

# Installation/Owner's Manual

# Model 6524-081

## Solar Powered Vehicular Swing Gate Operator

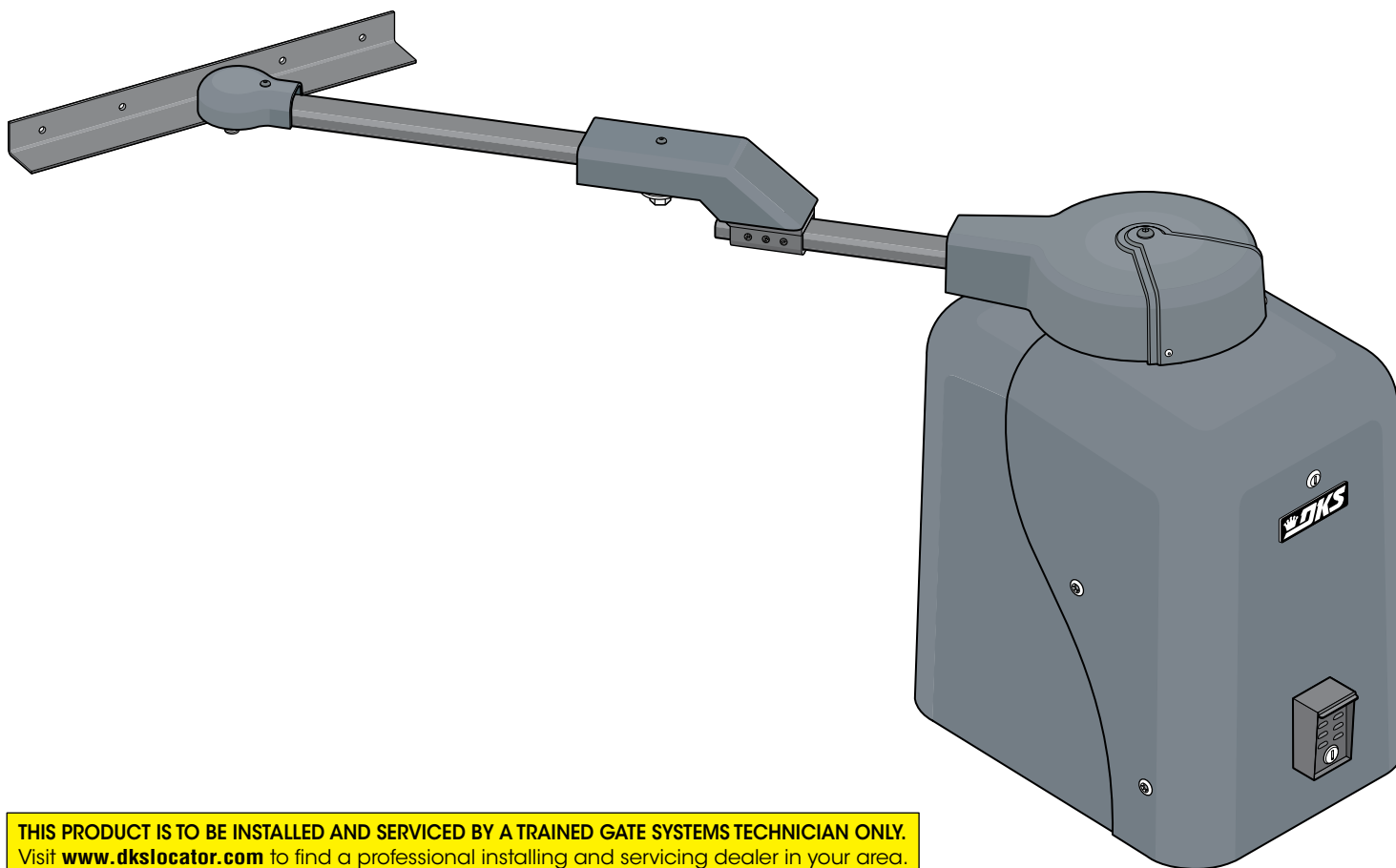
Use this manual for circuit board 4100-010 Revision AA or higher.

6524-066-N-12-17

**EXTERNAL ENTRAPMENT PROTECTION MUST be installed or the gate operator WILL NOT function.**

**Bi-Parting Gate Operators CANNOT be used with Solar Applications.**

## Solar Powered



**THIS PRODUCT IS TO BE INSTALLED AND SERVICED BY A TRAINED GATE SYSTEMS TECHNICIAN ONLY.**  
Visit [www.dkslocator.com](http://www.dkslocator.com) to find a professional installing and servicing dealer in your area.

## Solar Powered

Date Installed: \_\_\_\_\_

Installer/Company Name: \_\_\_\_\_

Phone Number: \_\_\_\_\_

Circuit Board  
Serial Number  
and Revision Letter: \_\_\_\_\_

**Leave Manual with Owner**

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UL 325  
Compliant



4100-010 Circuit  
Board Conforms To  
UL STD 991



# QUICK GUIDE: DIP-Switches

See page 23 for more information about DIP-switches.



Reset button on circuit board **MUST** be pressed before new DIP-switch settings will take affect.

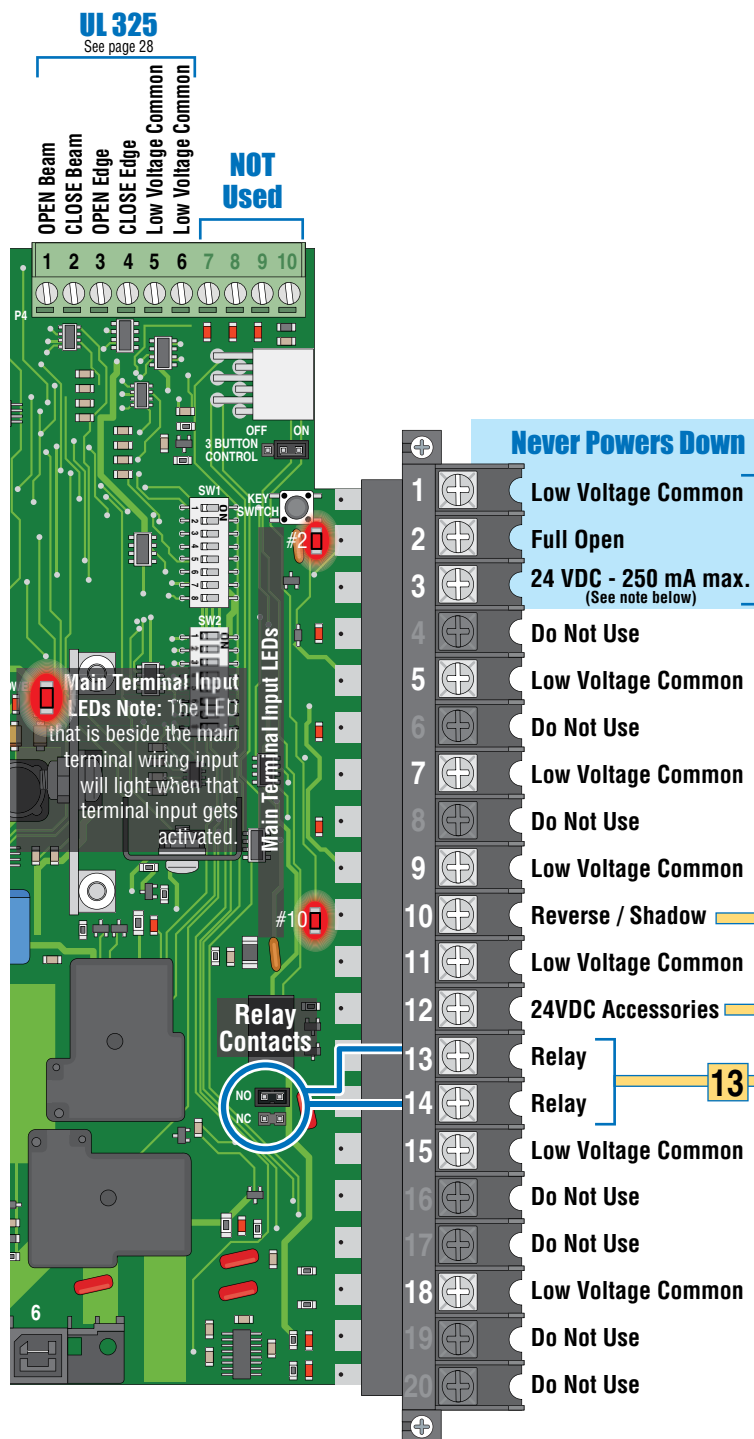
SW 1 (Top 8 Switches)			
Switch	Function	Setting	Description
1	Operator Opening Direction		Changes direction operator will cycle open upon initial power up and open command.
2	Auto-Close Timer	OFF	Auto-close timer is OFF. Manual input required to close gate.
		ON	<b>Normal Setting.</b> Auto-close timer is ON. Adjustable from 1-23 seconds.
3	Not Used	OFF	Switch <b>MUST</b> be turned OFF for Solar.
4	Reverses Gate	OFF	Input to main terminal 10 and/or reverse loops will <b>reverse</b> gate during <b>close</b> cycle.
	Not Used	ON	<b>Do Not</b> use this setting for the 6524.
5	Quick-Close Timer Override (Slide Gates ONLY)	OFF	Quick-close feature is OFF.
		ON	Quick-close feature is ON. Opening gate will stop and begin to close as soon as all reversing inputs (Reverse loops, photo sensors) are cleared regardless of the distance the gate has opened. Used for slide gates only.
6 and 7	Relay: Main Terminals Terminal 13-14	6-OFF 7-OFF	<b>Normal Setting.</b> Relay activates when gate is at open limit.
		6-OFF 7-ON	Relay activates when gate is not closed.
		6-ON 7-OFF	Relay activates when gate is opening and open.
		6-ON 7-ON	Relay activates during opening and closing cycle.
8	Accessory Power	OFF	24 VDC 500 mA <b>accessory power</b> for accessories connected to main terminal 12.
		ON	<b>DO NOT USE</b> for Solar.

Setting **MUST** be used

SW 2 (Bottom 8 Switches)			
Switch	Function	Setting	Description
1 and 2	Select Operator Type	1-OFF 2-OFF	<b>DO NOT USE</b> for the 6524. Slide Gate Operator
		1-OFF 2-ON	<b>Swing Gate Operator</b>
		1-ON 2-OFF	<b>DO NOT USE</b> for the 6524. Barrier Gate Operator
		1-ON 2-ON	<b>DO NOT USE</b> for the 6524. Overhead Gate Operator
3	Input Power Failure Mode	OFF	<b>DO NOT USE</b> for Solar.
		ON	Gate <b>operates normally</b> until batteries get low. Gate will <b>CLOSE and Shutdown operator</b> in close position until battery power reaches an operable level again.
4	Reverse/Shadow Input	OFF	Main terminal 10 is a REVERSE input.
		ON	<b>DO NOT USE</b> for solar power.
5	Overlapping Bi-Parting Gates	OFF	Switch 5 <b>MUST</b> be turned OFF for the 6524.
		ON	<b>DO NOT USE</b> for solar power. Overlapping gates <b>ARE</b> used (Dual swing gates ONLY). Secondary gate starts to open a few seconds before primary gate starts.
6	Circuit Board Power Management	OFF	<b>DO NOT USE</b> for Solar. For 115/230 VAC input power. Board has <b>Constant power</b> .
		ON	Used for <b>Solar</b> input power. Board <b>Minimizes power</b> when not in use. All terminals shut down power except <b>main terminals 1, 2 and 3</b> .
7 and 8	Not Used	OFF	Switches 7 and 8 <b>MUST</b> be turned OFF for Model 6524 operator.

See page 27 for terminal wiring.

## QUICK GUIDE: Terminal Descriptions



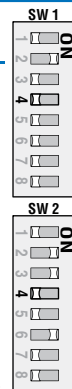
**20-Pin Main Terminal**

Terminals 1, 2 and 3 are ALWAYS powered up, even after circuit board has powered down to manage the power drain on the batteries, see page 20.  
**Opening devices MUST connect to terminal 2.**

This input ONLY functions when gate is **fully opened** or in the **closing cycle**.

- SW 1, **switch 4 MUST be OFF**. SW 2, **switch 4 MUST be OFF**. When gate is closing, an input to main terminal 10 (eg: photo beam gets blocked) will **reverse** and open the gate. **Note:** If the auto-close timer is **ON**, when gate reaches the open position, timer will time out and close the gate.
- **DO NOT** turn SW 1, switch 4 **ON**.
- **DO NOT** turn SW 2, switch 4 **ON**.

**Note:** Main terminal 10 is not available for a photo sensor when using a SHADOW LOOP. See page 29 about shadow loop connection.

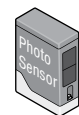


SW1, **switch 8 MUST be OFF**:

24-VDC 500 mA accessory power can be provided for desired accessories wired to terminal 12.

**DO NOT** turn ON SW1, switch 8.

**Note:** power to terminal 12 is ONLY available when the gate is opening, open, or closing. Power is OFF when the gate is closed.

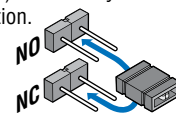


Operation of relay is dependent on setting of SW 1, **switches 6 and 7**.

**Relay contacts** can be set for Normally Open (NO) or Normally Closed (NC) operation.

**Contact rating is 1 amp maximum at 24-volts DC.**

**Note:** Board relay is used for a shadow loop when using a SHADOW LOOP. See page 29 about shadow loop connection.



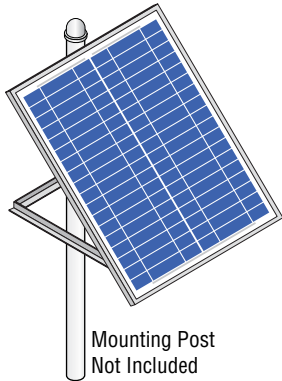
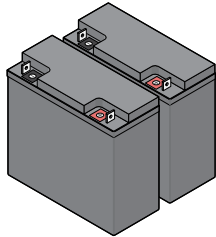
**Terminal #3 Note:**

Exceeding 250 mA of power from this terminal may cause the circuit board transformer to overheat, causing intermittent problems.

# SPECIFICATIONS FOR MODEL 6524-081

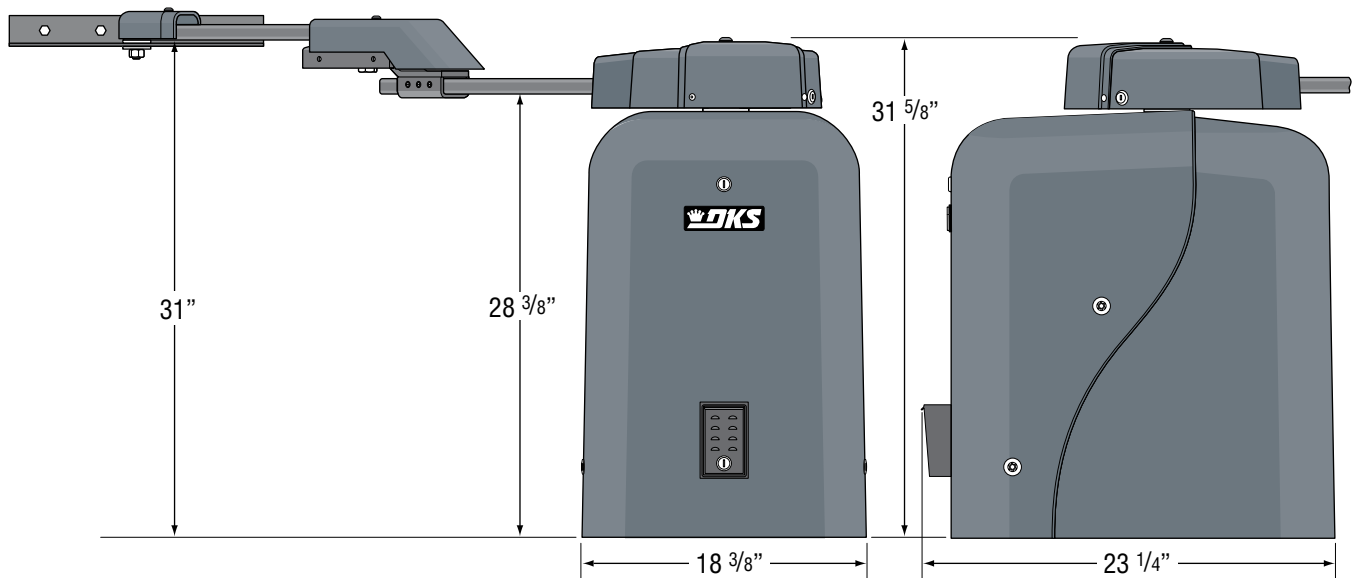
Use this manual for the Model 6524 operator with circuit board 4100-010 Rev AA or higher ONLY.

**OPTIONAL DKS Solar  
Power Kit Recommended**  
Two 12 Volt 18 Amp/Hr  
Batteries  
One 24 VDC Solar Panel  
P/N 2000-070



Class of Operation	UL 325 Class I, II, III, IV
Type of Gate	Vehicular Swing Gate Only
Motor	Quadra Drive DC Motor
Power Input: Volts@Amps	24 VDC @ 8 Amps
Batteries	None Included (24 VDC Output Required)
Maximum Gate Cycles	DKS Solar Power Kit: Solar Panel Power - Continuous DKS Solar Power Kit: ONLY Battery Power - 150+ Cycles Unknown when using Third Party Solar Power Setup
	<b>Battery Power Note:</b> The number of gate cycles when using <b>ONLY</b> battery power <b>WILL</b> vary depending on gate weight, gate length, operating condition of gate hardware, temperature and amount of charge in batteries.
Gate Speed	12-14 Sec
Max Gate Weight	600 lbs - 272 Kgs
Max Gate Length	18 Ft - 5.4 Meters
Inherent Entrapment Protection Device	Inherent Reverse Sensor System (Type A)
External Entrapment Protection Device Inputs (Monitored Inputs)	Connection inputs for Non-contact Sensor - Photo Sensor (Type B1) Connection input for Contact Sensor - Reversing Edge (Type B2)

**TWO (2) Entrapment Protection Devices are REQUIRED for UL 325 compliance.  
Type B1 and B2 MUST be MONITORED when used.**



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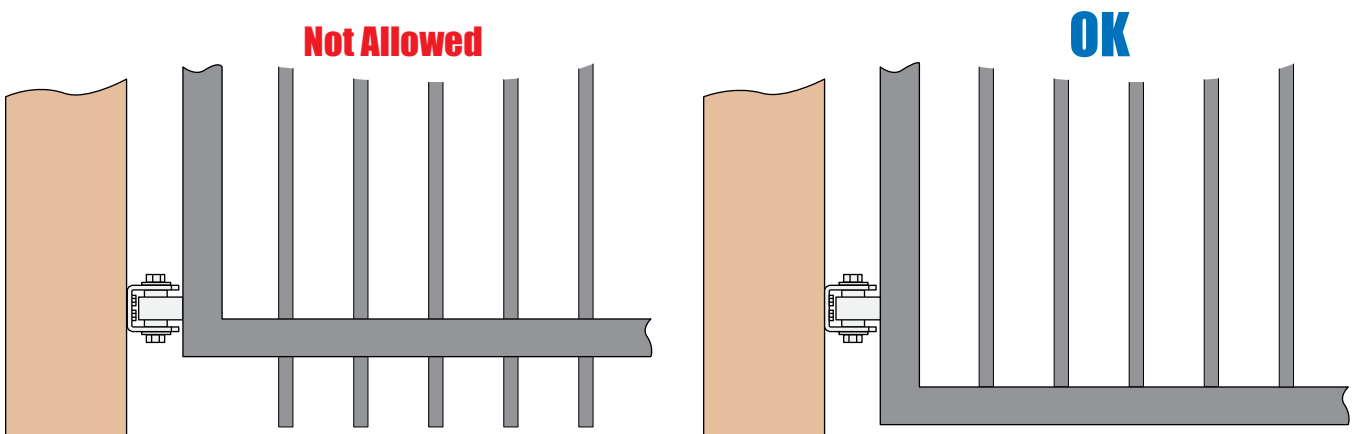
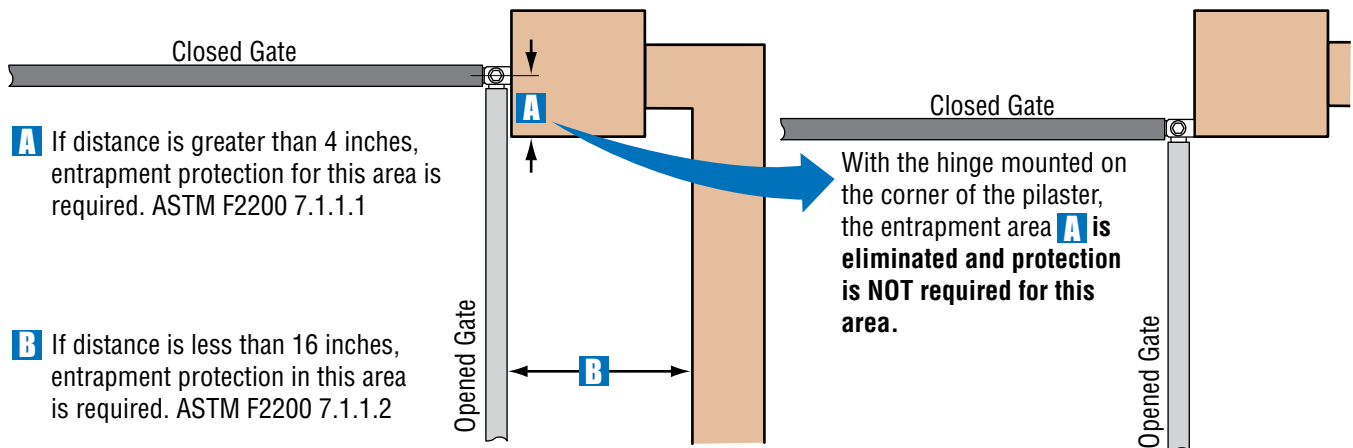
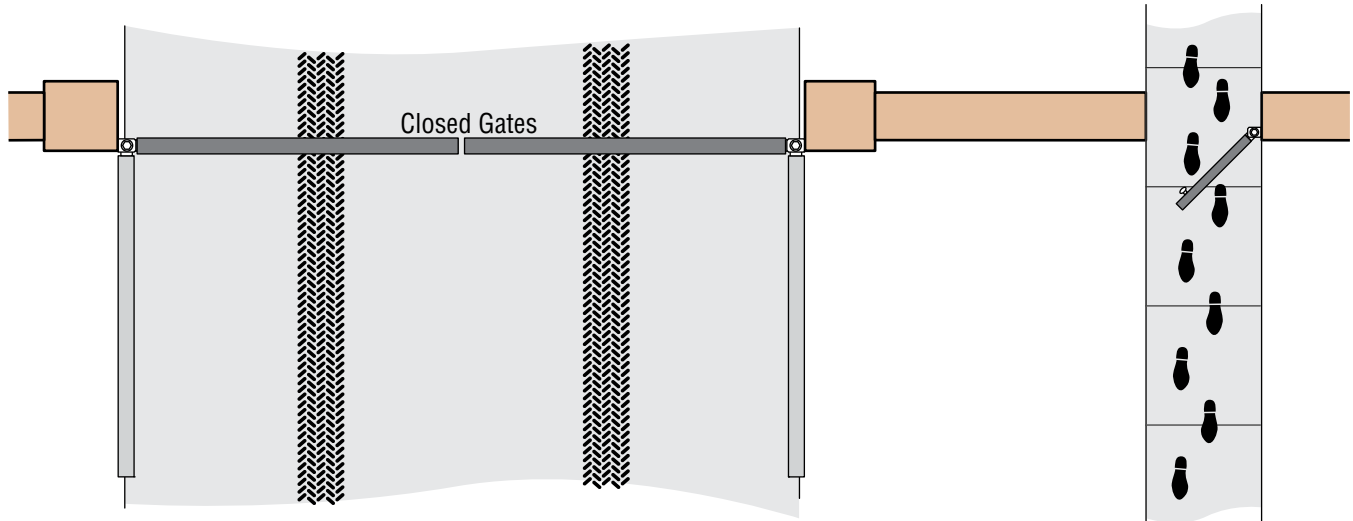
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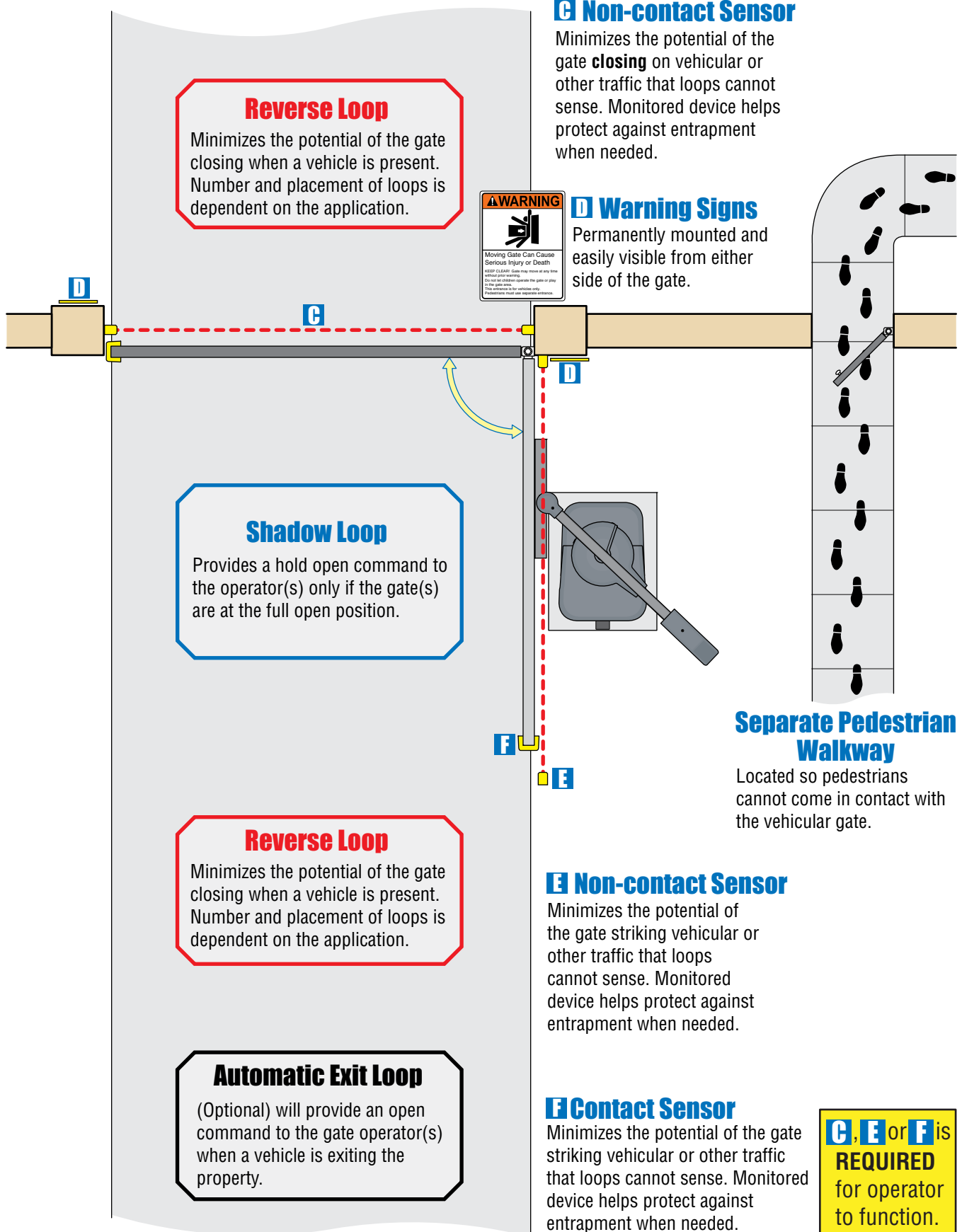
# Swing Gate Requirements

