16819 | 1 | DZ RIO CONTROL BOARD BOX (STEEL) |
| 21,1 | P27200 | 1 | FLOYD BELL M-80 BUZZER SET |
| 21,2 | P04078 | 1 | DZ RIO CONTROL BOARD STEEL BASE |
| 21,3 | P04077 | 1 | DZ RIO CONTROL BOARD STEEL LID |
| 21,4 | P00681 | 2 | OPERATOR CABLE BUSHING |
| 21,5 | C26958 | 4 | PCB ECI 9 SPACER |
| 21,6 | C10778 | 2 | M5 X 10 TORX SCREW |
| 21,7 | C10474 | 5 | M3X10 PP PL SCREW |
| 21,8 | A21924 | 1 | CONTROL BOARD TRI-FLEX 60HZ (SPARE) |
| 22 | A16489 | 1 | 120V 30MM 60HZ STATOR |
| 23 | A15647 | 1 | SET OUTPUT SHAFT |
| 23 | P15560 | 1 | SET UNIVERSAL DISC |
| 23,1 | C27619 | 1 | 6 X 6 X 31 KEY |
| 23,11 | C10779 | 1 | M5 X 25 TORX SCREW |
| 23,2 | P13869 | 1 | Ø5 X 21 BUSH PIN |
| 23,3 | P13865 | 2 | SPACER BUSHING |
| 23,4 | P13864 | 1 | UNLOCKING NYLON BUSHING |
| 23,5 | P01481 | 1 | UNLOCKING PLASTIC PIN |
| 23,6 | P01412 | 1 | Z14 GEAR |
| 23,7 | P01266 | 1 | UNLOCKING SPRING |
| 23,8 | P01202 | 1 | OUTPUT SHAFT |
| 23,9 | P00918 | 1 | Z23 WORM WHEEL |
| 24 | A15415 | 1 | SET UNIVERSAL ENCODER |
| 25 | A11612 | 1 | RACK BARS 1,50 M (BLACK) |
| 25,1 | P18260 | 1 | BRACKET RACK |
| 25,2 | P14201 | 5 | RACK PIECE |
| 25,3 | C10493 | 15 | M5X12 PR P SCREW |

DZ RIO 1/3 JET FLEX 60HZ U



| SLIDING GATE OPENER - DZ RIO 1/3 JET FLEX 60HZ U | | | |
|--|-----|---------|--|
| REF N° | QTY | PART N° | PARTS DESCRIPTION |
| 1 | 4 | P14200 | S10 BUSH |
| 2 | 4 | P14199 | 1/4" X 2.1/2" HEX SCREW |
| 3 | 1 | P10670 | MOTOR FAN |
| 4 | 1 | P10526 | LIMIT REED |
| 5 | 2 | P10518 | MAGNET BRACKET |
| 6 | 1 | P03569 | PLASTIC COVER PROTETION |
| 7 | 1 | P03090 | 40MM ROTOR SHAFT |
| 8 | 1 | P01541 | SET UNLOCKING HANDLE |
| 8.1 | 1 | P03497 | LOCK + FEATHER KEY SET (1/2 THREAD) |
| 8.2 | 1 | P01444 | DZ RIO ALUMINIUM UNLOCKING LEVER |
| 9 | 1 | P01414 | UPPER BASE MOTOR |
| 10 | 1 | P01394 | UPPER COVER MOTOR |
| 11 | 2 | P01264 | REED BRACKET |
| 12 | 1 | P01213 | RETAINING RING |
| 13 | 1 | P01197 | ENCODER COVER |
| 14 | 1 | P01192 | REDUCER BASE |
| 15 | 4 | C13014 | M5 X 50 TORX SCREW |
| 16 | 2 | C10938 | 3,5 X 16 PHILIPS SCREW |
| 17 | 4 | C10833 | M5 X 20 TORX SCREW |
| 18 | 1 | C10779 | M5 X 25 TORX SCREW |
| 19 | 1 | C10778 | M5 X 10 TORX SCREW |
| 20 | 2 | C10254 | 3,9 X 9,5 PHILIPS SCREW |
| 21 | 2 | C10083 | 10 X 18.8 X 36.3 MAGNET |
| 22 | 1 | C10066 | GROUND TERMINAL |
| 23 | 4 | C10003 | FLAT WASHER 1/4 |
| 24 | 1 | A16819 | DZ RIO CONTROL BOARD BOX (STEEL) |
| 24.1 | 1 | P27200 | FLOYD BELL M-80 BUZZER SET |
| 24.2 | 1 | P04078 | DZ RIO CONTROL BOARD STEEL BASE |
| 24.3 | 1 | P04077 | DZ RIO CONTROL BOARD STEEL LID |
| 24.4 | 2 | P00681 | OPERATOR CABLE BUSHING |
| 24.5 | 4 | C26958 | PCB ECI 9 SPACER |
| 24.6 | 2 | C10778 | M5 X 10 TORX SCREW |
| 24.7 | 5 | C10474 | M3 X 10 TORX SCREW |
| 24.8 | 1 | A21924 | CONTROL BOARD TRI-FLEX 60HZ (SPARE) |
| 25 | 1 | A16477 | DZ STATOR - 3 PHASE - 110V - 50/60 HZ - 40 MM (UL) |
| 26 | 1 | A15798 | SET OUTPUT SHAFT |
| 26.1 | 1 | P16033 | 17MM FLANGE BUSH |
| 26.2 | 1 | P15560 | SET UNIVERSAL DISC |
| 26.3 | 1 | P13869 | Ø5 X 21 BUSH PIN |
| 26.4 | 1 | P13866 | 17MM NYLON BUSH CASING |
| 26.5 | 1 | P13864 | UNLOCKING NYLON BUSH |
| 26.6 | 1 | P01481 | UNLOCKING PLASTIC PIN |
| 26.7 | 1 | P01421 | OUTPUT SHAFT |
| 26.8 | 1 | P01412 | Z14 GEAR |
| 26.9 | 1 | P01266 | UNLOCKING SPRING |
| 26.10 | 1 | P00918 | Z23 GEAR RING WITH ALUMINIUM HUB |
| 26.11 | 1 | C27619 | 6 X 6 X 31 FEATHER KEY |
| 26.12 | 1 | C10779 | M5 X 25 TORX SCREW |
| 26.13 | 1 | C10197 | 6203 ZZ BEARING |
| 27 | 1 | A15415 | SET UNIVERSAL ENCODER |
| 28 | 1 | A11612 | RACK BAR KIT |
| 28.1 | 1 | P18260 | RACK CORNER - LIGHT |
| 28.2 | 5 | P14201 | RACK BAR PIECE |
| 28.3 | 15 | C10493 | M5 X 12 FLANGED SCREW |

