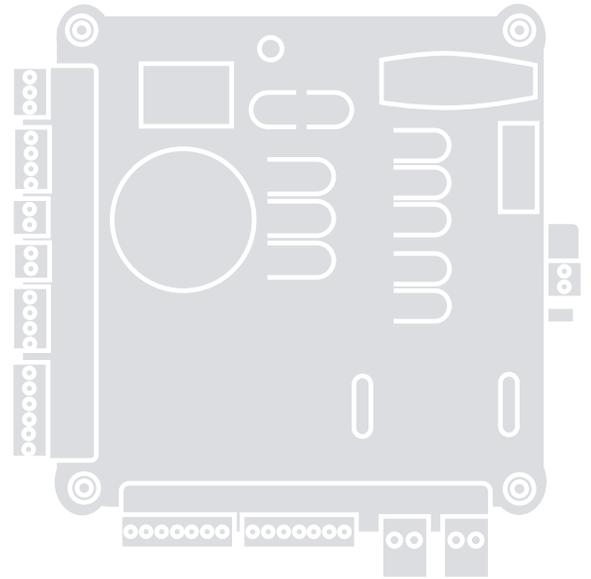


Mercury 310

SolarBOX and ACBox
with Mercury 310 Controller



Controller

EN - Installation reference manual

Nice

Mercury 310 Automated Gate System

Installation and Programming Manual

CONTENTS

CONTENTS

1: INTRODUCTION	3
1.1 OVERVIEW	3
1.2 CONTROL BOXES	4
1.3 ACUTATORS AND ACCESSORIES	5
2: IMPORTANT SAFETY INFORMATION ..	6
3: INSTALLATION SAFETY	14
4: TOOLS AND MATERIALS	14
5: ACBOX310 INSTALLATION.....	16
1.1.1 Earth Ground 18	
5.1 ACBOX310 POWER	18
5.1.1 Introduction and Warnings 8	
5.1.2 Wire Run Sizing 19	
5.1.3 Power Supply Wiring 19	
6: SOLARBOX310 INSTALLATION	24
6.1 SOLARBOX310 POWER.....	26
6.1.1 Introduction and Warnings 26	
6.1.2 Solar & Battery Requirements 26	
7: LINEAR ACTUATORS	30
8: PROGRAMMING AND SETUP	34
8.1 LIMIT LEARN PROCEDURE	35
8.2 STANDBY MODE	37
8.3 FUNCTION KNOB SETTINGS	38
8.4 ACCESSORY INSTALLATION	40
8.5 OXI RADIO PROGRAMMING	42
8.5.1 Deleting Transmitters 43	
8.6 FIRMWARE UPDATE	44
9: CONTROLLER OPERATION	45
9.1 GATE CONTROL BUTTONS	46
9.2 POWER STATUS LEDS	47
9.3 FAIL-SAFE & ALARM BUTTONS .	48
10: INPUTS AND OUTPUTS.....	49
10.1 CONTROL INPUTS.....	51
10.1.1 Remote/Radio Input 51	
10.1.2 Guard Station Input 52	
10.1.3 Fire Input 53	
10.1.4 Emergency Gate Access 53	

10.2 SAFETY SENSOR INPUTS	54
10.2.1 Auto Sensor Scan 54	
10.2.2 Manual Sensor Scan / Clear 54	
10.2.3 Sensor Activation (10K / BlueBUS) 55	
10.3 BLUEBUS INPUT	56
10.3.1 BlueBUS Intallation 56	
10.4 10K Ω SENSOR INPUTS	58
10.4.1 10K Ω Sensor Installation 58	
EMX IRB-MON (Photo Eye) Wiring 58	
EMX IRB-RET (Photo Eye) Wiring 59	
EMX NIR-50-325 (Photo Eye) Wiring 59	
Seco-Larm Enforcer Retro-Reflective (Photo Eye) 59	
Seco-Larm Enforcer Thru-Beam (E-960-D90GQ) 60	
Transmitter Solutions iGaze RE Kit (Photo Eye) 60	
EMX WEL200 (Edge Sensor) Wiring 60	
Generic 2-Wire Edge Sensor Wiring 61	
10.5 LOOP INPUTS.....	61
10.5.1 Obstruction Loop Input 62	
10.5.2 Shadow Loop Input 62	
10.5.3 Exit Loop Input 62	
10.6 LOOP INSTALLATION	63
10.6.1 Vehicle Detectors And Loops 64	
10.6.2 Security Gate Application Rules 64	
10.6.3 Detector Logic 65	
10.6.4 Loop Diagnostics 65	
10.6.5 Loop Layout (Dual Swing/TITAN) 66	
10.7 LINEAR ACTUATOR INPUTS	67
10.8 POWER INPUTS	68
10.9 POWER OUTPUTS.....	69
1: MANUAL RELEASE	70
11: ERROR, STOP, AND LED CODES	74
12: SOLAR REQUIREMENTS	76
13: MAINTENANCE	77
14: TROUBLESHOOTING	78
15: INSTALLATION CHECKLIST	79
16: WARRANTY	80