**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. (ref. UL 325 56.8.4.b)



Gates shall have smooth bottom edges, with vertical bottom edged protrusions not exceeding 0.50 inches. ASTM F2200 4.3

# Swing Gate Protection



# ASTM F2200 Standard for Gate Construction

Vehicular gates should be constructed and installed in accordance with ASTM F2200; Standard Specification for Automated Vehicular Gate Construction. For a copy of this standard, contact ASTM directly at 610-832-9585; service@astm.org; or [www.astm.org](http://www.astm.org).

## Important Safety Instructions

**WARNING - To reduce the risk of injury or death:**

1. READ AND FOLLOW ALL INSTRUCTIONS.
2. Never let children operate or play with gate controls. Keep the remote control away from children.
3. Always keep people and objects away from gate. **NO ONE SHOULD CROSS THE PATH OF THE MOVING GATE.**
4. Test the operator monthly. The gate **MUST** reverse on contact with a rigid object or stop or reverse 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!**

## Instructions regarding intended installation:

- Install the gate operator only if:
  1. The operator is appropriate for the construction of the gate and the usage class of the gate.
  2. All openings of a horizontal slide gate are guarded or screened from the bottom of the gate to a minimum of 6 feet (1.83 m) above the ground to prevent a 2 ¼ inch (57.2 mm) 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.
  3. All exposed pinch points are eliminated or guarded.
  4. Guarding is supplied for exposed rollers.
- 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.
- 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 should not open into public access areas.
- The gate must be properly installed and work freely in both directions prior to the installation of the gate operator. Do not over-tighten the operator clutch, pressure relief valve or reduce reversing sensitivity to compensate for a damaged gate.
- For gate operators utilizing Type D protection:
  1. The gate operator controls must be placed so that the user has full view of the gate area when the gate is moving.
  2. A warning placard shall be placed adjacent to the controls.
  3. An automatic closing device (such as a timer, loop sensor, or similar device) shall not be employed.
  4. No other activation device shall be connected.
- 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 should have a security feature to prevent unauthorized use.
- The Stop and/or Reset button must be located in the line-of-sight of the gate. Activation of the reset control shall not cause the operator to start.
- A minimum of two (2) WARNING SIGNS shall be installed, one on each side of the gate where easily visible.
- For gate operators utilizing a non-contact sensor:
  1. See the instructions on the placement of non-contact sensors for each type of application.
  2. 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 in the opening direction.
  3. One or more non-contact sensors shall be located where the risk of entrapment or obstruction exist, such as the perimeter reachable by a moving gate or barrier.
- For gate operators utilizing contact sensors:
  1. One or more contact sensors shall be located where the risk of entrapment or obstruction exist, such as at the leading edge, trailing edge, and post mounted both inside and outside of a vehicular horizontal slide gate.
  2. One or more contact sensors shall be located at the bottom edge of a vehicular vertical lift gate.
  3. One or more contact sensors shall be located at the pinch point of a vehicular vertical pivot gate.
  4. A hardwired contact sensor shall be located and its wiring arranged so that the communication between the sensor and the gate operator is not subjected to mechanical damage.
  5. A wireless contact sensor such as 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 obstructions. A wireless contact sensor shall function under the intended end-use conditions.
  6. One or more contact sensors shall be located at the bottom edge of a vertical barrier (arm).



# Important Notices

Vehicular gate operator products provide convenience and security. However, gate operators must use high levels of force to move gates and most people underestimate the power of these systems and do not realize the potential hazards associated with an incorrectly designed or installed system. These hazards may include:

- Pinch points
- Entrapment areas
- Reach through hazards
- Absence of entrapment protection devices
- Improperly located access controls
- Absence of vehicle protection devices
- Absence of controlled pedestrian access

In addition to these potential hazards, automated vehicular gate systems must be installed in accordance with the UL 325 Safety Standard and the ASTM F2200 Construction Standard. Most people are unaware of, or are not familiar with, these standards. If an automated vehicular gate system is not properly designed, installed, used and maintained, serious injuries or death can result. Be sure that the installer has instructed you on the proper operation of the gate and gate operator system.

Be sure that the installer has trained you about the basic functions of the required reversing systems associated with your gate operating system and how to test them. These include reversing loops, inherent reversing system, electric edges, photoelectric cells, or other external devices.

- This Owner's Manual is your property. Keep it in a safe place for future reference.
- Be sure that all access control devices are installed a minimum distance of 6 feet away from the gate and gate operator, or in such a way that a person cannot touch the gate or gate operator while using the device. If access control devices are installed in violation of these restrictions, immediately remove the gate operator from service and contact your installing dealer.

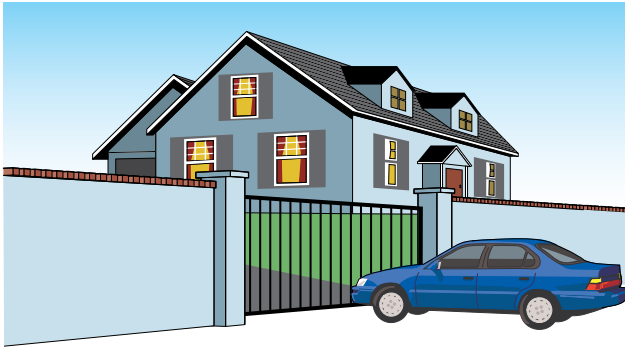
**Opening device MUST be mounted a minimum of 6 feet from the gate and NOT accessible through the gate!**



- Loops and loop detectors, photo-cells or other equivalent devices must be installed to prevent the gate from closing on vehicular traffic.
- The speed limit for vehicular traffic through the gate area is 5 MPH. Install speed bumps and signs to keep vehicular traffic from speeding through the gate area. Failure to adhere to posted speed limits can result in damage to the gate, gate operator, and to the vehicle.
- Be sure that all persons who will use the gate system are familiar with the proper use of the gate and gate operator and are familiar with the possible hazards associated with the gate system.
- Be sure that warning signs are permanently installed on both sides of the gate in an area where they are fully visible to traffic.
- It is your responsibility to periodically check all entrapment protection devices. If any of these devices are observed to function improperly, remove the operator from service immediately and contact your installing or servicing dealer.
- Follow the recommended maintenance schedule.
- Do not allow children to play in the area of the operator or to play with any gate-operating device.
- To remove the gate operator from service, operate the gate to the full open position and then shut off power to the operator at the service panel.

# UL 325 Entrapment Protection

## UL 325 Classifications



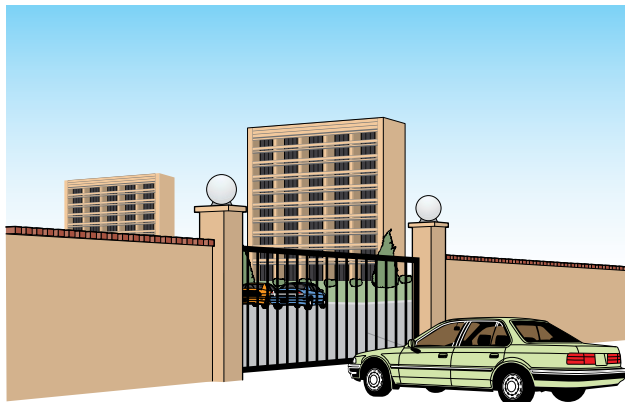
### Class I - Residential Vehicular Gate Operator

A vehicular gate operator (or system) intended for use in garages or parking areas associated with a residence of one-to four single families.



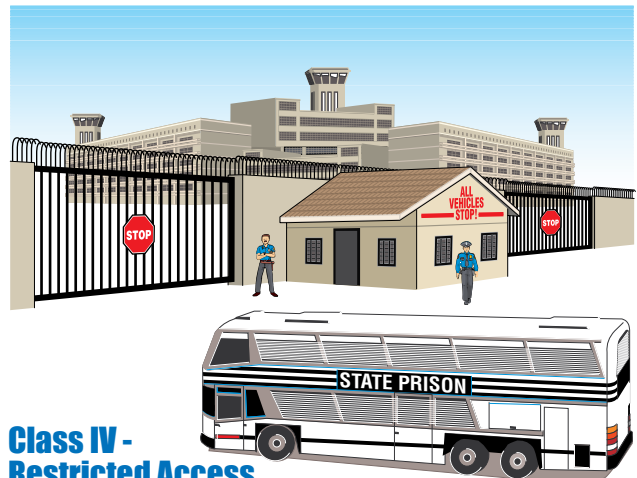
### Class III - Industrial/Limited Access Vehicular Gate Operator

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



### Class II - Commercial/General Access Vehicular Gate Operator

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



### Class IV - Restricted Access Vehicular Gate Operator

A vehicular gate operator (or system) 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.

## Gate Operator Category

Effective January 12, 2016	Horizontal Slide, Vertical Lift, Vertical Pivot	Swing, Vertical Barrier (Arm)
Entrapment Protection Types	A, B1*, B2* or D	A, B1*, B2*, C or D

**Type A** - Inherent entrapment protection system.

**Type B1** - Non-contact sensor (photoelectric sensor or the equivalent).

**Type B2** - Contact sensor (edge device or equivalent).

**Type C** - Inherent force limiting, inherent adjustable clutch or inherent pressure relief device.

**Type D** - Actuating device requiring constant pressure to maintain opening or closing motion of the gate.

\* B1 and B2 means of entrapment protection must be MONITORED.

**Vertical Barrier Note:** Barrier gate operators (arm) that is not intended to move toward a rigid object closer than 16 inches (406 mm) are not required to be provided with a means of entrapment protection.

# Glossary

**GATE** - A moving barrier such as a swinging, sliding, raising, lowering, or the like, barrier, that is a stand-alone passage barrier or is that portion of a wall or fence system that controls entrance and/or egress by persons or vehicles and completes the perimeter of a defined area.

**RESIDENTIAL VEHICULAR GATE OPERATOR – CLASS I** - A vehicular gate operator (or system) intended for use in a home of one-to four single family dwelling, or garage or parking area associated therewith.

**COMMERCIAL / GENERAL ACCESS VEHICULAR GATE OPERATOR - CLASS II** - A vehicular gate operator (or system) intended for use in a commercial location or building such as a multi-family housing unit (five or more single family units), hotels, garages, retail store, or other building servicing the general public.

**INDUSTRIAL / LIMITED ACCESS VEHICULAR GATE OPERATOR - CLASS III** - A vehicular gate operator (or system) intended for use in an industrial location or building such as a factory or loading dock area or other locations not intended to service the general public.

**RESTRICTED ACCESS VEHICULAR GATE OPERATOR - CLASS IV** - A vehicular gate operator (or system) 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.

**VEHICULAR BARRIER (ARM) OPERATOR (OR SYSTEM)** - An operator (or system) that controls a cantilever type device (or system), consisting of a mechanical arm or barrier that moves in a vertical arc, intended for vehicular traffic flow at entrances or exits to areas such as parking garages, lots or toll areas.

**VEHICULAR HORIZONTAL SLIDE-GATE OPERATOR (OR SYSTEM)** - A vehicular gate operator (or system) that controls a gate which slides in a horizontal direction that is intended for use for vehicular entrance and exit to a drive, parking lot, or the like.

**VEHICULAR SWING-GATE OPERATOR (OR SYSTEM)** - A vehicular gate operator (or system) that controls a gate which moves in an arc in a horizontal plane that is intended for use for vehicular entrance and exit to a drive, parking lot, or the like.

**SYSTEM** - In the context of these requirements, a system refers to a group of interacting devices intended to perform a common function.

**WIRED CONTROL** - A control implemented in a form of fixed physical interconnections between the control, the associated devices, and an operator to perform predetermined functions in response to input signals.

**WIRELESS CONTROL** - A control implemented in means other than fixed physical interconnections (such as radio waves or infrared beams) between the control, the associated devices, and an operator to perform predetermined functions in response to input signals.

**INHERENT ENTRAPMENT PROTECTION SYSTEM** - A system, examples being a motor current or speed sensing system, which provides protection against entrapment upon sensing an object and is incorporated as a permanent and integral part of the operator.

**EXTERNAL ENTRAPMENT PROTECTION DEVICE** - A device, examples being an edge sensor, a photoelectric sensor, or similar entrapment protection device, which provides protection against entrapment when activated and is not incorporated as a permanent part of an operator.

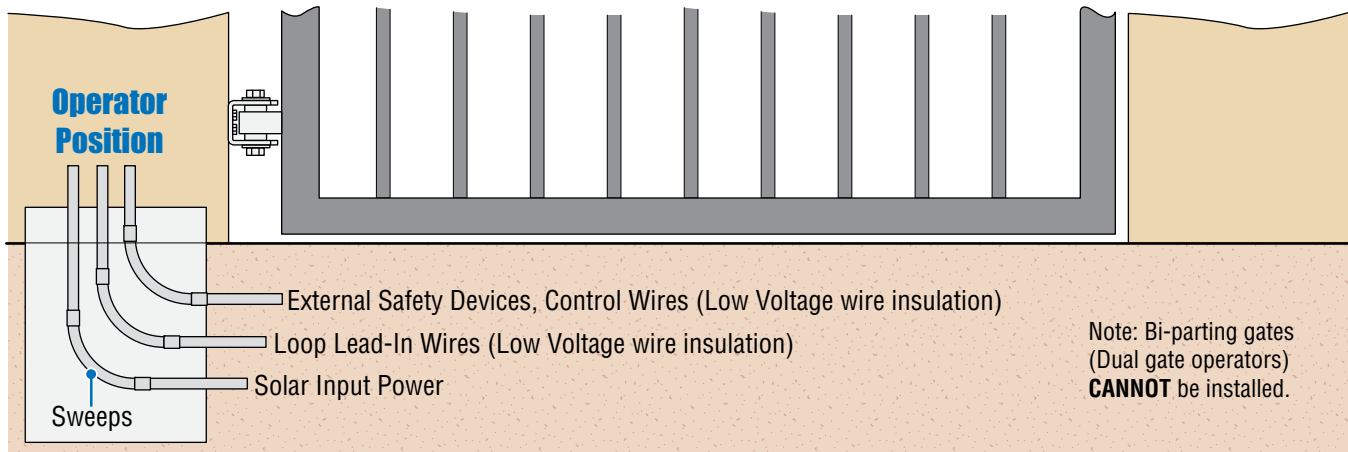
**ENTRAPMENT** - The condition when an object is caught or held in a position that increases the risk of injury.

# SECTION 1 - INSTALLATION

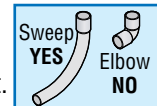
Prior to beginning the installation of the swing gate operator, we suggest that you become familiar with the instructions, illustrations, and wiring guide-lines in this manual. This will help insure that your installation is performed in an efficient and professional manner compliant with UL 325 safety and ASTM F2200 construction standards.

The proper installation of the vehicular swing gate operator is an extremely important and integral part of the overall access control system. Check all local building ordinances and building codes prior to installing this operator. Be sure your installation is in compliance with local codes.

## 1.1 Underground Conduit Requirements

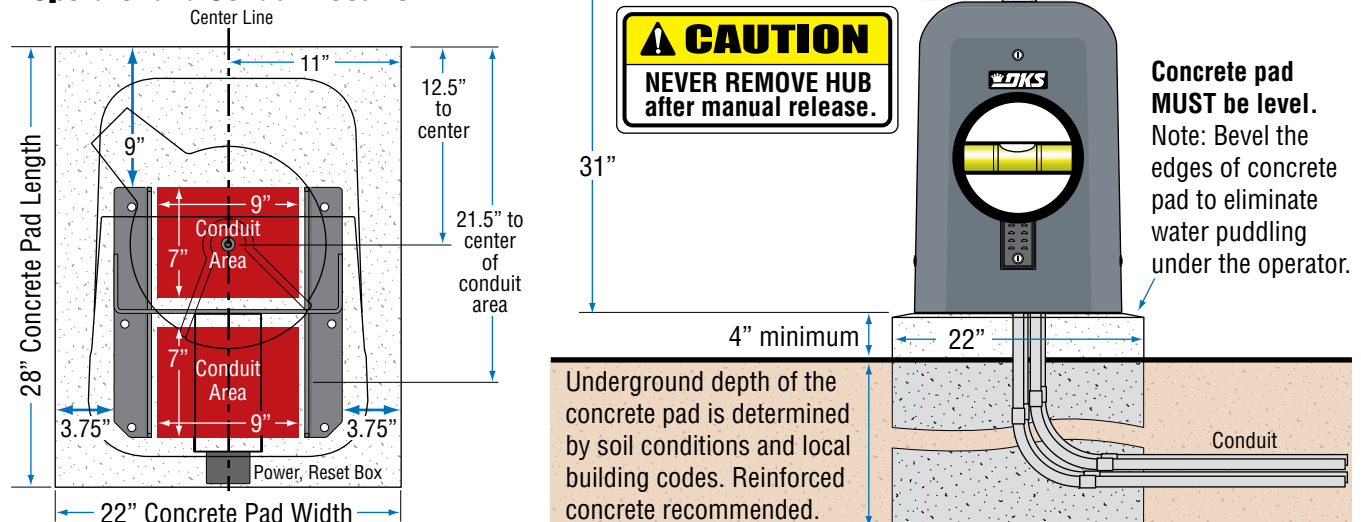


- The conduit requirements are for a typical slide gate operator installation. **The conduit requirements for your application may vary from this depending on your specific needs.**
- Use only sweeps for conduit bends. Do not use 90° elbows as this will make wire pulls very difficult and can cause damage to wire insulation. DoorKing recommends using 3/4-inch conduit.
- Installation of **ONE External Entrapment Protection Device** is **REQUIRED** (photo sensor and/or reversing edge).
- Be sure that all conduits are installed in accordance with local codes.
- Never** run low voltage rated wire insulation in the same conduit as high voltage rated wire insulation.