DZ RIO 1/2 JET FLEX 60HZ U



| SLIDING GATE OPENER - DZ RIO 1/2 JET FLEX 60HZ U | | | |
|--|-----|---------|--|
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| 1 | 4 | P14200 | S10 BUSH |
| 2 | 4 | P14199 | 1/4" X 2.1/2" HEX SCREW |
| 3 | 1 | P10670 | MOTOR FAN |
| 4 | 1 | P10526 | LIMIT REED |
| 5 | 2 | P10518 | MAGNET BRACKET |
| 6 | 1 | P03569 | PLASTIC COVER PROTETION |
| 7 | 1 | P03091 | DZ RIO 60 MM (RED 1:23) ROTOR SHAFT |
| 8 | 1 | P01541 | SET UNLOCKING HANDLE |
| 8.1 | 1 | P03497 | LOCK + FEATHER KEY SET (1/2 THREAD) |
| 8.2 | 1 | P01444 | DZ RIO ALUMINIUM UNLOCKING LEVER |
| 9 | 1 | P01414 | UPPER BASE MOTOR |
| 10 | 1 | P01394 | UPPER COVER MOTOR |
| 11 | 2 | P01264 | REED BRACKET |
| 12 | 1 | P01213 | RETAINING RING |
| 13 | 1 | P01197 | ENCODER COVER |
| 14 | 1 | P01192 | REDUCER BASE |
| 16 | 2 | C10938 | 3,5 X 16 PHILIPS SCREW |
| 17 | 1 | C10896 | M5 X 16 TORX SCREW |
| 18 | 4 | C10859 | M5 X 70MM - 30MM THREAD TORX SCREW |
| 19 | 4 | C10833 | M5 X 20 TORX SCREW |
| 20 | 1 | C10779 | M5 X 25 TORX SCREW |
| 21 | 1 | C10778 | M5 X 10 TORX SCREW |
| 22 | 2 | C10254 | 3,9 X 9,5 PHILIPS SCREW |
| 23 | 2 | C10083 | 10 X 18.8 X 36.3 MAGNET |
| 24 | 1 | C10066 | GROUND TERMINAL |
| 25 | 4 | C10003 | FLAT WASHER 1/4 |
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| 26.3 | 1 | P04077 | DZ RIO CONTROL BOARD STEEL LID |
| 26.4 | 2 | P00681 | OPERATOR CABLE BUSHING |
| 26.5 | 4 | C26958 | PCB ECI 9 SPACER |
| 26.6 | 2 | C10778 | M5 X 10 TORX SCREW |
| 26.7 | 5 | C10474 | M3 X 10 TORX SCREW |
| 26.8 | 1 | A21924 | CONTROL BOARD TRI-FLEX 60HZ (SPARE) |
| 27 | 1 | A16480 | DZ STATOR - 3 PHASE - 110V - 50/60 HZ - 60 MM (UL) |
| 28 | 1 | A15798 | OUTPUT SHAFT SET |
| 28.1 | 1 | P16033 | 17MM FLANGE BUSH |
| 28.2 | 1 | P15560 | SET UNIVERSAL DISC |
| 28.3 | 1 | P13869 | Ø5 X 21 BUSH PIN |
| 28.4 | 1 | P13866 | 17MM NYLON BUSH CASING |
| 28.5 | 1 | P13864 | UNLOCKING NYLON BUSH |
| 28.6 | 1 | P01481 | UNLOCKING PLASTIC PIN |
| 28.7 | 1 | P01421 | OUTPUT SHAFT |
| 28.8 | 1 | P01412 | Z14 GEAR |
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| 28.10 | 1 | P00918 | Z23 GEAR RING WITH ALUMINIUM HUB |
| 28.11 | 1 | C27619 | 6 X 6 X 31 FEATHER KEY |
| 28.12 | 1 | C10779 | M5 X 25 TORX SCREW |
| 28.13 | 1 | C10197 | 6203 ZZ BEARING |
| 29 | 1 | A15415 | SET UNIVERSAL ENCODER |
| 30 | 1 | A11612 | RACK BAR KIT |
| 30.1 | 1 | P18260 | RACK CORNER - LIGHT |
| 30.2 | 5 | P14201 | RACK BAR PIECE |
| 30.3 | 15 | C10493 | M5 X 12 FLANGED SCREW |



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