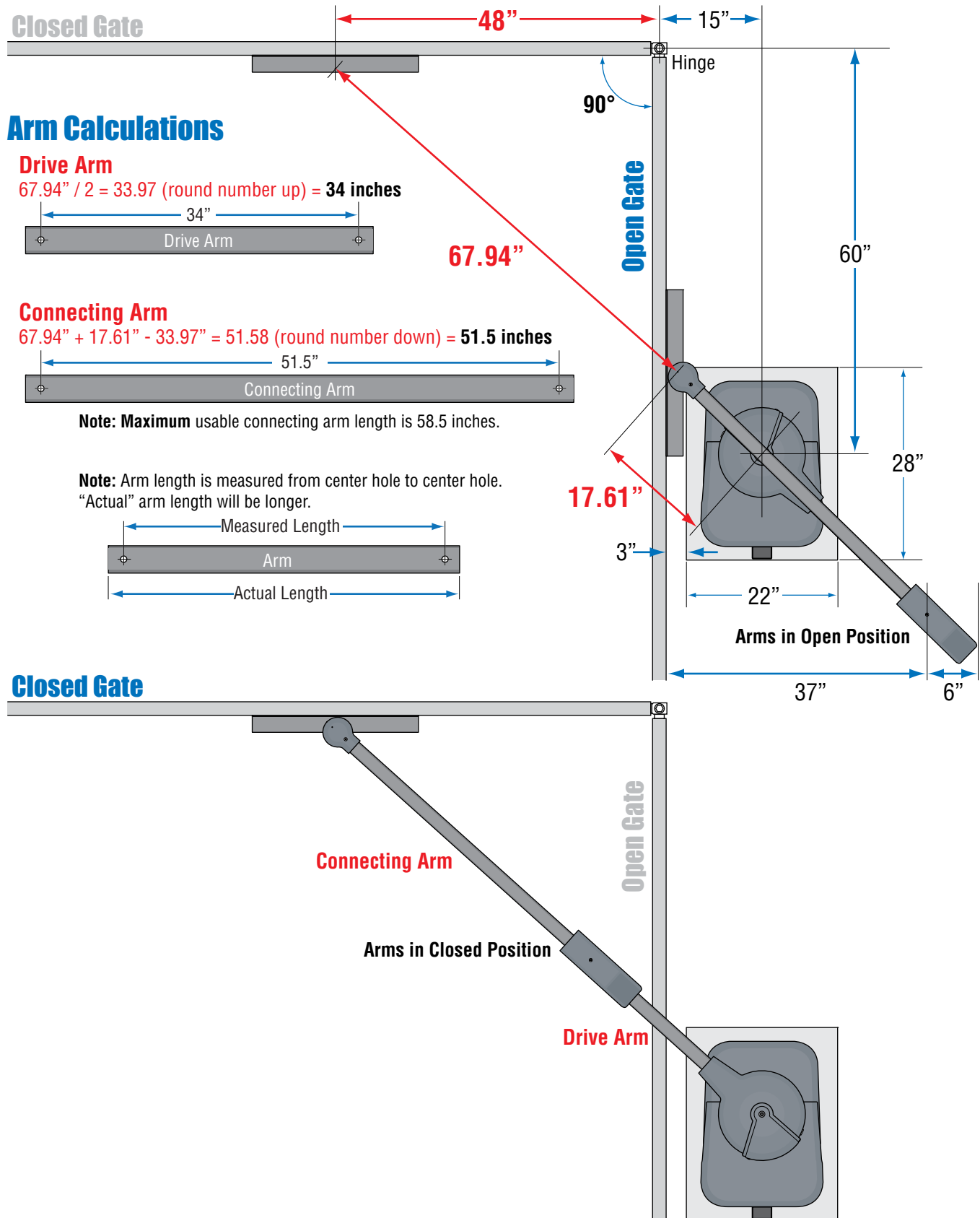
## 1.2 Concrete Pad

### Operator and Conduit Location

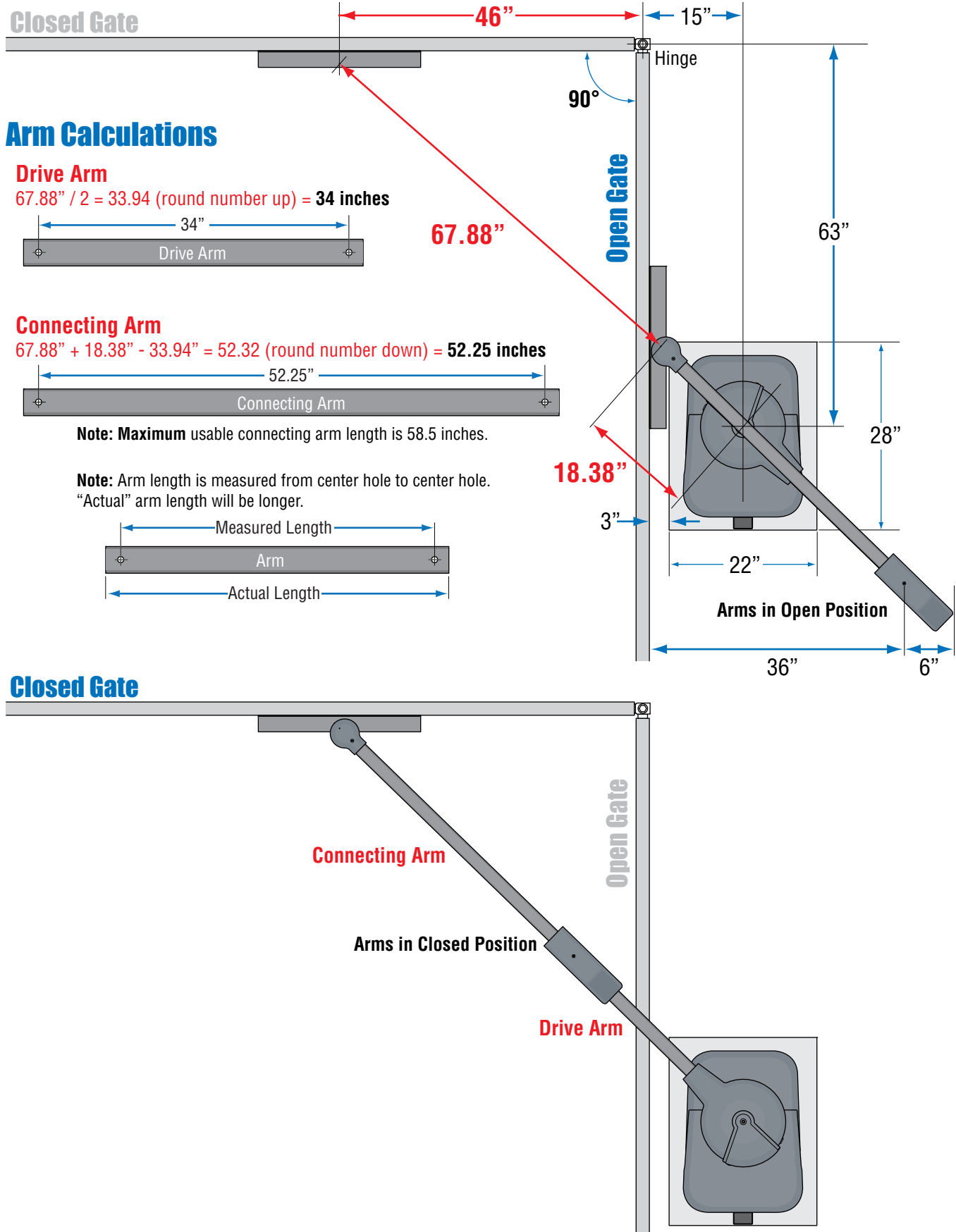


# 1.3 Installation Layouts

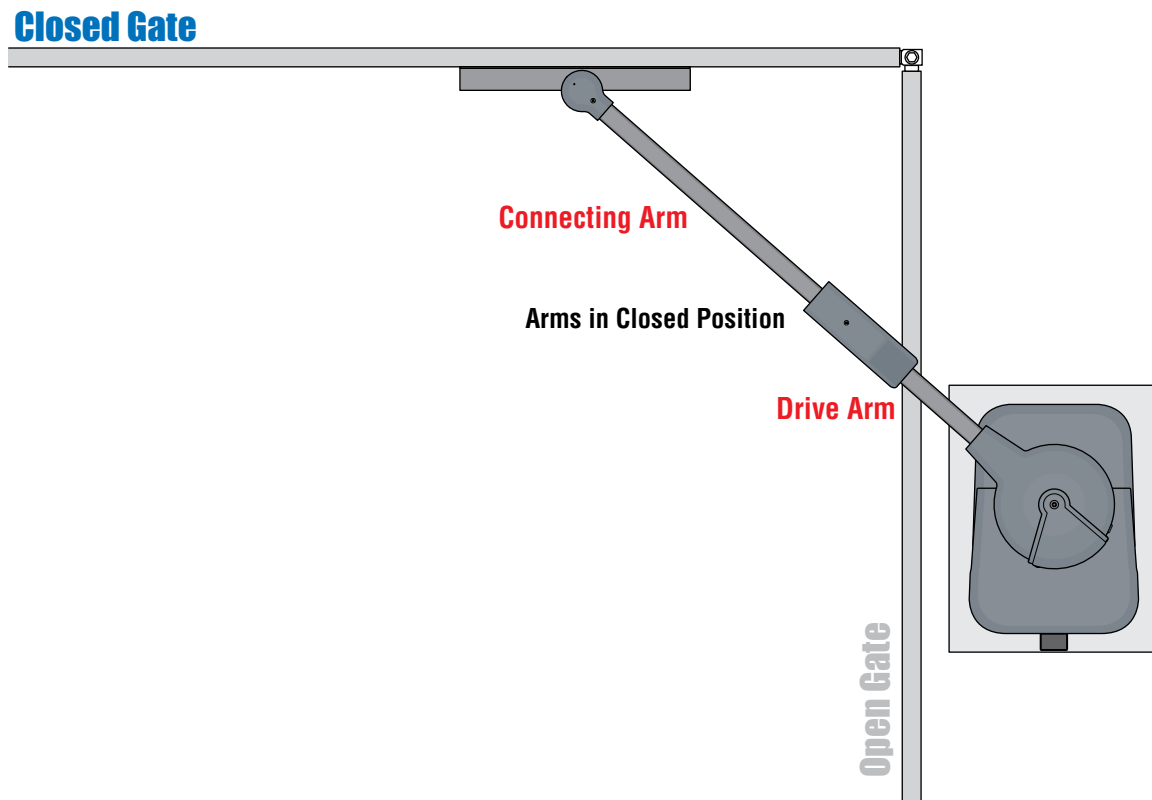
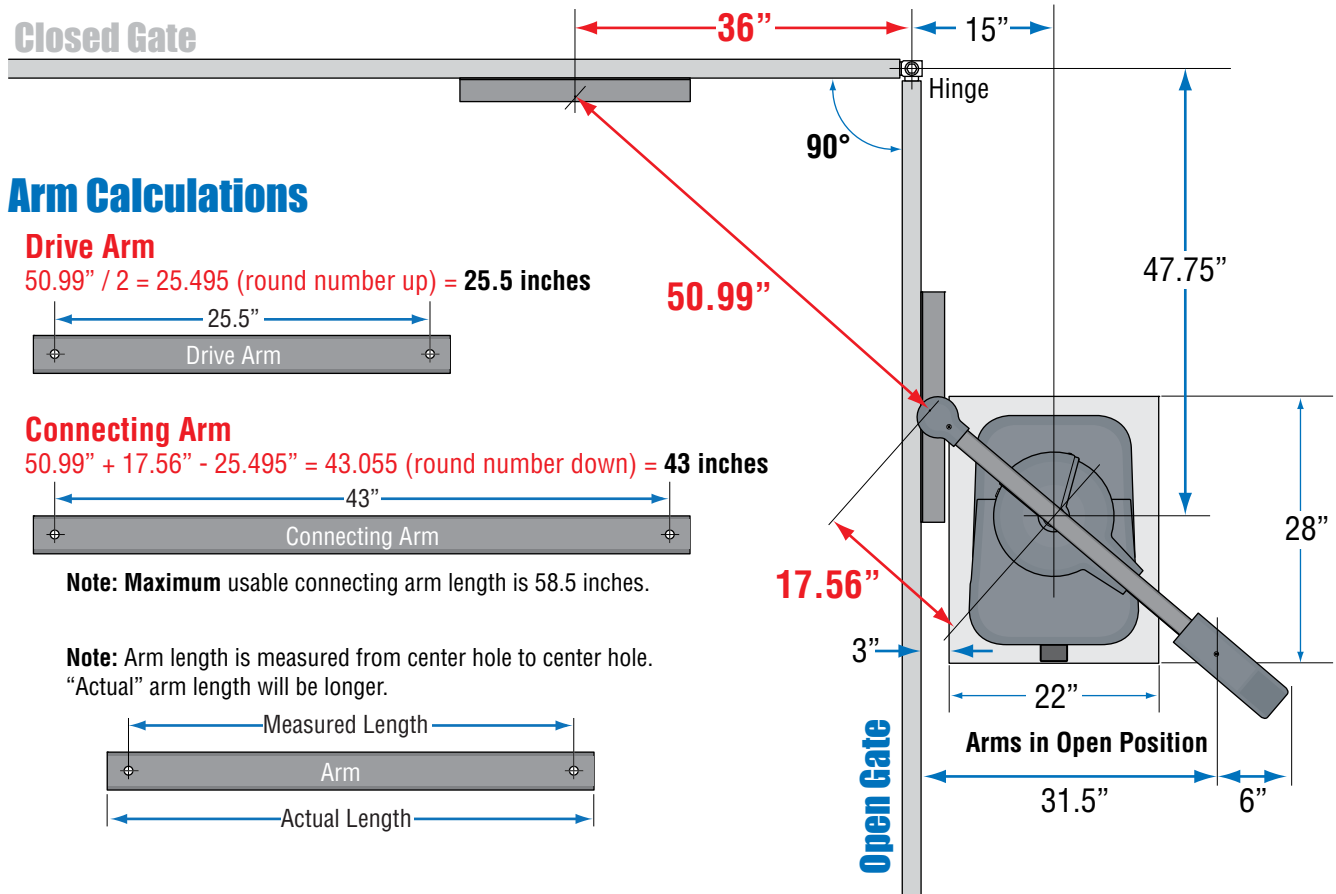
## 48" Gate Attachment Point - Gates up to 22 Ft.



## 46" Gate Attachment Point - Gates up to 22 Ft.



## 36" Gate Attachment Point - Gates up to 14 Ft.



## 28" Gate Attachment Point - Gates up to 8 Ft.

### Closed Gate

### Arm Calculations

#### Drive Arm

$$39.7" / 2 = 19.85 \text{ (round number down)} = 19.75 \text{ inches}$$



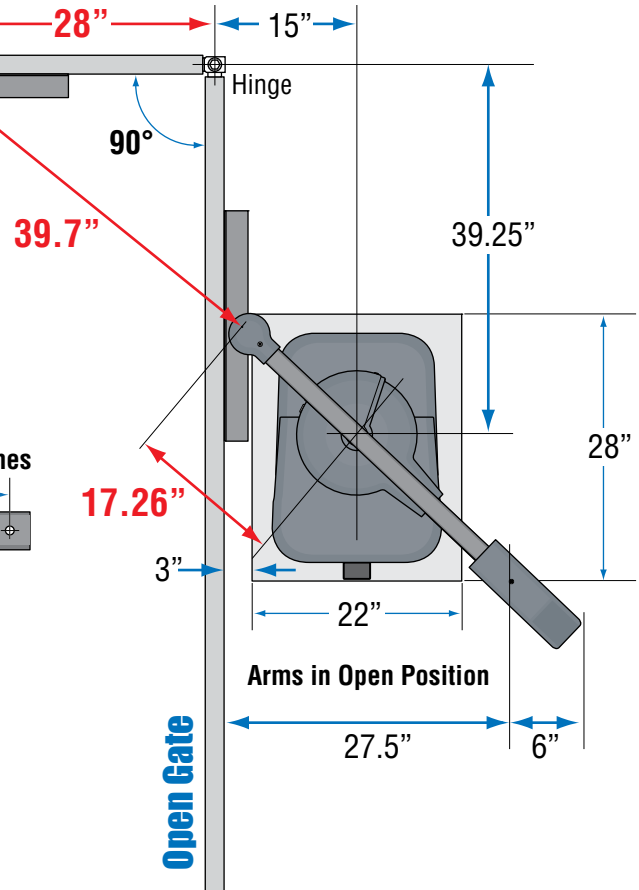
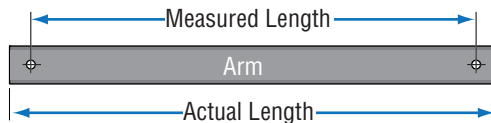
#### Connecting Arm

$$39.7" + 17.26" - 19.85" = 37.11 \text{ (round number down)} = 37 \text{ inches}$$

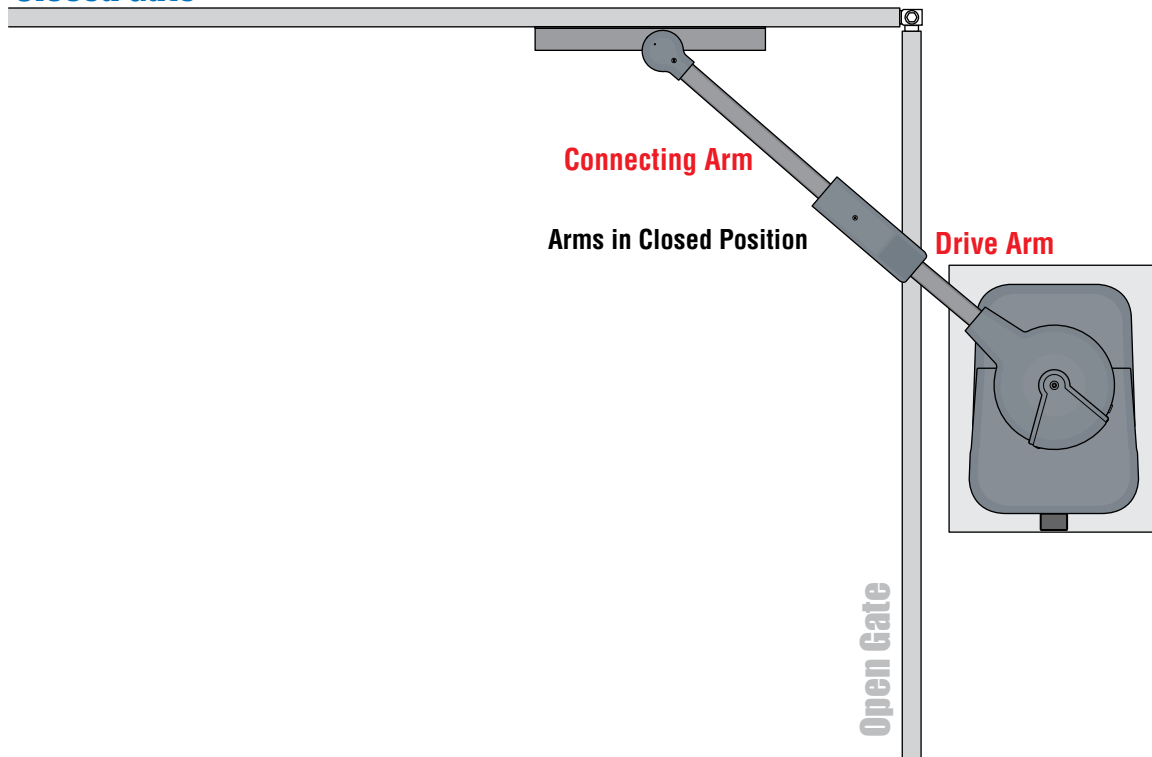


**Note:** Maximum usable connecting arm length is 58.5 inches.

**Note:** Arm length is measured from center hole to center hole.  
"Actual" arm length will be longer.



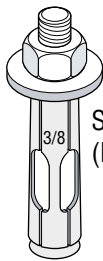
### Closed Gate





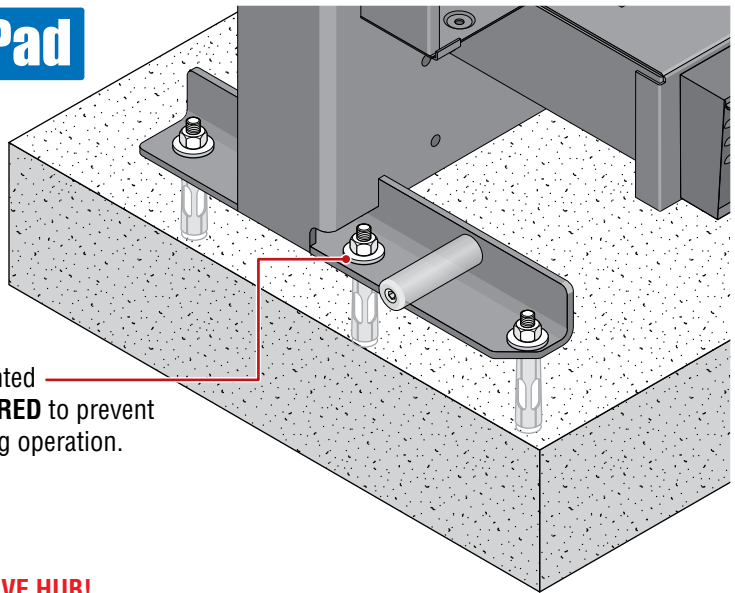
## 1.4 Securing Operator to Pad

Permanently attach the operator to the concrete pad using six (6) 3/8" x 3" sleeve anchors (not supplied).



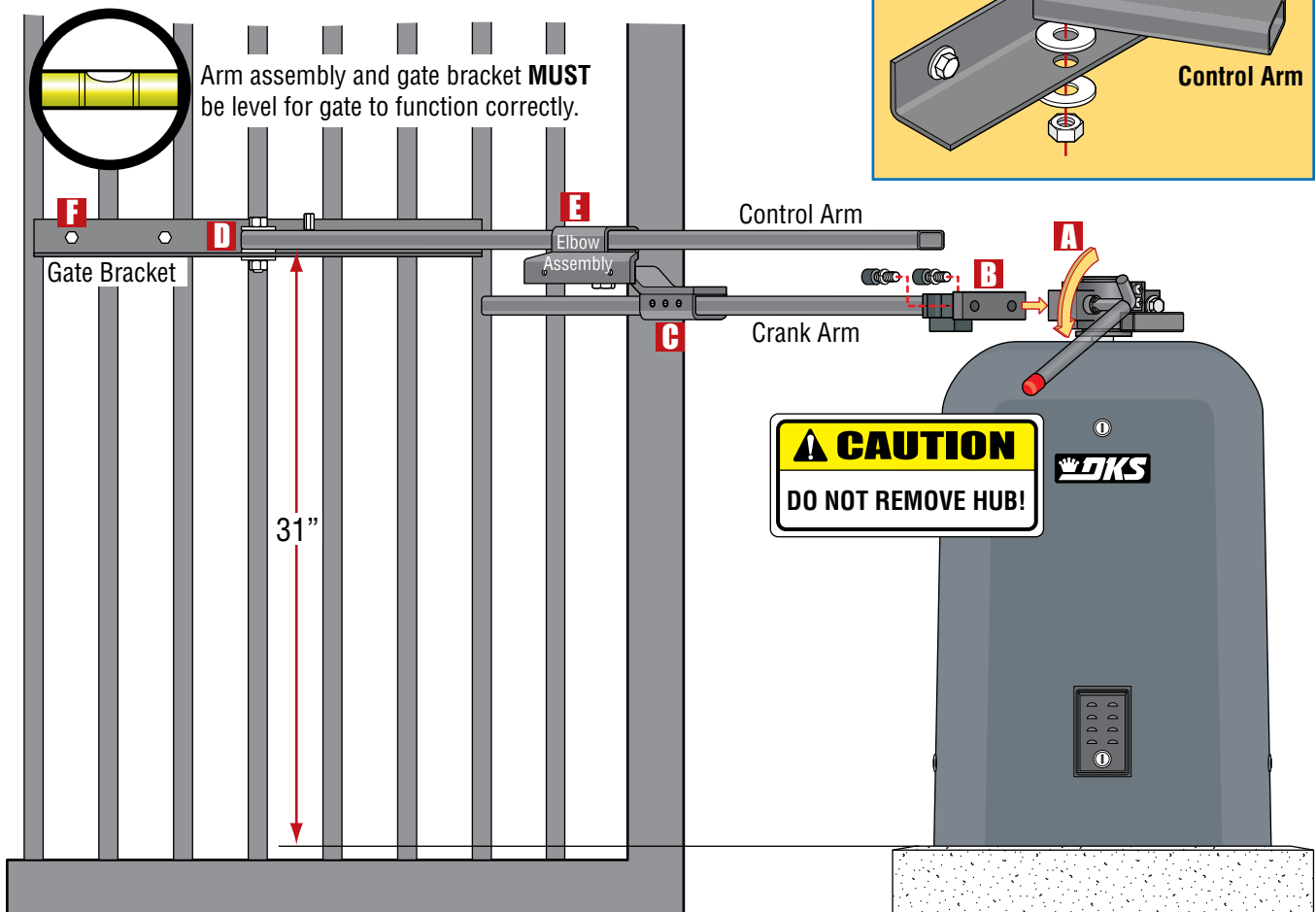
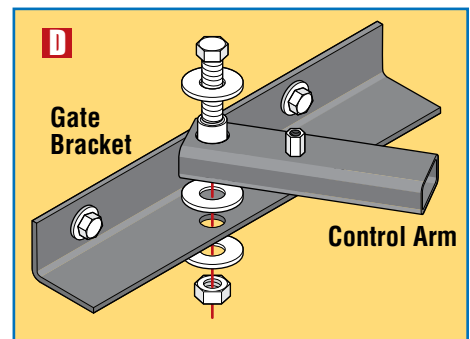
Sleeve Anchor  
(Not supplied)

**IMPORTANT:** Center mounted sleeve anchors are **REQUIRED** to prevent chassis from flexing during operation.



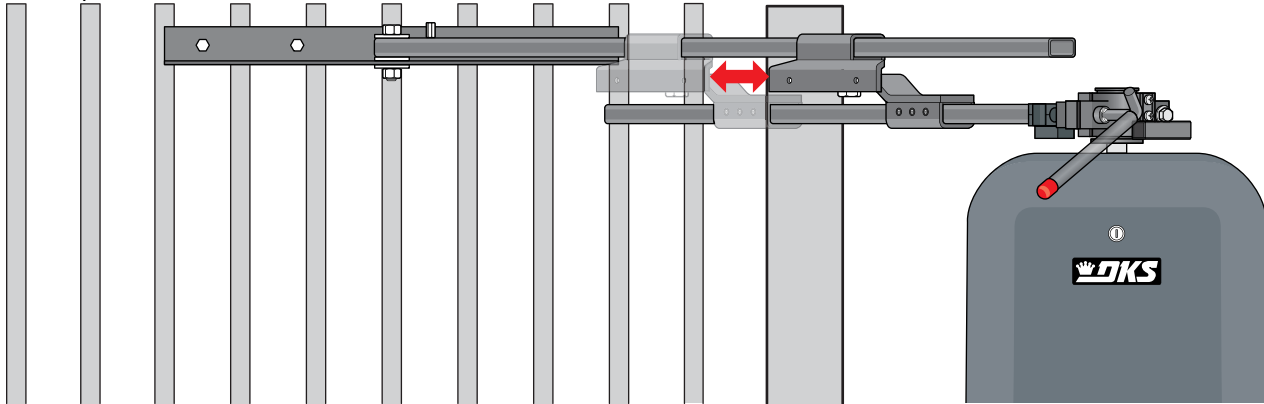
## 1.5 Attach Gate Bracket

- A** Release hub with release tool. **DO NOT REMOVE HUB!**
- B** Bolt crank arm to operator.
- C** Slide elbow assembly on crank arm.
- D** Bolt control arm to gate bracket.
- E** Slide control arm into elbow assembly. **KEEP ARM ASSEMBLY LEVEL.**
- F** Bolt gate bracket to gate.

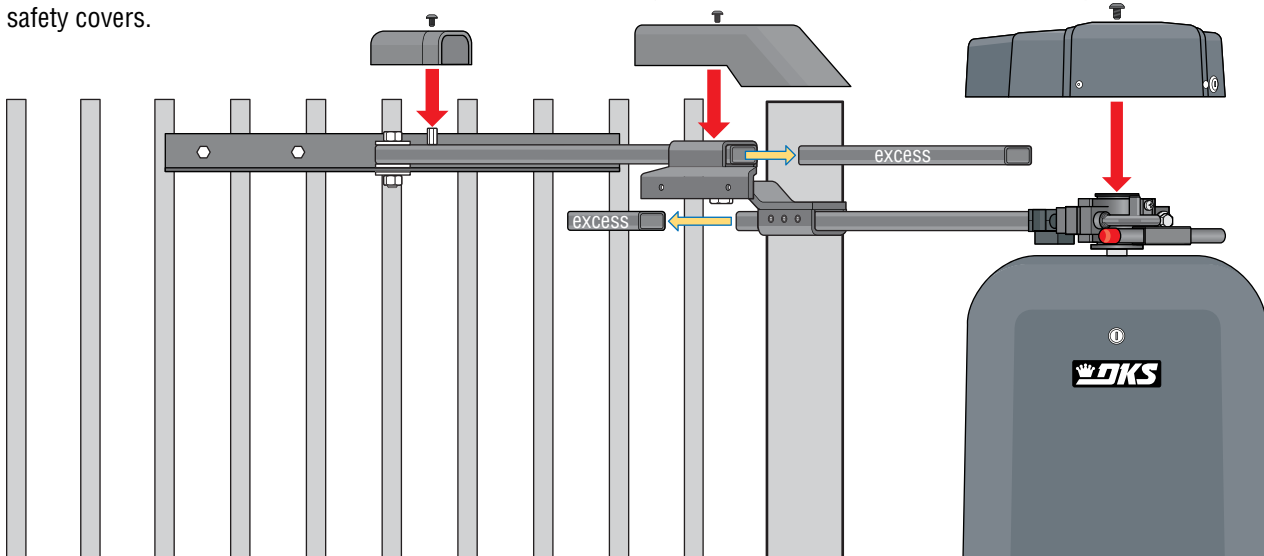


## 1.6 Determining Arm Lengths

Slide elbow assembly back and fourth, manually opening and closing gate until satisfied with the gate's 90° open and fully closed positions.



Mark and cut off excess arms. Secure arms to elbow assembly with 6 allen screws. Tighten hub and replace release tool. Install safety covers.



## 1.7 Installation of Warning Signs

This DoorKing Swing Gate Operator is shipped with two warning signs. The purpose of the warning sign is to alert uninformed persons, and to remind persons familiar with the gate system, that a possible hazard exists so that appropriate action can be taken to avoid the hazard or to reduce exposure to the hazard. See page 3 for suggested mounting positions of signs.

- **Permanently install the supplied warning signs in locations so that the signs are visible by persons on both sides of the gate.**
- Use appropriate hardware such as wood or sheet metal screws (not supplied) to install the warning signs.

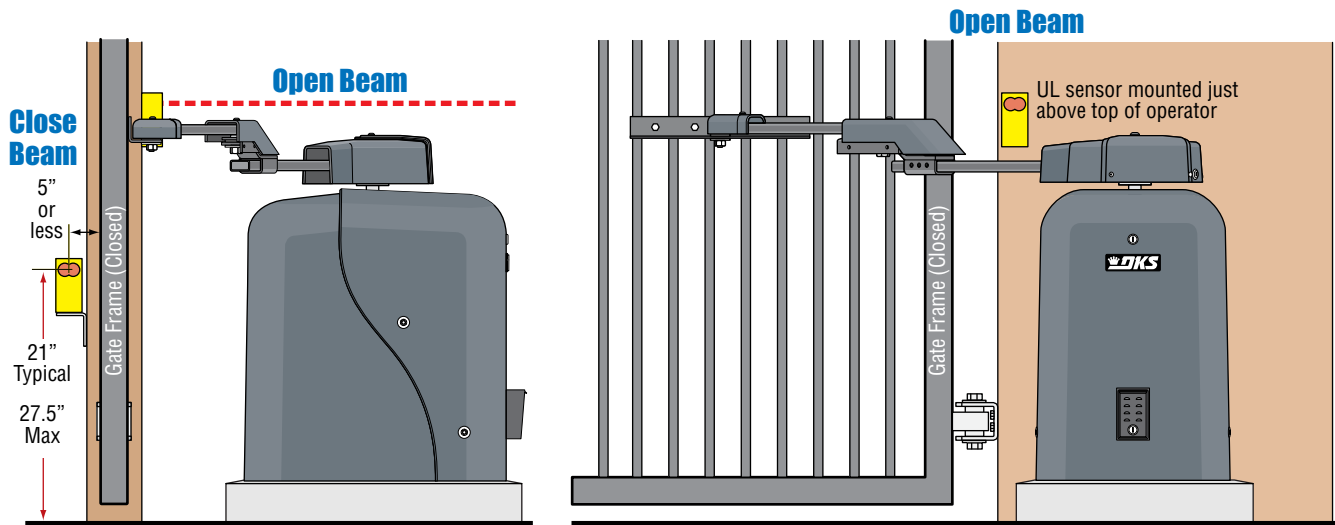


## 1.8 Entrapment Protection Installation

### External Entrapment Protection Devices:

In addition to the inherent reversing sensor system, this operator has a UL 325 terminal for the connection of **photo sensors**-Type B1 and/or **reversing edges**-Type B2 entrapment protection required by UL 325 standards. **At least ONE external entrapment protection device MUST be installed or the operator will NOT function.** Install these devices where the risk of entrapment or a safety hazard exists while the gate is moving. Specific installations will vary.

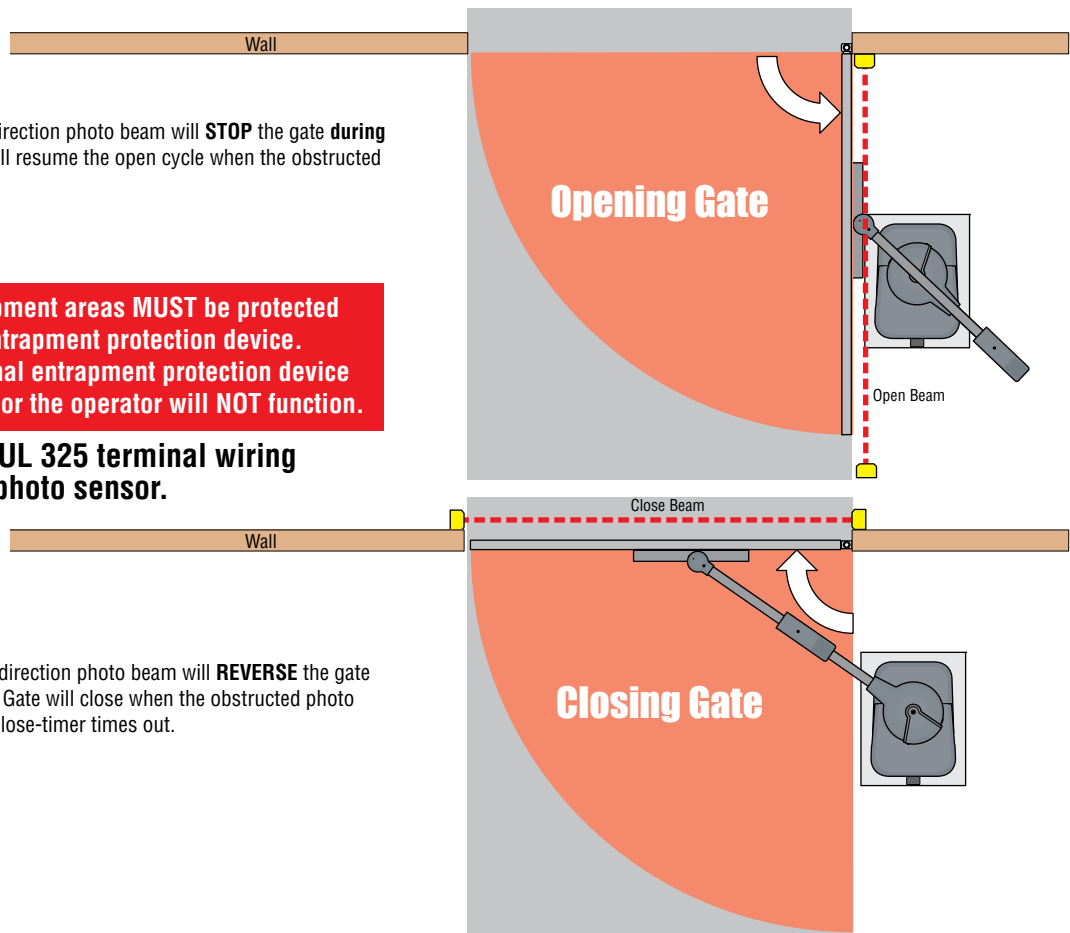
### Typical UL Photo Sensor mounting height and distance away from gate.



**OPEN Beam:** Obstructed open-direction photo beam will **STOP** the gate **during the open-direction only**. Gate will resume the open cycle when the obstructed photo beam has been cleared.

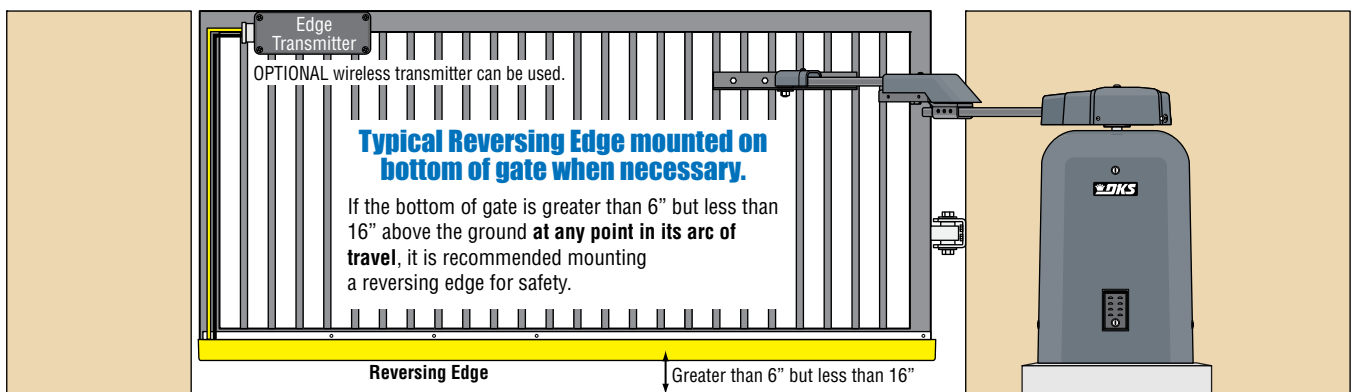
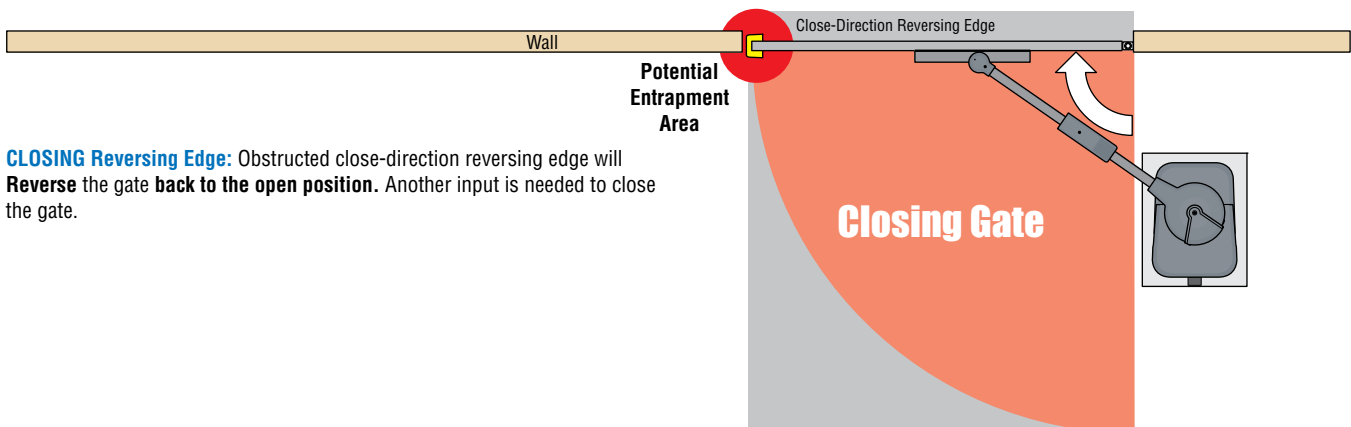
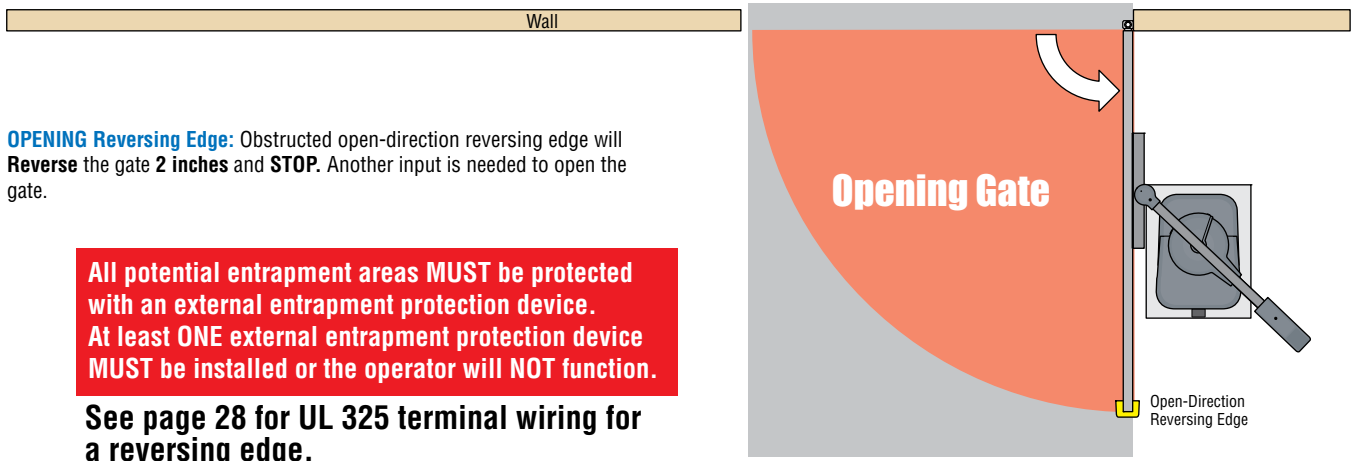
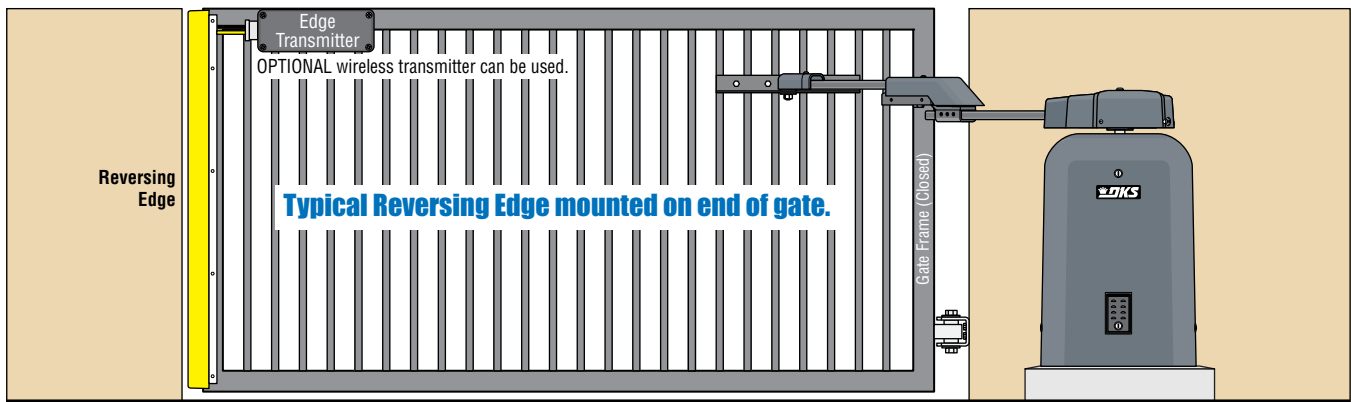
**All potential entrapment areas MUST be protected with an external entrapment protection device. At least ONE external entrapment protection device MUST be installed or the operator will NOT function.**

**See page 28 for UL 325 terminal wiring for a monitored photo sensor.**



**CLOSE Beam:** Obstructed close-direction photo beam will **REVERSE** the gate **during the close-direction only**. Gate will close when the obstructed photo beam has been cleared and the close-timer times out.

## 1.8 Continued



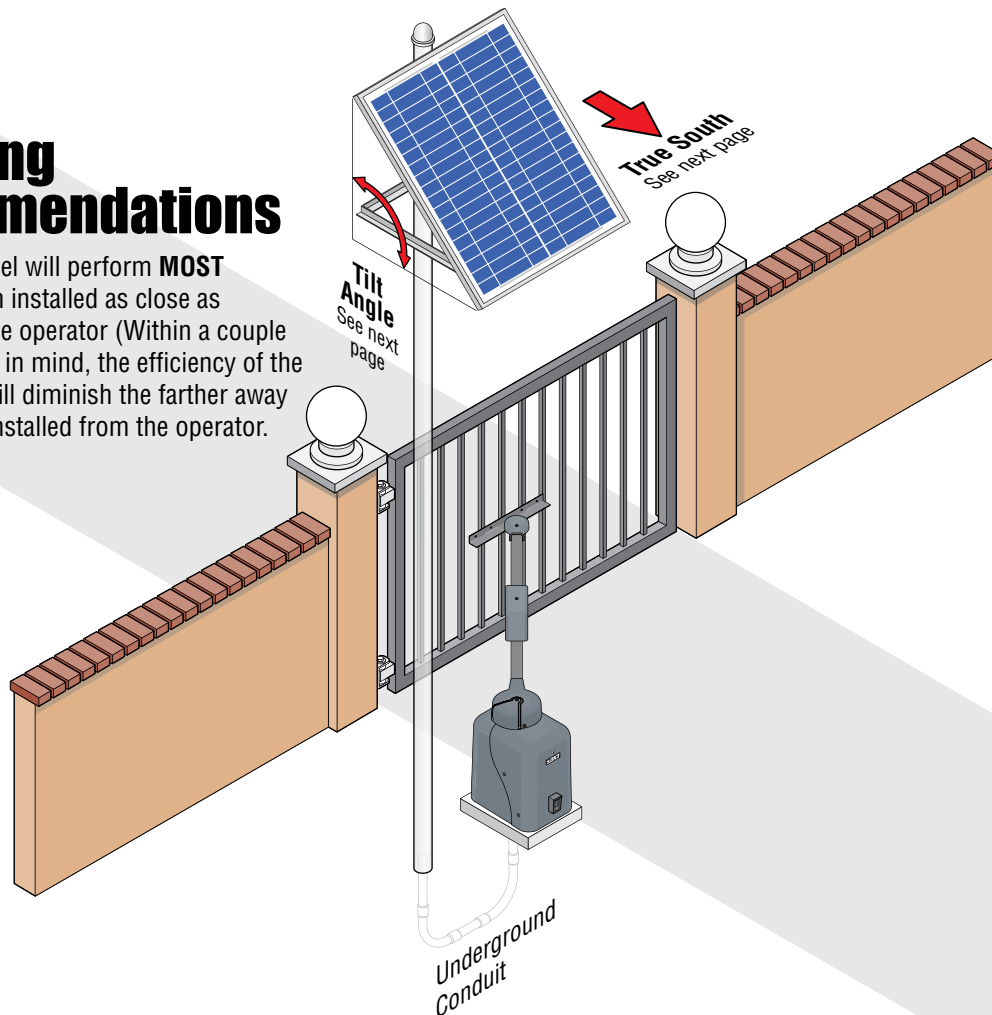
## 1.9 Concerns BEFORE Solar Panel Installation

Correct positioning of the solar panel will determine the efficiency of the system. In general, the panel should be facing **TRUE SOUTH** at a specific **TILT ANGLE** towards the sun using the information provided on the next page to achieve the highest efficiency. Some re-adjustment of the panel might be necessary to over time to “Fine Tune” the systems efficiency. The solar panel should be installed as close as possible to the operator in an area free and clear of **ALL** obstructions and shadows during the **ENTIRE** day. Generally, If the solar panel does **NOT** cast a shadow by the sun, the batteries are **NOT** being charged.

- **Trees / Buildings** that do not block the solar panel from direct sunlight in the summer, **could** block the panel during the winter. The sun's path across the sky is lower during the winter than in the summer. The shadows that do not obstruct the solar panel during the summer months, will cast longer shadows in the winter, which could block the panel then.
- **Wind** can exert extreme pressure on the solar panel and support post. Make sure they are securely fastened.
- **Dust** can accumulate on the panel over time. Cleaning the panel every so often is necessary to keep the system operating at its highest efficiency.
- **Snow** may cover the panel during the winter. You may want to re-adjust the panel to a steeper angle to allow the snow to slide off. Even then, the panel may still accumulate snow and need to be manually cleaned off when necessary to keep the system functioning.

### Mounting Recommendations

The solar panel will perform **MOST** efficient when installed as close as possible to the operator (Within a couple of feet). Keep in mind, the efficiency of the solar panel will diminish the farther away the panel is installed from the operator.



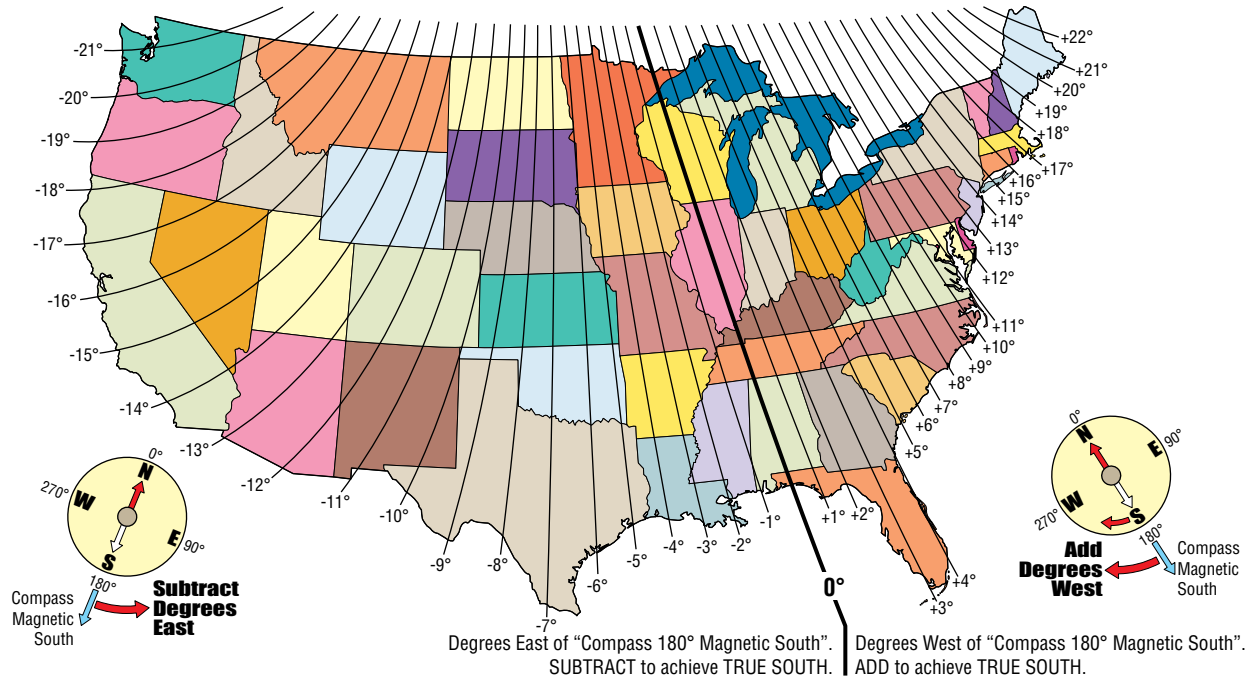
OPTIONAL DKS Solar Power Kit P/N 2000-070.  
If other solar sources are used, **output MUST be 24 VDC.**

## 1.10 Solar Panel Positioning

These charts should be used only for estimates. Solar systems can vary from this information. These maps do not take into account small climate changes and may not be 100% accurate for all locations.

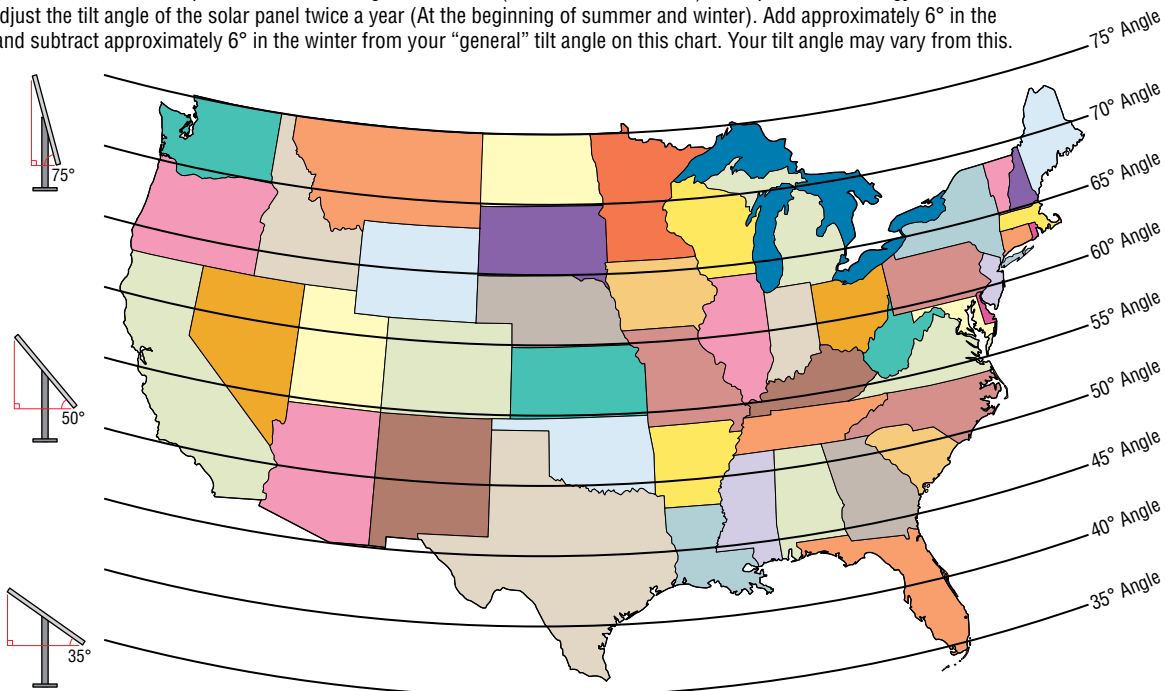
### Solar Panel MUST Point “TRUE SOUTH”

It is important for proper system operation that the solar panel is oriented to **TRUE SOUTH**. The directions of magnetic South and TRUE South differ from one another depending on geographic location. The map below shows the difference between magnetic south and TRUE south for your area.



### General Solar Panel “Tilt Angle”

It is simplest to mount the solar panel at a fixed tilt angle and leave it (Shown on chart below). To capture more energy from the sun, you can adjust the tilt angle of the solar panel twice a year (At the beginning of summer and winter). Add approximately 6° in the summer and subtract approximately 6° in the winter from your “general” tilt angle on this chart. Your tilt angle may vary from this.



## SECTION 2 - SOLAR POWER TO OPERATOR

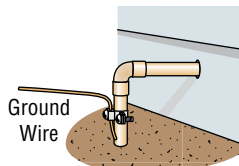
Before connecting the solar panel wire to the operator, make sure that the solar panel is blocked from the sunlight. **The solar panel is "HOT" (discharging power) whenever the sun is shining on it. It will shock you if you attempt to touch the wires while it is in the sunlight!**

Permanent wiring must be installed to the operator as required by local electrical codes. It is recommended that a licensed electrical contractor perform this work.

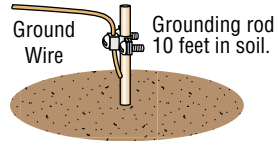
Since building codes vary from city to city, we highly recommend that you check with your local building department prior to installing any permanent wiring to be sure that all wiring to the operator complies with local code requirements.

### THIS GATE OPERATOR MUST BE PROPERLY GROUNDED!!

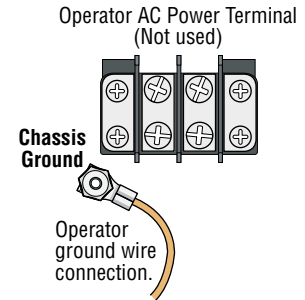
#### Typical Grounding Sources



Ground to metallic cold water pipe.



Grounding rod 10 feet in soil.



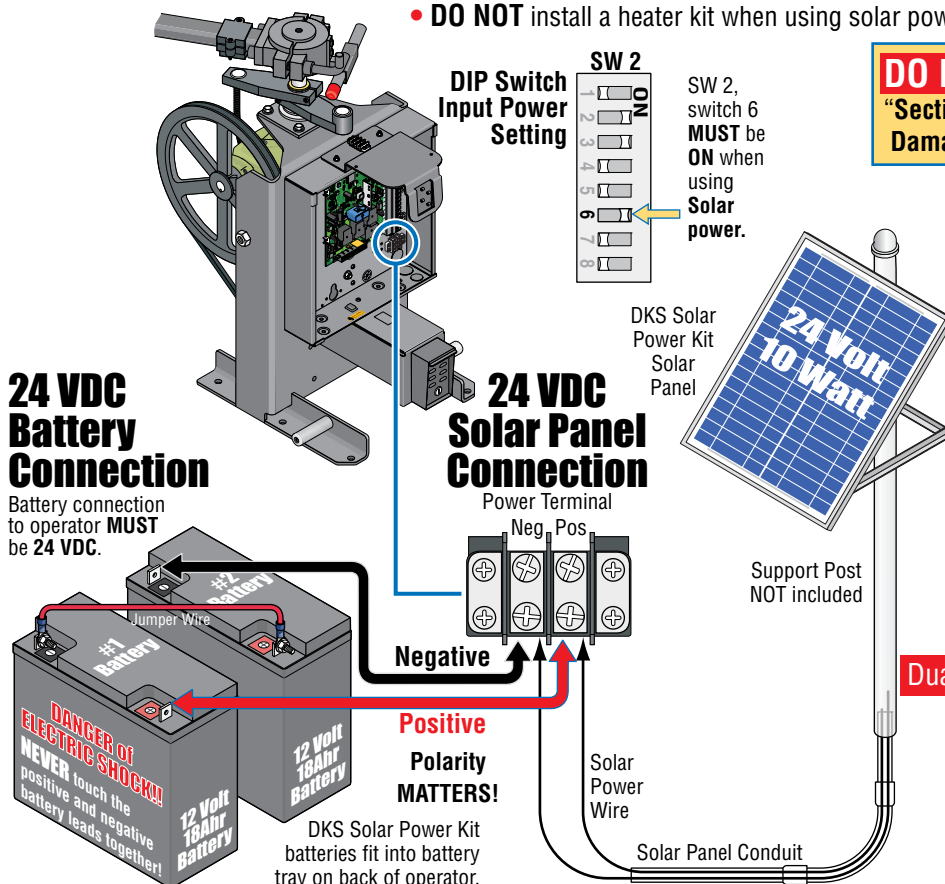
**IMPORTANT:** Ground wire shown without safety protection for clarity. Make sure ground wire is protected from being touched or electrical shock could occur!

### 2.1 Solar Power Connections

Connect **ONLY 24 VDC** power. DoorKing Solar Power Kit P/N 2000-070 is recommended. Third party **24 VDC batteries and solar panel** can be used if desired.

The solar panel will perform **MOST** efficient when installed as close as possible to the operator (Within a couple of feet). Keep in mind, the efficiency of the solar panel will diminish the farther away the panel is installed from the operator.

- **DO NOT** install a heater kit when using solar power.



**DO NOT** power up the operator until "Section 2.2" is complete (see next page). Damage could occur to the gate operator.

- Cover solar panel **BEFORE** connecting wire to power terminal.
- Route incoming solar power wire through the solar panel conduit and run wire to the **operator's power terminal**.
- Be sure wiring is installed in accordance with local codes. Be sure to color code all wiring.
- It is recommended that a surge suppressor (P/N 1878-010) be installed on the 24V solar power line to help protect the operator and circuit board from surges and power fluctuations.

**Dual gate operators CANNOT be used.**

#### CAUTION

**DO NOT** connect an **AC input power wire** to the Model 6524-081's power terminal when using Solar Power or **DAMAGE** will occur and **VOID** the warranty!

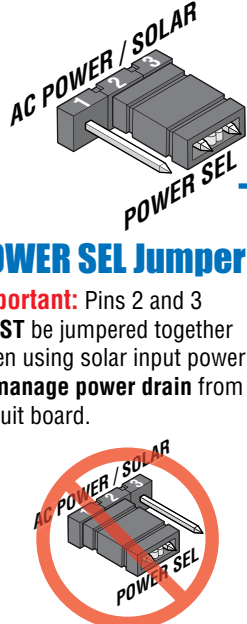
**An EXTERNAL ENTRAPMENT PROTECTION DEVICE MUST be connected or the gate operator WILL NOT function. See page 28.**



## 2.2 Power Select Jumper and Turning Power ON

The “**POWER SEL**” jumper on the circuit board **MUST** be set correctly or operator will not function correctly.

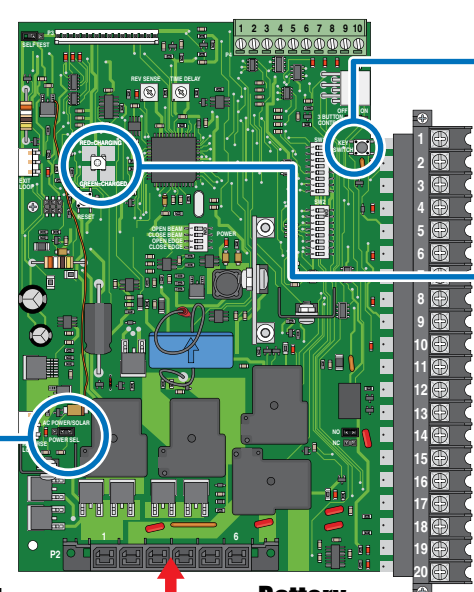
**DO NOT** cycle the operator until the “**DIP-Switches**” and the “**Limit Switches**” have been adjusted. Damage could occur to the gate and gate operator. See pages 22-24.



**POWER SEL Jumper**

**Important:** Pins 2 and 3 **MUST** be jumpered together when using solar input power to **manage power drain** from circuit board.

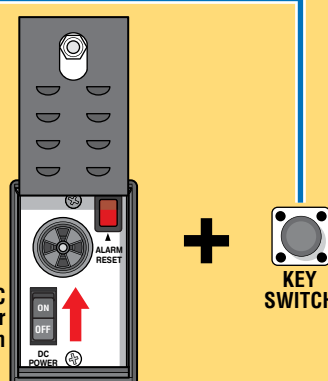
**DO NOT** jumper pins 1 and 2 together or circuit board will not manage power and **continually draw FULL** power from the batteries.



**Battery Plug P2**

**Important Battery Plug Note:** Battery Plug P2 comes from the factory unplugged and needs to be plugged into circuit board when operator is ready to be powered up.

**To power up operator:** turn DC power switch **ON**. Press **KEY SWITCH** and LEDs will light up on circuit board.



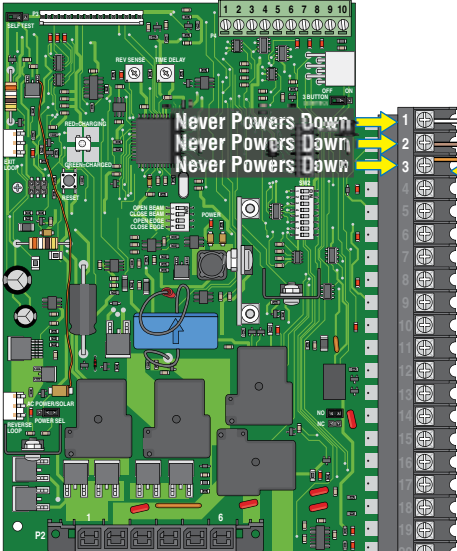
**Battery Charging LED Monitor**

RED=CHARGING  
GREEN=CHARGED

This may be red when first powering up operator depending on how much of a charge the batteries have.

### Power Management of Circuit Board

The operator manages the power drain of the circuit board by powering down unused inputs on the board when the operator is idle. When the gate has been closed for 5 min. or held open for 5 min., the circuit board powers down unused inputs to conserve power drain. **Main terminals 1, 2 and 3 NEVER** power down. Any activation from one of these inputs will power up the circuit board when it is in the powered down mode. **It is important to have LOW CURRENT DRAW devices connected to terminals 1, 2 and 3 or operator performance will be significantly reduced!**

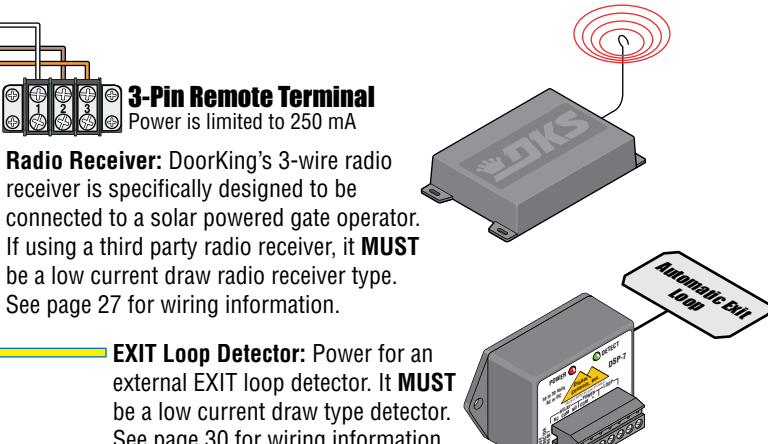


**Never Powers Down**  
**Never Powers Down**  
**Never Powers Down**

**3-Pin Remote Terminal**  
Power is limited to 250 mA

**Radio Receiver:** DoorKing's 3-wire radio receiver is specifically designed to be connected to a solar powered gate operator. If using a third party radio receiver, it **MUST** be a low current draw radio receiver type. See page 27 for wiring information.

**EXIT Loop Detector:** Power for an external EXIT loop detector. It **MUST** be a low current draw type detector. See page 30 for wiring information.





# SECTION 3 - ADJUSTMENTS

The switch settings and adjustments in this chapter should be made after your installation and wiring to the operator(s) is complete. **Whenever any of the programming DIP-switches on the circuit board are changed, DC power switch must be shut-off, and then turned back on OR press reset button for the new setting to take effect.**

## 3.1 4100 Circuit Board Descriptions and Adjustments

### How LEDs Function



Illuminated **LEDs** Indicates that low voltage power is being applied to the circuit board.

**Input LEDs** should be OFF and will only illuminate when the input that is next to the LED is activated. See page 26.  
**Limit LEDs** will only illuminate when the respective limit switch has been activated.

### Self-Test



**Self-Test Mode**

Self-test mode is for bench checks **ONLY!** Operator **MUST** be disconnected from the gate. The operator will continually cycle the gate.



**Normal Mode**

The jumper must be set at normal mode for normal operator function.

**DC Power Switch located inside.**

**Note:** Alarm reset button **WILL NOT** reset circuit board after changing DIP-switch settings.

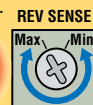
**Limit/Alarm Plug P3 Terminal**

**UL 325 Terminal**

See pages 15-16 and 28.

### Reverse Sensor

Adjust reversing sensitivity for the open **AND** close direction of the operator. See page 25.



### Auto-Close Timer

Auto-close timer (when turned on) SW 1, switch 2.



### Time Delay:

Adjust from 1 second (full counter-clockwise) to approximately 23 seconds (full clockwise).



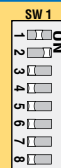
**Key Switch:** Cycles the operator when pressed. Will use Auto-Close timer when turned ON (see above).



**Note:** When powering up operator, the key switch **MUST** be pressed **AFTER** DC power switch is turned ON to power up operator.

### DIP-Switches

Set the DIP-switches on the circuit board to the desired setting. See switch-settings on next 2 pages.

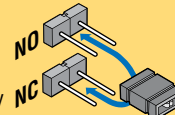


**Reset Button:** Press after changing a DIP-switch setting on the board or if board locks up during operation.

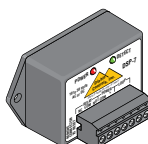
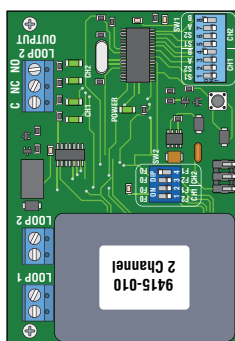
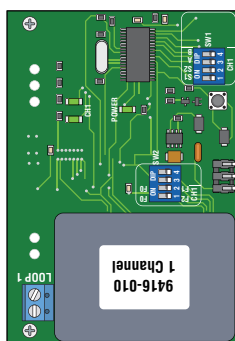


### Board Relay

Dry relay contacts (terminals 13-14) can be set for Normally Open (NO) or Normally Closed (NC) operation by placing the relay shorting bar on the N.O. or N.C. pins respectively. SW 1, switches 6 and 7 must be set to control relay. See next page for descriptions.



**Plug-In Low Current Draw Loop Detectors**  
See page 29, sold separately



### External Low Current Draw Loop Detectors

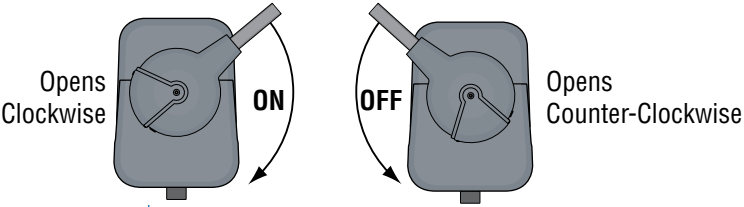
See page 30 and instruction sheet that comes with loop detector for more information.

**Battery Plug P2 Terminal**

**20-Pin Main Terminal**  
See pages 27 and 28.

## 3.2 DIP-Switch Settings for 4100 Circuit Board

The two DIP-switches located on the circuit board are used to program the operator to operate in various modes and to turn on or off various operating features. Whenever a switch setting is changed, reset button must be pressed, located on circuit board for the new setting to take affect.

SW 1 (Top 8 Switches)			
Switch	Function	Setting	Description
1	Operator Opening Direction		Changes direction operator will cycle open upon initial power up and open command.
2	Auto-Close Timer	OFF	Auto-close timer is OFF. Manual input required to close gate.
		ON	<b>Normal Setting.</b> Auto-close timer is ON. Adjustable from 1-23 seconds.
3	Not Used	OFF	Switch <b>MUST</b> be turned OFF for Solar.
4	Reverses Gate	OFF	Input to main terminal 10 and/or reverse loops will <b>reverse</b> gate during <b>close</b> cycle.
	Not Used	ON	<b>Do Not</b> use this setting for the 6524.
5	Quick-Close Timer Override (Slide Gates ONLY)	OFF	Quick-close feature is OFF.
		ON	Quick-close feature is ON. Opening gate will stop and begin to close as soon as all reversing inputs (Reverse loops, photo sensors) are cleared regardless of the distance the gate has opened. Used for slide gates only.
6 and 7	Relay: Main Terminals Terminal 13-14	6-OFF 7-OFF	<b>Normal Setting.</b> Relay activates when gate is at open limit.
		6-OFF 7-ON	Relay activates when gate is not closed.
		6-ON 7-OFF	Relay activates when gate is opening and open.
		6-ON 7-ON	Relay activates during opening and closing cycle.
8	Accessory Power	OFF	24 VDC 500 mA <b>accessory power</b> for accessories connected to main terminal 12.
		ON	<b>DO NOT USE</b> for Solar.

 Setting **MUST** be used

SW 2 (Bottom 8 Switches)			
Switch	Function	Setting	Description
1 and 2	Select Operator Type	1-OFF 2-OFF	<b>DO NOT USE</b> for the 6524. Slide Gate Operator
		1-OFF 2-ON	<b>Swing Gate Operator</b>
		1-ON 2-OFF	<b>DO NOT USE</b> for the 6524. Barrier Gate Operator
		1-ON 2-ON	<b>DO NOT USE</b> for the 6524. Overhead Gate Operator
3	Input Power Failure Mode	OFF	<b>DO NOT USE</b> for Solar.
		ON	Gate <b>operates normally</b> until batteries get low. Gate will <b>CLOSE and Shutdown operator</b> in close position until battery power reaches an operable level again.
4	Reverse/Shadow Input	OFF	Main terminal 10 is a REVERSE input.
		ON	<b>DO NOT USE</b> for solar power.
5	Overlapping Bi-Parting Gates	OFF	Switch 5 <b>MUST</b> be turned OFF for the 6524.
		ON	<b>DO NOT USE</b> for solar power. Overlapping gates <b>ARE</b> used (Dual swing gates ONLY). Secondary gate starts to open a few seconds before primary gate starts.
6	Circuit Board Power Management	OFF	<b>DO NOT USE</b> for Solar. For 115/230 VAC input power. Board has <b>Constant power</b> .
		ON	Used for <b>Solar</b> input power. Board <b>Minimizes power</b> when not in use. All terminals shut down power except <b>main terminals 1, 2 and 3</b> .
7 and 8	Not Used	OFF	Switches 7 and 8 <b>MUST</b> be turned OFF for Model 6524 operator.

## 3.2 Continued

### SW-1 Switch

(Top 8 switches on circuit board)

Typical Settings	SW 1
Opening - RT/LT	1 <input type="checkbox"/>
Normal - ON	2 <input type="checkbox"/>
<b>MUST use - OFF</b>	3 <input type="checkbox"/>
<b>MUST use - OFF</b>	4 <input type="checkbox"/>
<b>MUST use - OFF</b>	5 <input type="checkbox"/>
Normal - OFF	6 <input type="checkbox"/>
Normal - OFF	7 <input type="checkbox"/>
<b>MUST use - OFF</b>	8 <input type="checkbox"/>

**Switch 1 - Operator Opening Direction:** **Must OPEN** the operator's gate upon initial DC power up and open command. If the first open command begins to close the gate, turn DC power off and reverse this switch.

**Switch 2 - Auto-Close Timer:** Turns the auto-close timer on or off. If auto-close is ON, maximum time that can be set for is approximately 23 secs.

If auto-close is OFF, an open gate will not close until a manual input is received.

**Switch 3 - EXIT Loop Port Output / Full Open Input:** This switch **MUST** be turned **OFF** when using solar power. **DO NOT** turn this switch ON. **DO NOT** wire any devices to main terminal 4.

**Switch 4 - Standard Reverse:** This switch **MUST** be turned OFF for the Model 6524. An input to main terminal 10 (Photo Sensor) **AND/OR** Reverse Loops will reverse a **CLOSING gate back to open position**. If auto-timer is turned ON, timer will time out and close the open gate. **Note:** SW 2, switch 4 **MUST** also be turned OFF when an external entrapment device (Photo Sensor) has been wired to main terminal 10 (see below).

**DO NOT** turn this switch ON.

**Switch 5 - Quick-Close Timer Override:** This switch **MUST** be turned OFF for the Model 6524. **DO NOT** turn ON.

**Switches 6-7 - Relay:** These work in conjunction with each other and determine when the relay on the board (main terminals 13-14) will be activated. This relay can be used as a switch for various functions such as illuminating a warning light when the gate is moving, or turning on a green light when the gate is full open. This relay is used for a **shadow loop** when using in-ground loops, see page 30.

**Switch 8 - Accessory Power:** This switch **MUST** be turned **OFF** when using solar power. A maximum of 500 mA of accessory power is supplied to any accessory connected to main terminal 12. Power to terminal 12 is **ONLY** available when the gate is opening, open, or closing. Power is **OFF** when the gate is closed. **DO NOT** turn this switch ON.

### SW-2 Switch

(Bottom 8 switches on circuit board)

Typical Settings	SW 2
<b>MUST use - OFF</b>	1 <input type="checkbox"/>
<b>MUST use - ON</b>	2 <input type="checkbox"/>
<b>MUST use - ON</b>	3 <input type="checkbox"/>
<b>MUST use - OFF</b>	4 <input type="checkbox"/>
<b>MUST use - OFF</b>	5 <input type="checkbox"/>
<b>MUST use - ON</b>	6 <input type="checkbox"/>
<b>MUST use - OFF</b>	7 <input type="checkbox"/>
<b>MUST use - OFF</b>	8 <input type="checkbox"/>

**Switches 1-2 - Select Operator Type:** Sets the type operator that will be used with the circuit board.

**Switch 3 - Input Power Failure Mode:** This switch **MUST** be turned **ON** when using solar power. In the event that the solar panel cannot charge the batteries and battery power gets depleted through normal gate cycling, gate will **CLOSE** and operator will shut down. When solar panel power begins charging the batteries and they reach an operable level, the gate will resume normal operation.

**DO NOT** turn this switch OFF.

**Switch 4 - Reverse/Shadow:** This switch **MUST** be turned **OFF**. External entrapment device (Photo Sensor) **OR** a SHADOW LOOP wired to main terminal 10 is a **standard reverse** input (see SW 1, switch 4 above).

**DO NOT** turn this switch ON.

**Switch 5 - Overlapping Dual Gates:** This switch **MUST** be turned **OFF** for the 6524. **DO NOT** turn ON for the 6524.

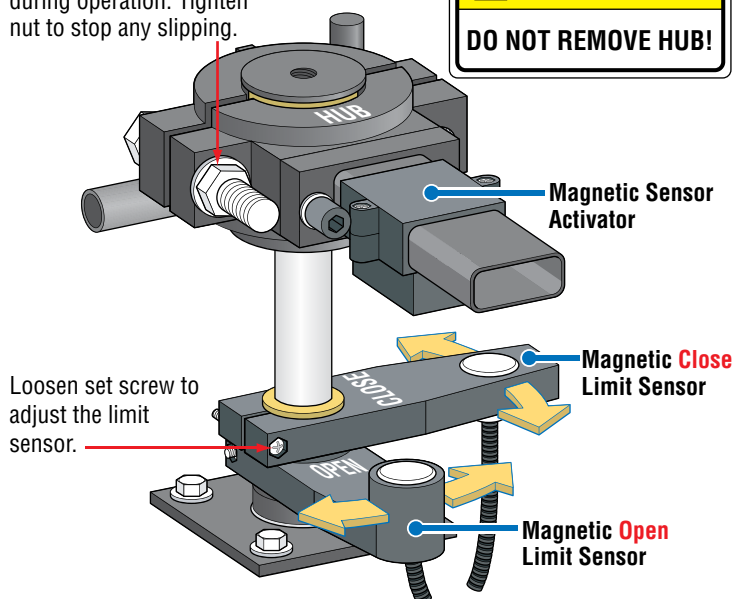
**Switch 6 - Circuit Board Power Management:** This switch **MUST** be turned **ON** when using solar power. It minimizes the power drain by the circuit board. When the gate has been closed for 5 min. or held open for 5 min., circuit board will power down to conserve power. Main terminals 1, 2 and 3 will remain powered up. An input from one of these connections will power up the circuit board again.

**DO NOT** turn OFF when using solar power.

**Switches 7-8 - Not Used:** These switches **MUST** be turned **OFF** for the Model 6524. **DO NOT** turn ON.

## 3.3 Limit Sensors

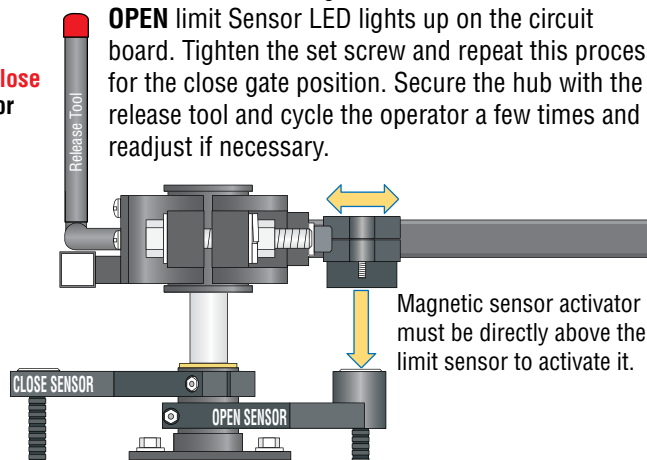
The hub **must not slip** during operation. Tighten nut to stop any slipping.



### Important Limit Sensor Adjustment Note:

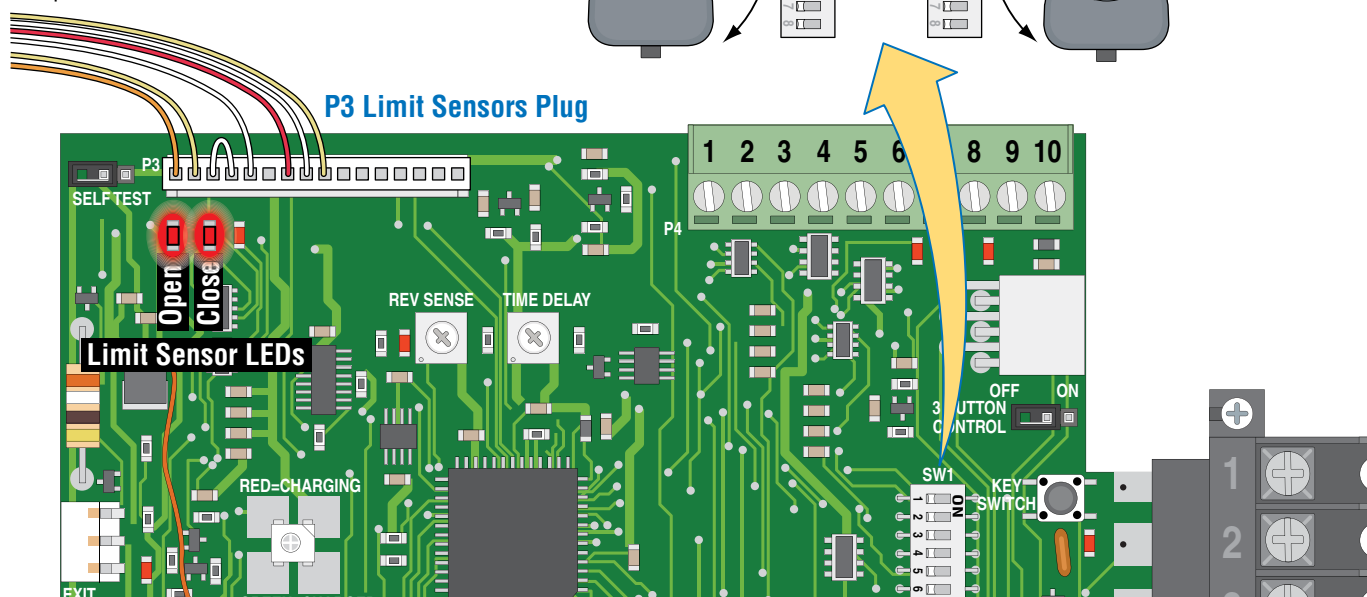
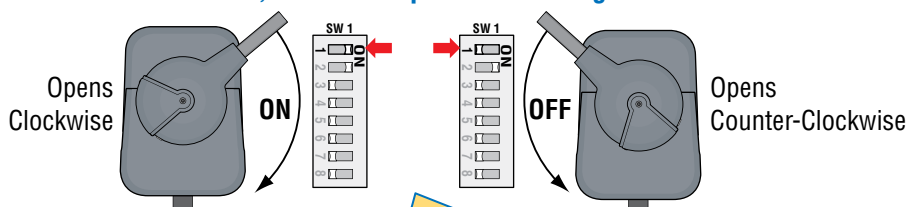
It is very important **NOT** to cycle the gate operator before the limit sensors are in the correct position or it could cause damage to the gate and operator.

With **power ON**, **Manually release** the gate operator hub with the release tool (See page 34). Physically move the gate to the desired open position. Loosen the set screw on the **OPEN** limit sensor and slowly slide it under the magnetic sensor activator until the **OPEN** limit Sensor LED lights up on the circuit board. Tighten the set screw and repeat this process for the close gate position. Secure the hub with the release tool and cycle the operator a few times and readjust if necessary.



**Note:** If P3 plug is not connected to the circuit board and power is turned on, alarm will sound and operator will NOT function.

### SW 1, Switch 1 Dip-Switch Settings



## 3.4 Inherent Reverse Sensor Adjustment

This vehicular gate operator is equipped with an inherent adjustable reversing sensor (Type A) used as entrapment protection according to UL 325 standards. **The gate will reverse direction after “physically” encountering an obstruction in either the opening or closing gate cycle.**

If the Auto-Close Timer (DIP-switch SW 1, switch 2) is ON and the gate physically encounters an obstruction during the **CLOSING** cycle, it will reverse to the open position and **HOLD** the gate at this position (Soft shutdown condition). Another input command is needed before the gate will reset and close again (open device command, safety device command, exit loop input). For the reverse sensors to function correctly, **THE HUB MUST NOT SLIP** when the gate encounters an obstruction. The gate must be properly installed and work freely in both directions. A good set of roller bearing hinges is essential for proper swing gate operation.

For the reverse system to function correctly, the gate must be properly installed and work freely in both directions and **the limit sensors must be properly adjusted BEFORE adjusting the reverse sensors.** The ideal adjustment will allow the operator to move the gate through its entire travel cycle without reversing, but will reverse upon contact with an obstruction with no more than 40 Lbs of force. This force can be measured with a gate scale.

**CAUTION:** Keep pedestrians and vehicles clear of the gate while adjusting and testing sensors!

- 1 Press the “**Push to Operate**” button to **OPEN** the gate.

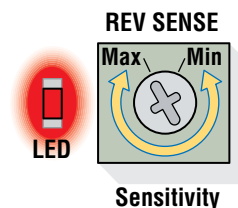


Note: “**Push to Operate**” button will use the Auto-Close timer if turned ON (SW 1, switch 2 **ON**).

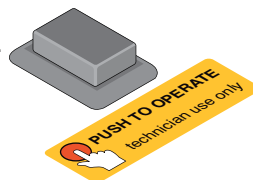
- 2 While gate is opening, slowly rotate the reverse sensor clockwise until the LED lights up and the gate reverses direction. Rotate the reverse sensor back counter-clockwise approximately 1/8 turn to decrease the sensitivity (LED will turn off).

**Note:** The LED will light up during the first seconds of gate travel. Wait until it turns off before adjusting the reverse sensor.

Note: The LED will turn on briefly when DC power is turned on.



- 3 Press the “**Push to Operate**” button and **CLOSE** the gate. Make sure the gate closes completely. If it reverses and opens (LED will turn on), rotate the reverse sensor counter-clockwise a little more to decrease the reverse sensitivity (LED will turn off). Cycle the gate a few times to be sure that it cycles completely in both directions, adjusting the sensor as necessary.



**Safety Note:** The LED will remain ON after a cycling gate gets obstructed during normal operation to indicate that the reverse sensor has been tripped. Always check the gate area for possible obstructions before putting operator back in service.

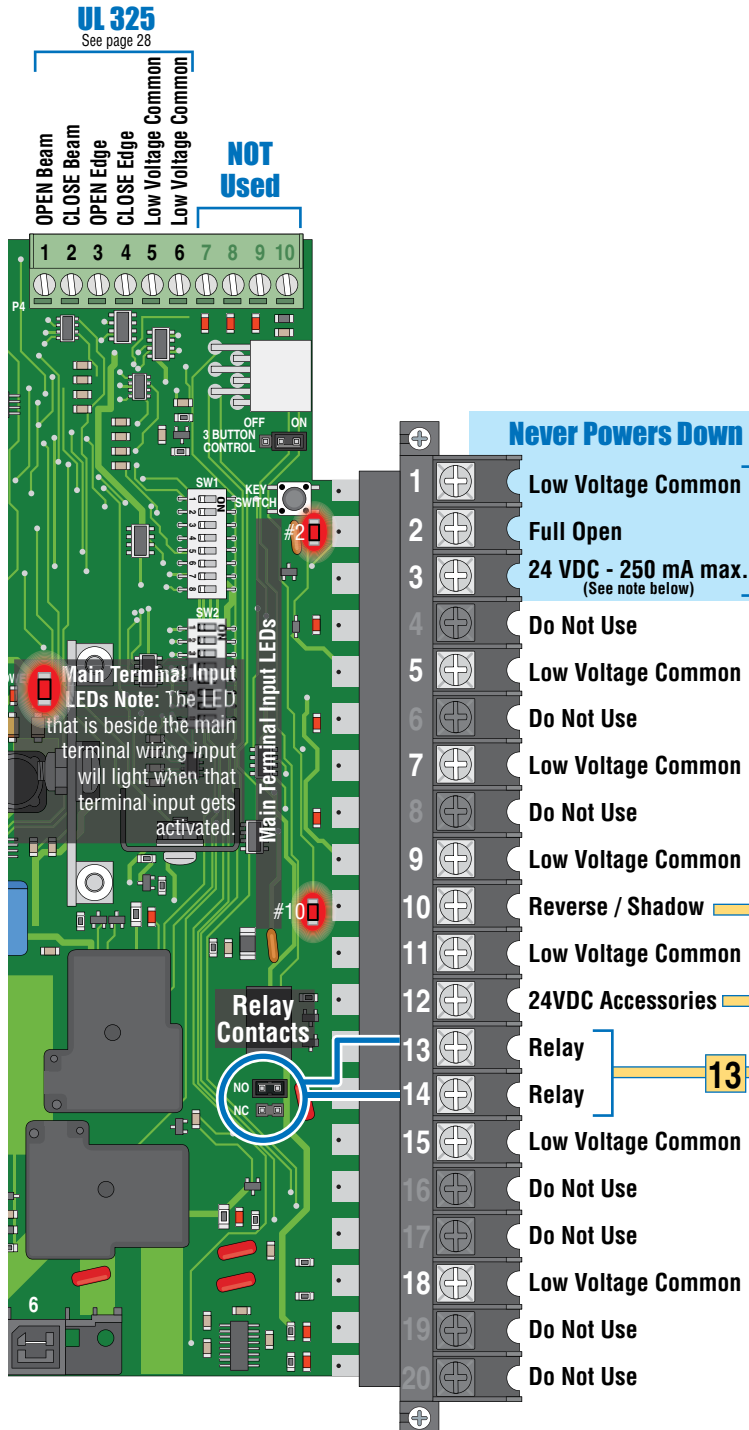
### Test the operator reversing sensitivity:

Place an immobile object along the gate path, allowing the gate to strike it while in the **open** and **close** cycles. The gate must reverse direction after striking the object. If it does not, increase the reverse sensitivity and repeat this testing until the correct sensitivity has been achieved in **BOTH** directions. The operator will assume a soft shutdown (Hold the auto-close timer) after striking and reversing the gate which will require pressing the “**Push to Operate**” button to cycle the operator again.



# SECTION 4 - WIRING TERMINALS

## 4.1 Terminal Descriptions



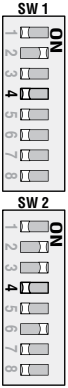
**20-Pin Main Terminal**

Terminals 1, 2 and 3 are ALWAYS powered up, even after circuit board has powered down to manage the power drain on the batteries, see page 20.  
**Opening devices MUST** connect to terminal 2.

This input ONLY functions when gate is fully opened or in the closing cycle.

- SW 1, switch 4 MUST be OFF. SW 2, switch 4 MUST be OFF. When gate is closing, an input to main terminal 10 (eg: photo beam gets blocked) will reverse and open the gate. **Note:** If the auto-close timer is ON, when gate reaches the open position, timer will time out and close the gate.
- DO NOT turn SW 1, switch 4 ON.
- DO NOT turn SW 2, switch 4 ON.

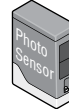
**Note:** Main terminal 10 is not available for a photo sensor when using a SHADOW LOOP. See page 29 about shadow loop connection.



SW1, switch 8 MUST be OFF:  
24-VDC 500 mA accessory power can be provided for desired accessories wired to terminal 12.

DO NOT turn ON SW1, switch 8.

**Note:** power to terminal 12 is ONLY available when the gate is opening, open, or closing. Power is OFF when the gate is closed.

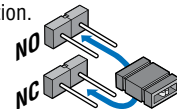


Operation of relay is dependent on setting of SW 1, switches 6 and 7.

Relay contacts can be set for Normally Open (NO) or Normally Closed (NC) operation.

Contact rating is 1 amp maximum at 24-volts DC.

**Note:** Board relay is used for a shadow loop when using a SHADOW LOOP. See page 29 about shadow loop connection.



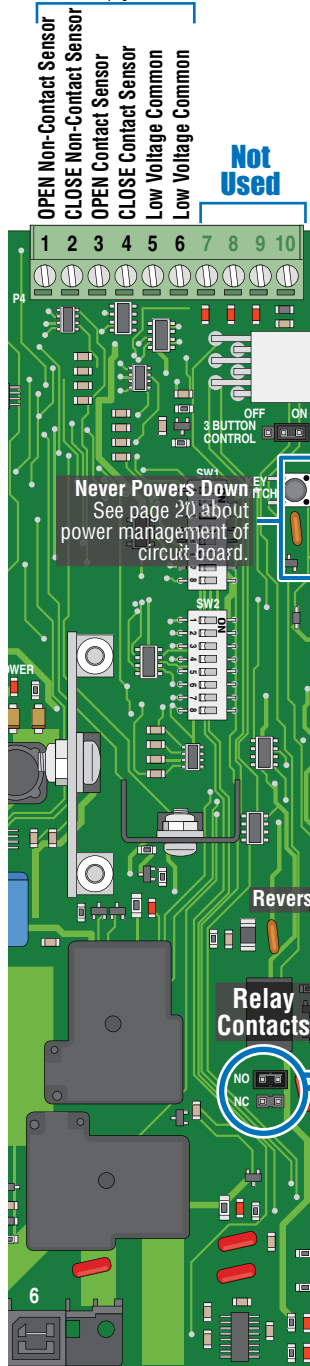
### Terminal #3 Note:

Exceeding 250 mA of power from this terminal may cause the circuit board transformer to overheat, causing intermittent problems.

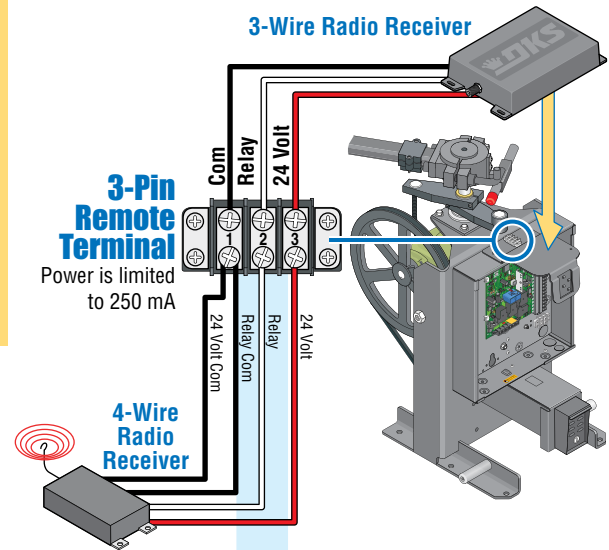
## 4.2 Control Wiring

### UL 325 10-Pin Terminal

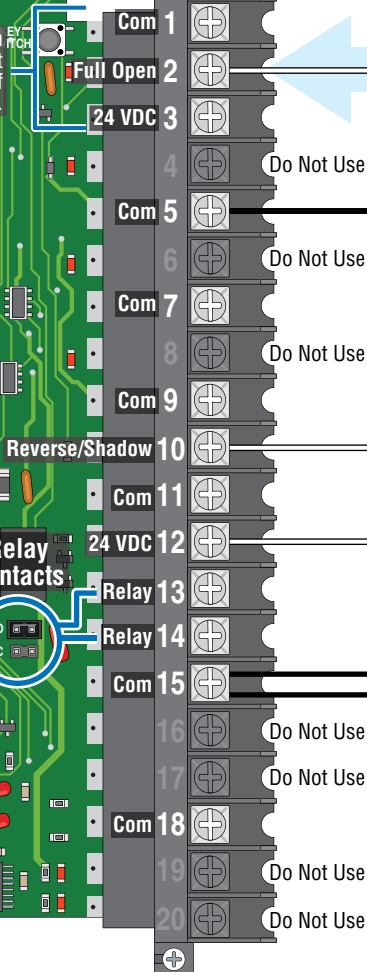
**UL 325**  
See page 28



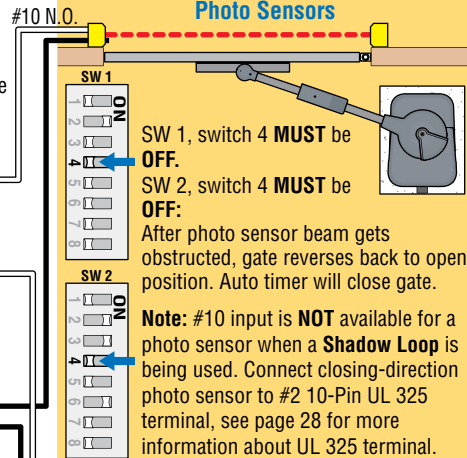
**Important:** Controls intended for user activation must be located at least six (6) feet away from any moving part of the gate and where the user is prevented from reaching over, under, around or through the gate to operate the controls. Emergency access controls only accessible by authorized personnel (e.g., fire, police, EMS) may be placed at any location in the line-of-sight of the gate.



**Terminal #3 Note:**  
Exceeding 250 mA of power from this terminal may cause the circuit board transformer to overheat, causing intermittent problems.



### Standard "Reverse" Closing-Direction Photo Sensors



### Safety Opening Device

Note: All stand-alone and telephone entry devices must use a separate power source.

### Telephone Entry

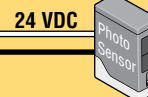
### Stand-Alone Key Switch

### Stand-Alone Keypad

### Stand-Alone Card Reader

### Accessories Power

24 VDC, 500 mA max accessories can be powered by main terminal 12.



### 20-Pin Main Terminal

## 4.3 Entrapment Protection Wiring

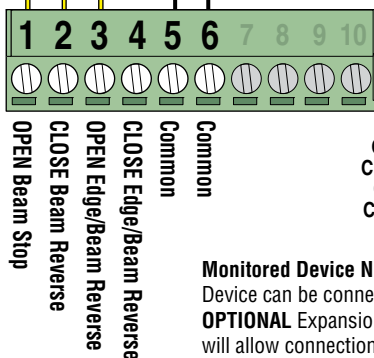
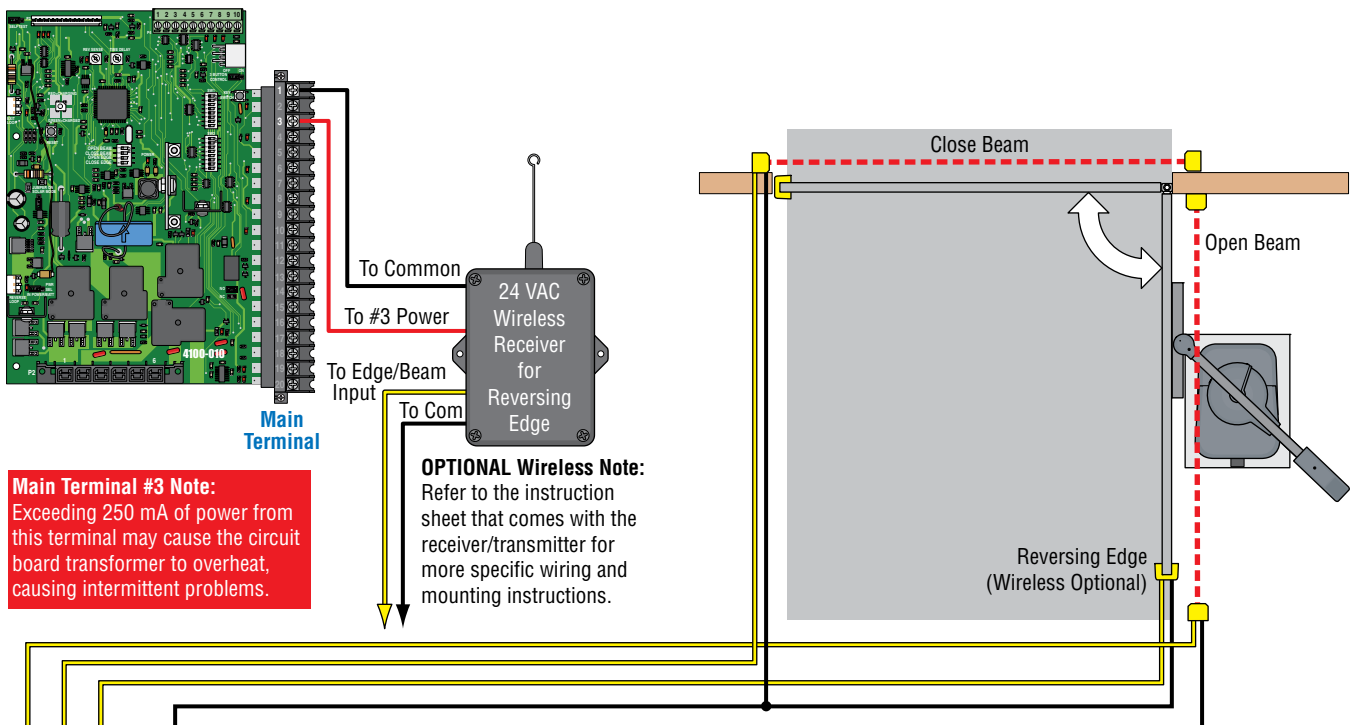
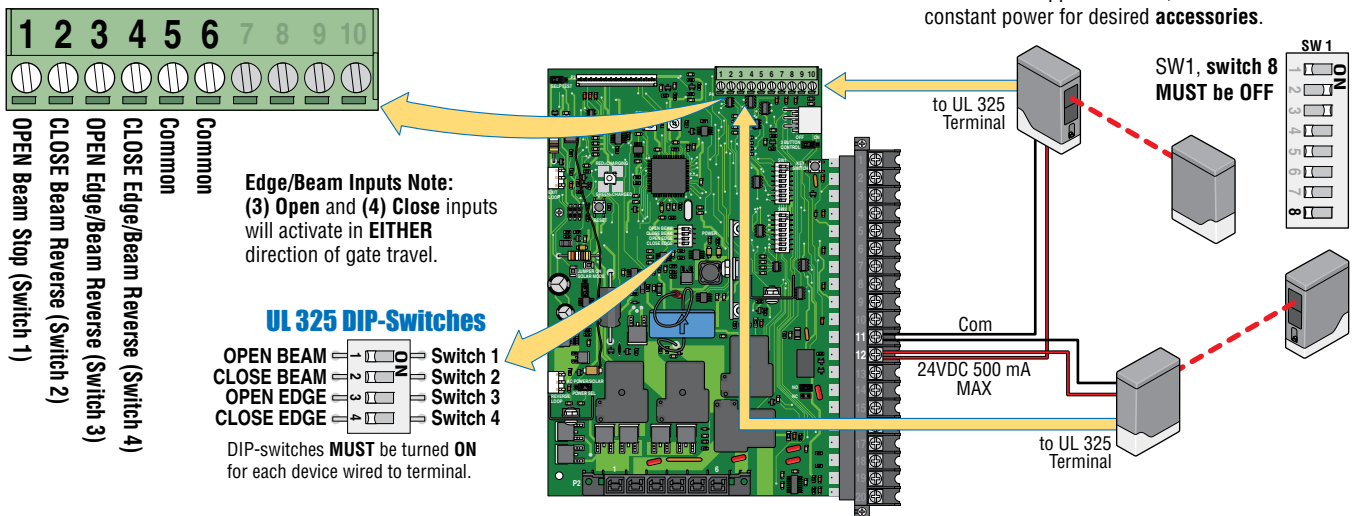
### UL 325 Terminal

External Entrapment Protection  
Device Connection

**ONLY connect monitored devices.**

### Photo Sensors POWER:

Terminal 12 supplies 24 VDC, 500 mA of  
constant power for desired accessories.



**Monitored Device Note:** Only 1 monitored Device can be connected to each input. An **OPTIONAL** Expansion Board (sold separately) will allow connection for additional devices.

**Edge/Beam Inputs (3 & 4) Note:**  
Open/Close Edge/Beam inputs will activate in **EITHER** direction of gate travel.

**All potential entrapment areas MUST be protected with an external entrapment protection device. See pages 15 & 16. At least ONE external entrapment protection device MUST be installed or the operator will NOT function.**



## 4.4 Plug-In Loop Detector Wiring

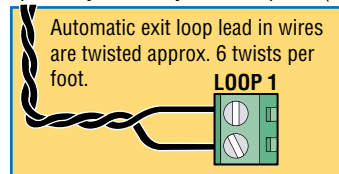
To help protect the operator from accidentally closing on vehicles in the gate's path, DoorKing highly recommends that loops and loop detectors be installed. Loops are laid underneath, cut into asphalt or concrete driveways or buried beneath gravel and earth driveways. A loop detection system will sense a vehicle like a metal detector and send a signal to the gate operator preventing the gate from automatically opening or closing on a vehicle when it is in the gate's path. DoorKing recommends that a licensed installer perform this work.

- Loop detector wiring is shown for DoorKing plug-in loop detectors. If other loop detectors are used, refer to the installation instructions supplied with those detectors for wiring instructions.
- If other detectors are used, use a separate power supply to power these detectors.
- Loop layout shown is for a typical swing gate application with two-way traffic, or one-way exit only traffic.

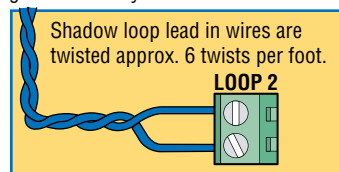
DoorKing offers a free “**Loop and Loop-Detectors Information Manual**” PDF located at DoorKing’s web site for more information. [www.doorking.com](http://www.doorking.com)

### Automatic Exit Loop

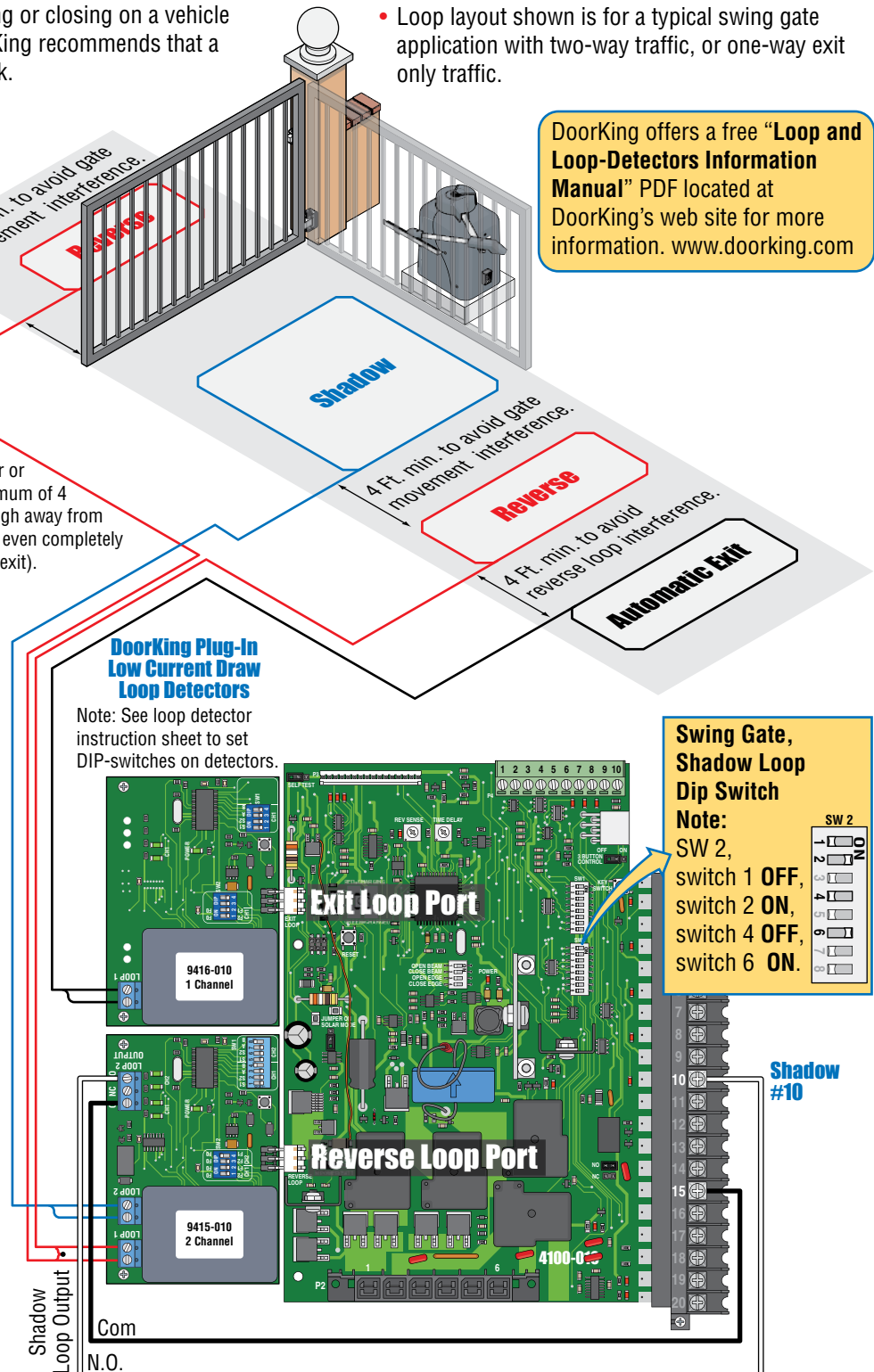
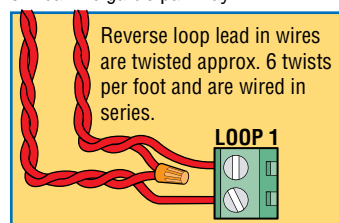
Automatically opens the gate for exiting vehicles without having to use a transmitter or keypad. The exit loop can be placed a minimum of 4 feet away from the reverse loop or far enough away from the gate so the gate has started opening or even completely opened by the time you drive up to it (Free exit).



**Shadow Loop** will **ONLY HOLD** the main gates in the **Full Open Position** when a vehicle is on the shadow loop. However, it **WILL NOT stop or reverse** the main gates once they start to close.



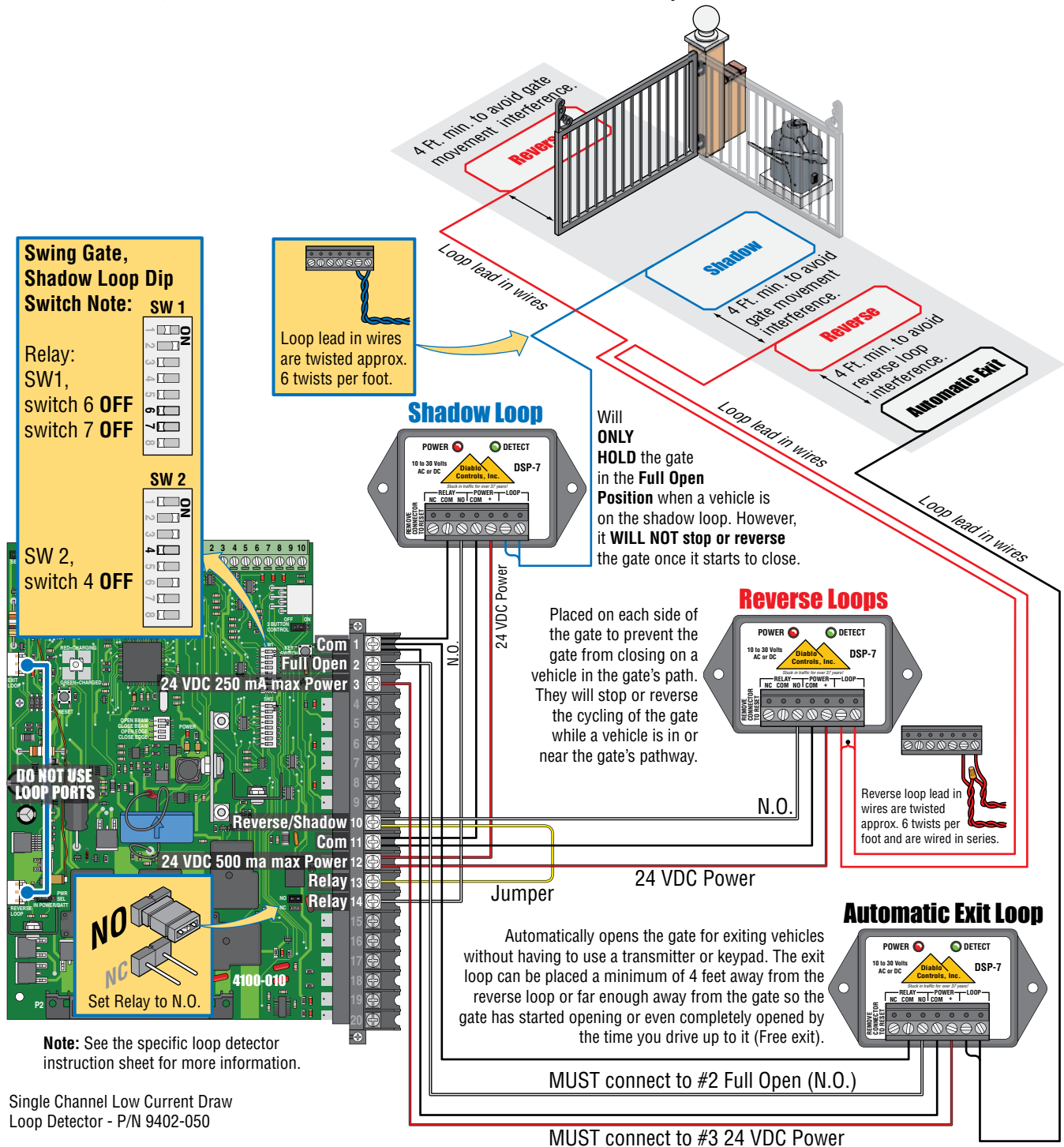
**Reverse Loops** are placed on each side of the gate to prevent the gate from closing on a vehicle in the gate's path. They will stop or reverse the cycling of the gate while a vehicle is in or near the gate's pathway.



## 4.5 External Loop Detector Wiring

To help protect the operator from accidentally closing on vehicles in the gate's path, DoorKing highly recommends that loops and loop detectors be installed. Loops are laid underneath, cut into asphalt or concrete driveways or buried beneath gravel and earth driveways. A loop detection system will sense a vehicle like a metal detector and send a signal to the gate operator preventing the gate from automatically opening or closing on a vehicle when it is in the gate's path. **DoorKing recommends that a licensed installer perform this work.**

- Loop detector wiring is shown for Diablo external loop detectors. If other loop detectors are used, refer to the installation instructions supplied with those detectors for wiring instructions.
- DO NOT use EXIT or REVERSE loop ports on the circuit board
- Loop layout shown is for a typical swing gate application with two-way traffic, or one-way exit only traffic.



# SECTION 6 - OPERATING INSTRUCTIONS

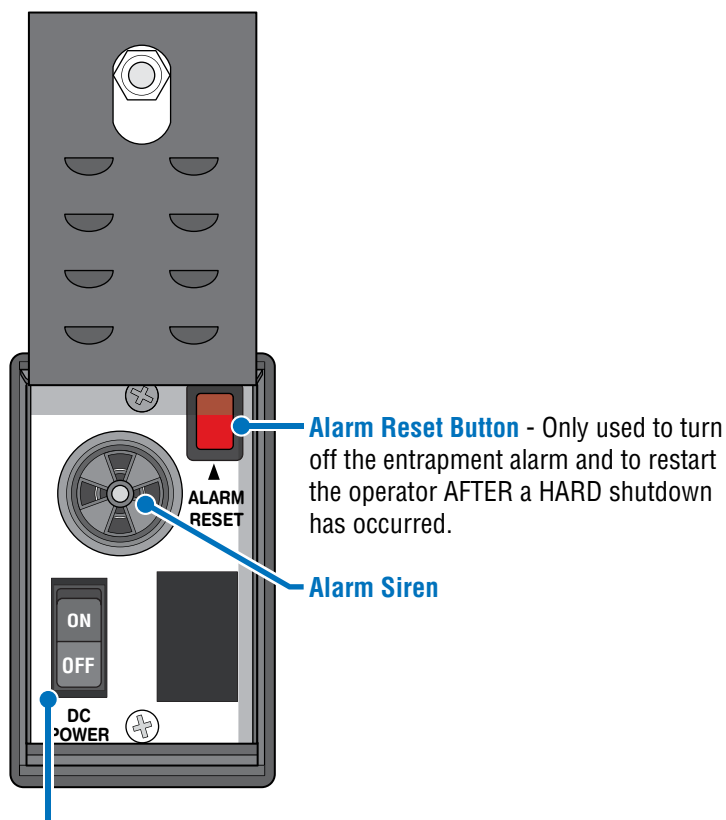
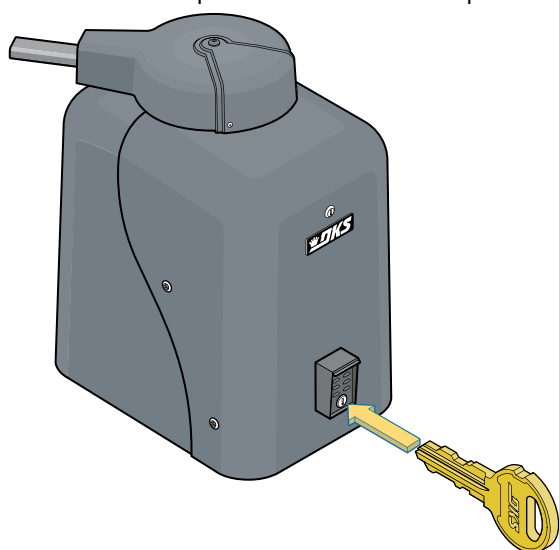
## IMPORTANT SAFETY INSTRUCTIONS

**WARNING** - To reduce the risk of injury or death:

1. READ AND FOLLOW ALL INSTRUCTIONS.
2. Never let children operate or play with gate controls. Keep the remote control away from children.
3. Always keep people and objects away from gate. **NO ONE SHOULD CROSS THE PATH OF THE MOVING GATE.**
4. Test the operator monthly. The gate **MUST** reverse on contact with a rigid object or stop or reverse 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 and power has been shut-off.
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.**

## 6.1 DC Power Switch and Alarm Reset Button


Unlock the power switch cover and open to access the DC POWER switch and the operator ALARM RESET button.



**Alarm Reset Button** - Only used to turn off the entrapment alarm and to restart the operator AFTER a HARD shutdown has occurred.

**Alarm Siren**

**DC Power Switch** - Powers the DC ON (toggle left) or OFF (toggle right).

**Note:** When powering up operator, the key switch  **MUST** be pressed (located on circuit board) AFTER DC power switch is turned ON to power up operator.

## 6.2 Shutdown Conditions

Under various entrapment conditions the operator will assume either a **soft** or **hard (alarm)** shutdown. To determine what type of reset action is required, you will need to understand how the different entrapment conditions affect the gate operator.

### Soft Shutdown

This occurs in various situations where the inherent or external entrapment protection devices have been activated. In a soft shutdown condition, the operator **will not** respond to any input that was present when the entrapment protection device sensed an obstruction. If the gate stops at the open position, the operator will not respond to the automatic close timer.

- **Example 1** - A time clock keys the gate open in the morning and an entrapment protection device senses an obstruction prior to the gate reaching the full open position. If the entrapment is sensed by the inherent system, the gate will reverse and run back to the closed position. The time clock input is still present, but the gate will not re-open.

NOTE: In some systems, the time clock input comes from the telephone entry system relay. This same relay may also provide open commands for a card reader, MicroPLUS transmitters and the visitor telephone entry. If so, these devices will also be disabled in a soft shutdown condition.

- **Example 2** - If the gate is closing and an entrapment protection device is activated, the gate will either stop or reverse and run back to the open position, depending upon if the external or inherent device was activated. The automatic close timer will not close the gate.
- **Example 3** - Vehicle arrives at open loop and gate runs towards the open position. The inherent entrapment protection is activated. The gate reverses and runs back to the closed position. If the vehicle is still present at the open loop a soft shutdown condition does not occur. The loop input provides an immediate reset of the operator and the gate will again run to the open position.

### Resetting a Soft Shutdown

In some conditions, a soft shutdown will reset as soon as the entrapment condition clears. For example, if a non-contact sensor (photo sensor) is sensing an obstruction, the operator will stop the gate and assume a soft shutdown condition. When the photocell clears, the operator will return to normal operation.

When the operator is in a soft shutdown, activation of any “intended input” will reset the operator. An “intended input” includes any command input, any standard safety input and any loop input. Activating any of these inputs will reset the gate. At that point the gate will return to normal operation. If the gate is open, the automatic close timer will then time out and close the gate.

### Hard Shutdown (Alarm Activated)

A hard shutdown condition occurs when the inherent entrapment protection system has sensed **TWO** consecutive obstructions before the gate reaches the full open or closed position.

- **Example** - The gate is closing and the inherent entrapment protection system senses an obstruction and causes the gate to reverse direction. As the gate begins to run in the open direction, a second obstruction is sensed prior to the gate reaching the full open position. Once the second obstruction has been sensed, the operator will stop, the audio alarm will be activated and all standard inputs are shut down (including open commands, safety commands, loop inputs, etc.).

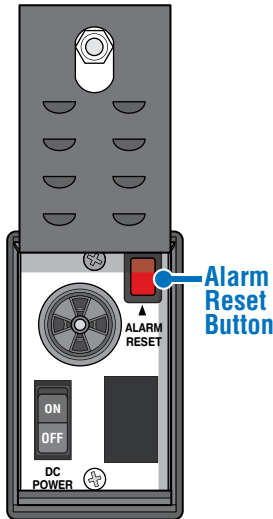
**The audio alarm will sound for five minutes, or until the operator's alarm reset button is pushed. After (5) five minutes the alarm will “chirp every 5 sec.” and the hard shutdown condition will remain in affect until the alarm reset button is pushed.**

- After 5 minutes, the audio alarm will “chirp” every 5 seconds. This indicates that the operator is in a hard shutdown condition and the alarm reset button must be activated to reset the operator and silence the alarm.

Continued on the next page

## Resetting a Hard Shutdown

When the operator is in a hard shutdown condition (audio alarm activated or audio alarm “chirps” every 5 seconds), to silence the alarm, press the alarm reset button.



- Before resetting a hard shutdown, determine why the shutdown occurred. Inspect the gate for any obstructions along its path that could have activated the inherent entrapment sensing system. Inspect the gate and gate hardware.

NOTE: DoorKing operators have a built-in alarm reset push button mounted on the operator above the power ON-OFF switch. Activating this button will return the gate operator to normal operation, **but will not activate the gate operator.**

Once the gate has been reset, an open or close command is needed to start the gate operator. Most activating commands will cause the gate operator to cycle to the open position. This includes activation of a key switch or open command and activation of the automatic exit loop. Activation of a close command will run the gate to the closed position.

## 6.3 Manual Gate Operation

This operator is equipped with a manual release system that will allow the gate to be pushed open in the event of a power outage or equipment failure. **NEVER** remove the hub from the operator after manually releasing it.

**This gate operator CAN NOT be manually forced open in the event of a power failure without FIRST manually releasing the gate! (See next page)**

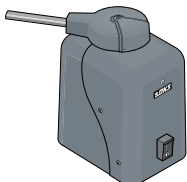
**Never attempt to manually push open any gate with an operator attached to it until you have verified that ALL power to the operator has been shut-off.**

## Emergency Vehicle Access Conditions

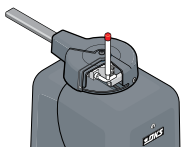
The automatic vehicular gate system must be designed to allow access to emergency vehicles under different operating conditions.



1. During normal powered operation, emergency vehicles access the gate by use of the **Emergency Vehicle Access Device** installed on your gate system. The type of device that is used in your community is dependent on your city codes. These devices may include (but are not limited to) Fire Department lock boxes, Click-2-Enter radio receivers, strobe light sensors, siren sensors, etc.

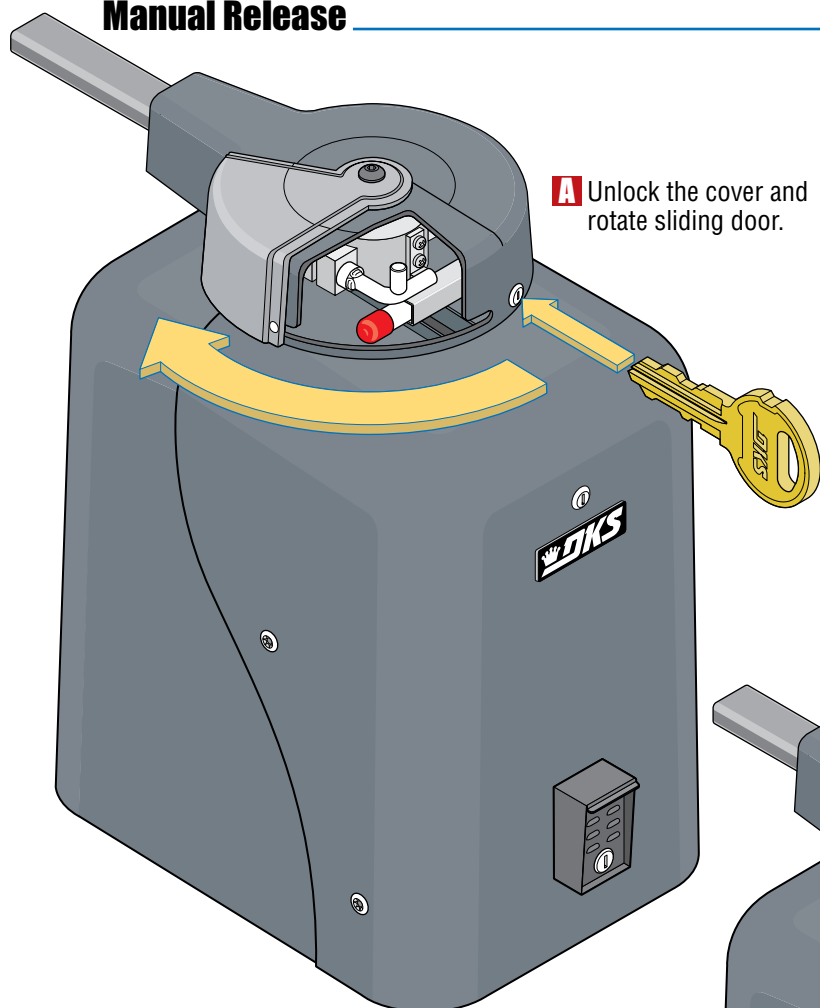


2. In the event of a power failure, The gate operator is equipped with a built-in **Battery Back-Up System**, this system will allow the gate operator to continue to function normally when solar input power is removed.

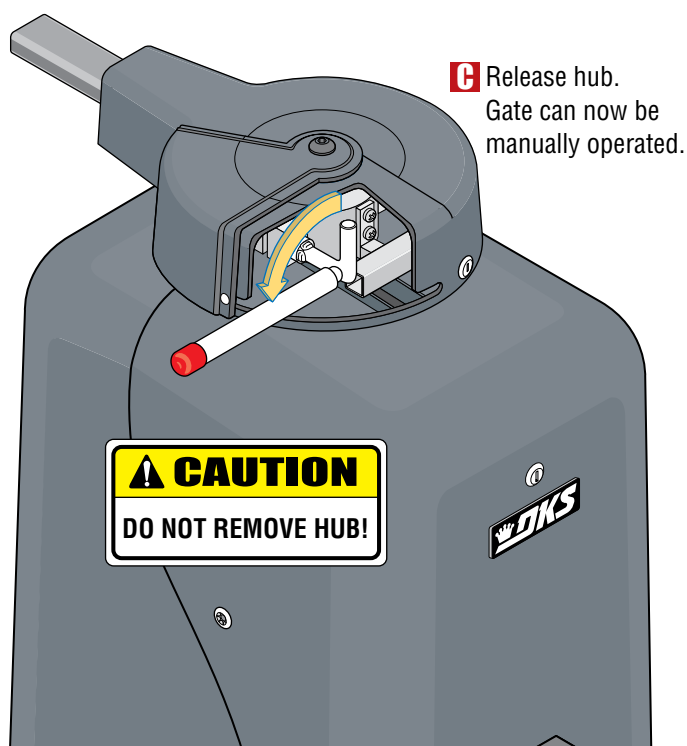
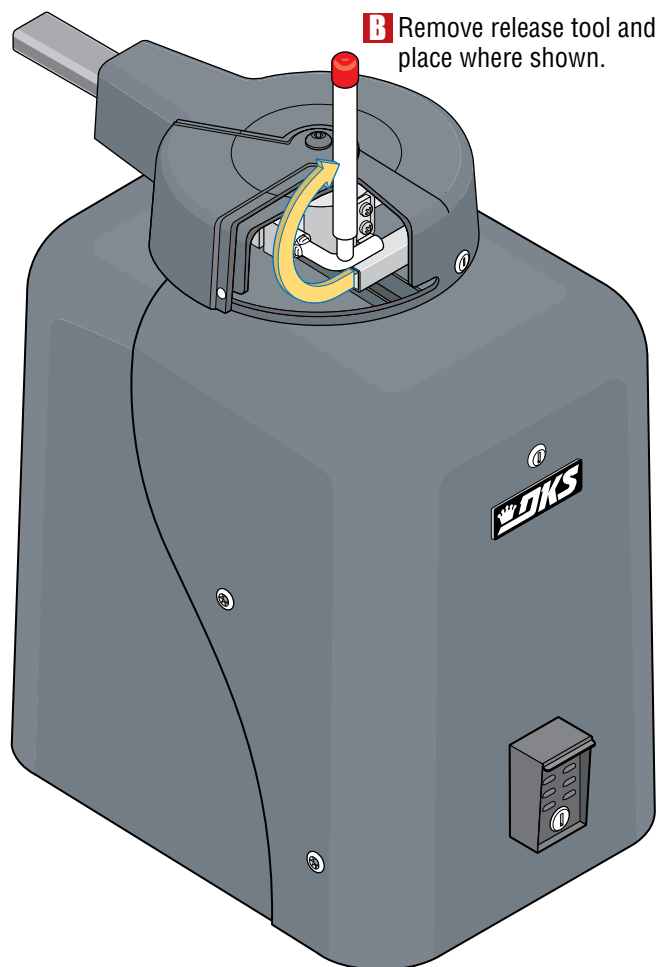


3. In the event of a solar input power failure and a back-up system (DC) power failure (low charged or dead batteries for example), the system must have a release system to allow the gate to be **Manually Operated** (See next page).

## Manual Release



Never attempt to manually push open any gate with an operator attached to it until you have verified that ALL power to the operator has been shut-off.





## SECTION 7 - MAINTENANCE AND TROUBLESHOOTING

Inspection and service of this gate operator by a qualified technician should be performed anytime a malfunction is observed or suspected. High cycle usage may require more frequent service checks.

### 7.1 Maintenance

When servicing the gate operator, always check any external reversing devices (loops, photocells, etc.) for proper operation. If external reversing devices cannot be made operable, do not place this operator in service until the malfunction can be identified and corrected.

**Always check the entrapment protection devices (external and internal) when performing any maintenance. If any of these devices cannot be made operable, remove this operator from service until the cause of the malfunction is identified and corrected. Keeping this operator in service when any entrapment protection devices are malfunctioning creates a hazard for persons which can result in serious injury or death should they become entrapped in the gate.**

When servicing this gate operator, always turn power **OFF!!**

**If gearbox requires oil, use only Mobil SYNTHETIC SHC-629 Oil. Do not completely fill gearbox with oil. Gearbox should be half full only. Do not exceed this level.**

Operator Component	Maintenance	Monthly Interval		
		3	6	12
<b>Alarm</b>	Activate the inherent reverse system by blocking the gate with a solid object. When the gate reverses, block the gate in the opposite direction prior to the limit being reached. The entrapment alarm should activate. Press the reset button to silence the alarm.	✓		
<b>Arms</b>	Check set screws and nuts. Check bushings for wear.		✓	
<b>Batteries</b>	Check the batteries for any leakage or loose connections. Batteries should be replaced every two years.	✓		
<b>Drive Belt</b>	Check for alignment, tightness and wear.		✓	
<b>Fire Dept.</b>	Check emergency vehicle access device for proper operation.	✓		
<b>Gate</b>	Inspect for damage. Check gate hinges for wear and grease if necessary.		✓	
<b>Inherent Reverse System</b>	Check that the gate reverses on contact with an object in both the opening and closing cycles. Adjust the reversing sensor if necessary.	✓		
<b>Loop(s)</b>	Check vehicular reverse and shadow loops for proper operation.	✓		
<b>Release</b>	Check manual release for proper operation.	✓		
<b>External Reverse Device</b>	Check external reverse device(s) stop or reverse the gate when activated.	✓		
<b>Complete System</b>	Complete check of gate and gate operating system.			✓

## 7.2 Troubleshooting

Have a good VOM meter with Min/ Max test button to check voltages and continuity. A Meg-Ohm meter capable of checking up to 500 meg-ohms of resistance is necessary to properly check the integrity of the ground loops. When a malfunction occurs, isolate the problem to one of three areas: 1) the operator, 2) the loop system, 3) the keying devices. **Use caution when checking high voltage areas.**

1. Check the input indicator LEDs. They should only come ON when a keying device (card reader, push button, etc.) is activated. If any of the input LEDs are ON continuously, this will cause the gate operator to hold open. Disconnect the keying devices one at a time until the LED goes OFF.
2. Check any external entrapment protection devices. Any short or malfunction in these devices can cause the gate operator to stop or to hold open.
3. A malfunction in a loop or loop detector can cause the gate operator to hold open, or to not detect a vehicle when it is present over the loop. The LEDs on the loop detector will light only when the loop has detected an object above it. If the LEDs stays on after the object has gone, then the loop detector has malfunctioned. Disconnect the loop detector from the operator circuit board. If the malfunction persists, the problem is not with the loop system. For more information on trouble shooting loops and loop detectors, refer to your loop detector instruction sheet and to the DoorKing Loop and Loop Detector Information Manual.
4. Check to be sure that there are no shorted or open control wires from the keying devices to the gate operator. If a keying device fails to open the gate, momentarily jumper across terminals 1 and 2 (or 1 and 6) on the gate operator circuit board. If the gate operator starts, this indicates that a problem exist with the keying device and is not with the gate operator.
5. Check the input voltage supply. A voltage drop on the supply line (usually caused by using too small supply voltage wires) will cause the operator to malfunction.

Symptom	Possible Solution(s)
Operator will not run. Power LED is OFF.	<ul style="list-style-type: none"> <li>Check that power to the operator is turned ON.</li> <li>Check for DC power at the power input terminals. If power is absent, check incoming power to operator.</li> <li>Be sure DC power switch is ON. Check for 24 VDC at P2, terminals 1 (+) and 2 (-). If no power, faulty bridge rectifier or toroidal transformer. If power is present, possible faulty board.</li> </ul>
Operator will not run. Power LED is ON.	<ul style="list-style-type: none"> <li>Insure that a minimum of one (1) entrapment protection device is connected and the input it is connected to is enabled (UL 325-DIP switch is ON).</li> </ul>
Operator will not run, entrapment protection input(s) LED is ON.	<ul style="list-style-type: none"> <li>The entrapment protection device has a fault or the wiring to it is shorted.</li> </ul>
Operator will not run, entrapment protection input(s) LED is Blinking.	<ul style="list-style-type: none"> <li>The entrapment protection device is not connected or the wiring to it is open.</li> </ul>
Gate will not reverse when an obstruction is encountered.	<ul style="list-style-type: none"> <li>Check ERD (Reverse Sensor) setting.</li> </ul>
Gate opens a short distance, then stops and reverses.	<ul style="list-style-type: none"> <li>Check the reversing sensitivity.</li> <li>Disconnect the gate from the gate operator and check that the gate slides freely without binding. Gate might be too heavy.</li> <li>Continue troubleshooting.</li> </ul>



Symptom	Possible Solution(s)
Gate opens but will not close.	<ul style="list-style-type: none"> <li>• Check the input LEDs. Any ON will hold the gate open and indicates a problem with a keying device.</li> <li>• Check the external safety devices. Any activated will hold the gate open and indicates a problem with the safety device.</li> <li>• Check the loop detectors. Any activated can hold the gate open and indicates a problem with the loop detector or ground loop.</li> <li>• Operator may be in a “soft shutdown.” Activate any keying device to determine if operator returns to normal operation.</li> <li>• If automatic close is desired, be sure SW-1, switch 2 is ON.</li> </ul>
Gate closes but will not open.	<ul style="list-style-type: none"> <li>• Operator may be in a “soft shutdown.” Check input LEDs. If any are ON, momentarily disconnect, then re-connect the wire going to the respective terminal. Operator should open.</li> <li>• Check to be sure that the operator is running in the proper direction. Turn power OFF, and then back ON. Activate a keying device. Operator should run in the open direction. If operator runs in the close direction, turn power OFF and change direction switch SW-1, switch 1. Go to above section if operator now opens but will not close.</li> <li>• Be sure that the respective LED on the control board lights when the keying device connected to the respective terminal is activated. If LED does not light, momentarily place a jumper wire from terminal 1 to the input terminal being checked. If LED lights and gate opens, problem is with the keying device. If LED does not light, replace control board.</li> </ul>
Gate starts to close, then reverses to open.	<ul style="list-style-type: none"> <li>• Check that the reverse sensitivity is properly adjusted.</li> <li>• Disconnect the gate from the operator and check that the gate operates freely without any binding.</li> <li>• Check the loop detector LEDs and input LEDs. Any that flash ON will cause the gate to reverse.</li> <li>• Check for proper loop wiring. A mis-wired loop detector will cause the gate to reverse.</li> <li>• Continue troubleshooting.</li> </ul>
Gate closes and then re-opens.	<ul style="list-style-type: none"> <li>• Check for any input or loop detector LEDs that are ON.</li> <li>• Check that the operator is running in the proper direction (see “gate closes but will not open” above).</li> </ul>
Alarm sounds for 5 minutes and then chirps once every 5 seconds. Operator will not run.	<ul style="list-style-type: none"> <li>• Operator is in a “hard shutdown” condition. Alarm Reset button must be pressed to return operator to normal operation. See pages 32 and 33 for “hard shutdown” information.</li> </ul>
Operator has intermittent functionality problems that vary.	<ul style="list-style-type: none"> <li>• The main terminal #3 250 mA power has been exceeded. Check total amp draw of connected device(s).</li> </ul>

## 7.3 Built-in Diagnostics

This gate operator is designed with built-in diagnostics that will alert you to potential or existing problems that the microprocessor has detected. Specific fault conditions are checked and the operator will signal that a fault exist through the built-in alarm.

**Constant tone is heard when power is applied:** This indicates that the limit switch wire harness is not connected to the circuit board. In this condition, the operator will not run and the tone will continue until the fault is corrected. Check to be sure that the limit switch plug is properly inserted into P3.

**Constant tone is heard:** This indicates that the operator is in a hard shutdown condition. The tone will continue to sound for five minutes, and then will beep once every five seconds. The alarm reset button must be pressed or power must be removed and then reapplied to return the operator to normal operation.

**Short tone is heard every five seconds:** This indicates that the operator has been in a hard shutdown condition in excess of five minutes. This will continue until the alarm reset button is pressed or until power is removed from the operator.

**Operator runs for 1 second and stops, two short tones are heard:** This indicates that there may be a fault with the current sensor circuit. Check that the black current sensor wire has been passed through the hole in the current sensor donut with the correct number of loops (DC motor - 2 loops).

## 7.4 Accessory Items

**UL 325 Monitored Entrapment Protection Devices available for the model 6524 swing gate operator.**

### **Type B2 Contact Sensors (Reversing Edge)**

Miller Edge Sensing Edges - all models with a T2 (resistive) termination.

Miller Edge Monitored Gate Link Model MGL-K20

Miller Edge wireless monitored transmitter/receiver kit model RB-G-K10

ASO GMBH Sentir GF Series sensing edges

### **Type B1 Non-contact Sensors (Photo Cell)**

Miller Edge Reflective-Guard Model RG

Miller Edge Prime-Guard Model PG

EMX Industries Model IRB-MON

EMX Industries Model IRB-RET

Omron Model E3K-R10K4

Seco-Larm Model E-936-S45RRGQ

Seco-Larm Model E-960-D90GQ

### **Monitored Expansion Kit**

Miller Edge Multi-Input Module Model MIM-62

**Accessory items available for the model 6524 swing gate operator.**

**Magnetic Lock** - Magnetic Gate Lock Kit provides an excellent means to secure swing gates and is a fail-safe device allowing emergency vehicle access upon power outage. P/N 1216-080 and P/N 1216-081

**Time Clock** - 7 day time clock can be used to automatically open gate at pre-set time and days. Compact clock fits inside the operator. P/N 2600-791 - 7 day clock

**Uphill Arm Pivot Assembly** - Ball joint pivot gate connection used on uphill or downhill opening swing gates. P/N 6500-490

**Torsion Rods** - Torsion rod assembly is used on uphill swing gates for counter balance. P/N 1203-084

**Hinges** - Heavy-duty ball bearing hinges provide easy swing gate operation. P/N 1200-009, P/N 1200-019, P/N 1200-039.

**Surge Devices** - High and low voltage surge suppressors help prevent circuit board failure caused by lightning strikes and power surges.

P/N 1879-010 - High Voltage

P/N 1878-010 - Low Voltage

**Speed Bumps** - Prefabricated six-foot speed bump reduces traffic speed through gate system. P/N 1610-150

**12 Volt 18 Amp/Hr Extended Battery** - P/N 1801-004. Two (2) required.

**24 VDC Solar Power Kit** - P/N 2000-070.

**Low Current Draw External Loop Detector** - Detectors are solar friendly and mount into solar control box.

Single channel detector - P/N 9402-050

**Plug-In Low Current Draw Loop Detector** - Detectors plug directly into ports on circuit board simplifying wiring. Can be used with solar powered operators.

P/N 9416-010 - Single channel detector

P/N 9415-010 - Two-channel detector

## 6.5 Gearbox Shaft Extension Replacement

**Drive Arm Only** P/N 6500-255

**Control Arm Only** P/N 2600-714

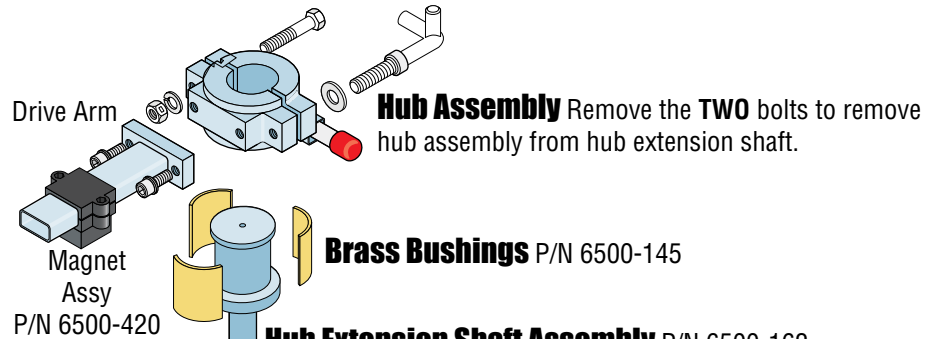
**Elbow Assy ONLY** P/N 2600-720

**Complete Arm Kit** P/N 6500-430

**Limit Sensor Assemblies** Loosen set screws on plastic limit assemblies to remove them. **Be CAREFUL** not to damage limit sensor wires after the assemblies have been removed.

**Note:** Close Limit Sensor must be reinstalled on **TOP** of Open Limit Sensor.

Limit Sensor P/N 1601-263



P/N 6600-030  
Open Bracket

P/N 6600-032  
Close Bracket

Limit Sensor P/N 1601-261

**Limit Sensors**

**Limit Sensors Collar** P/N 6500-117  
Remove the **FOUR** bolts to remove collar.

**Brass Bushing** P/N 6500-138

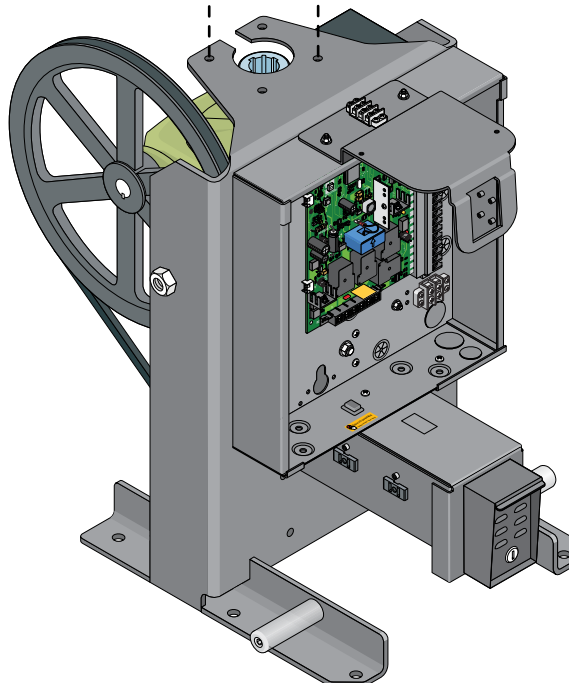
**Bushing Lock Plate** P/N 6500-123

**Stainless Steel Washer** P/N 2620-075

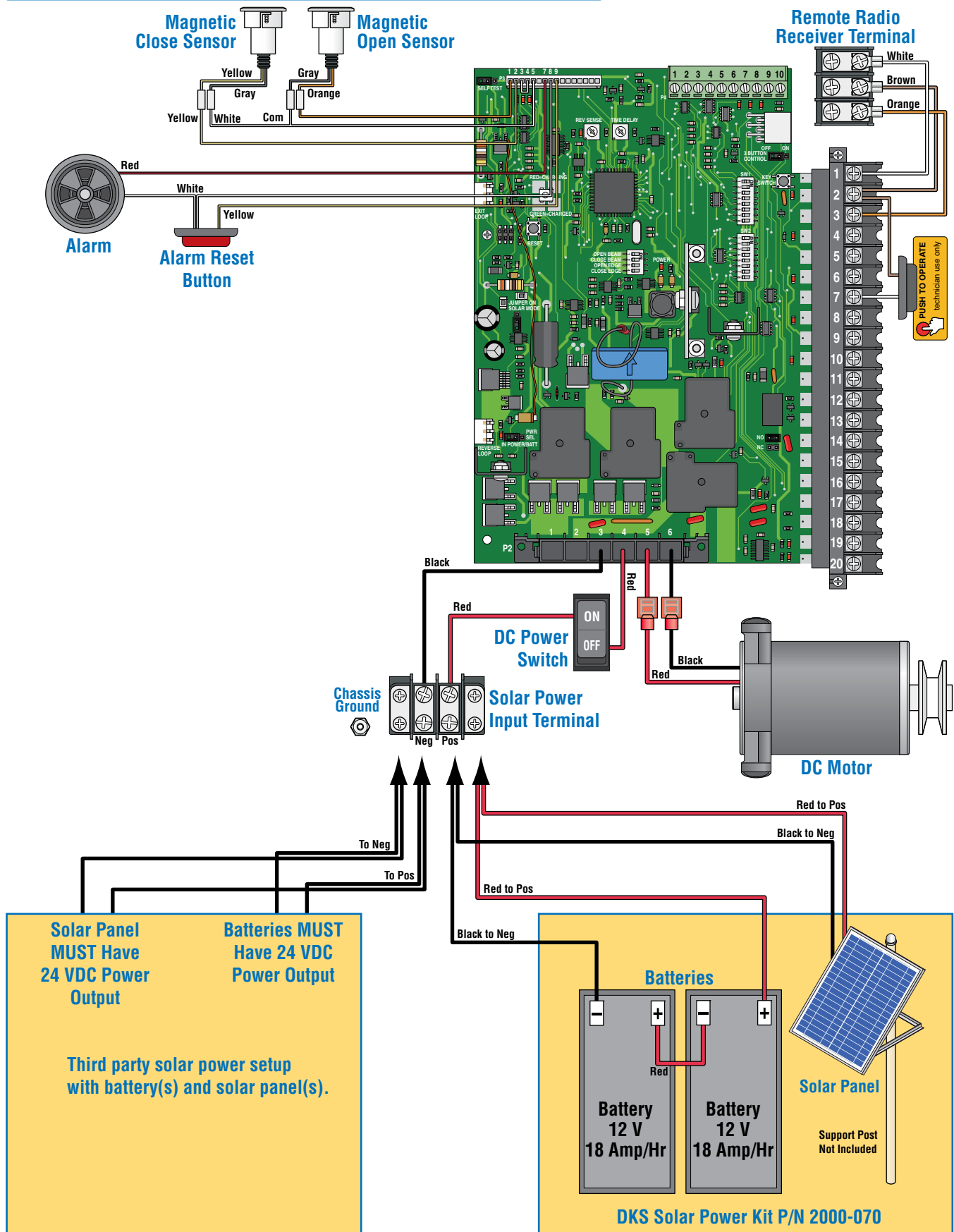
P/N 2630-007 **Snap Ring**

Removing snap ring will release hub extension shaft.

**Gearbox** P/N 2600-719



# Model 6524-081 Solar Input Power



# Installation/Owner's Manual

# Model 6524-081

Solar Powered Vehicular Swing Gate Operator

Use this manual for circuit board 4100-010 Revision AA or higher.

6524-066-N-12-17

**EXTERNAL ENTRAPMENT PROTECTION MUST be installed or the gate operator WILL NOT function.**

**Bi-Parting Gate Operators CANNOT be used with Solar Applications.**



**THIS PRODUCT IS TO BE INSTALLED AND SERVICED BY A TRAINED GATE SYSTEMS TECHNICIAN ONLY.**  
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