1: INTRODUCTION

Thank you for selecting a Nice Mercury 310 automatic gate controller. With proper selection, system design, installation and maintenance this operator should provide years of reliable operation. Nice contact information is at the bottom of this page and on the last page of this installation manual.

 **CAUTION**

Anyone who installs, assists with installation or otherwise facilitates the installation in any manner should thoroughly read and understand this manual in its entirety before any attempt is made to actually begin the installation process.

1.1 OVERVIEW

There are four kits available using the Mercury 310 controller, as shown in the table below. These are described in greater detail on the following pages.

MERCURY 310 KITS	
KIT NAME	COMPONENTS
TITANKIT 310 Solar	<ul style="list-style-type: none"> 912L-1 linear actuator arm SolarBOX (metal control box) with Mercury 310 controller Solar panel (10W) OXIBD receiver, ON2E transmitter, and ABF antenna
TITANKIT 310 AC	<ul style="list-style-type: none"> 912L-1 linear actuator arm ACBOX (plastic control box with power supply) with Mercury 310 controller Battery (8Ah) OXIBD receiver, ON2E transmitter, and ABF antenna.
ApolloKIT 310 Solar	<ul style="list-style-type: none"> 816-1 linear actuator arm SolarBOX (metal control box) with Mercury 310 controller Solar panel (10W) OXIBD receiver, ON2E transmitter, and ABF antenna
ApolloKIT 310 AC	<ul style="list-style-type: none"> 816-1 linear actuator arm ACBOX (plastic control box with power supply) with Mercury 310 controller Battery (8Ah) OXIBD receiver, ON2E transmitter, and ABF antenna.

Contact Information:

Visit <https://support.hysecurity.com/hc/en-us> for installation manuals, replacement part instructions, part diagrams and more. Qualified Nice distributors are experienced and trained to assist in resolving installation problems.

For the name of a qualified distributor near you, call Nice at 800-321-9947. *Before contacting your distributor or Nice Technical Support, obtain the serial number of your operator.

Mercury 310 Automated Gate System

Installation and Programming Manual

1.2 MERCURY 310 CONTROL BOXES

Each kit contains one of the two control boxes shown below. The tables below list the basic contents for each control box model. Kits are for a single-gate installation. An additional actuator kit may be purchased separately for full dual gate capability.

CONTROL BOX



ACBOX310 Control Box



SolarBOX310 Control Box

ACBOX310 Control Box Parts

Part Number	Description	Qty
ACBOX310	AC Powered ACBOX w/ Mercury 310 controller	1
<ul style="list-style-type: none"> • Apollo 816-1 • TITAN 912L-1 	Linear actuator (one type per installation)	1
OXIBD/A Receiver	Multi-channel plug-in 433Mhz receiver module	1
ON2E/A	Two-button remote control (for OXIBD/A)	1
ABF/A	Antenna for OXIBD/A receiver module	1
273C	Gate warning signs (UL requirement)	2
75500019	Cable ties (for warning signs)	4

SolarBOX310 Control Box Parts

Part Number	Description	Qty
SolarBOX310	Solar Powered CBOX w/ Mercury 310 Controller	1
<ul style="list-style-type: none"> • Apollo 816-1 • TITAN 912L-1 	Linear actuator (one type per installation)	1
OXIBD/A Receiver	Multi-channel plug-in 433Mhz receiver module	1
ON2E/A	Two-button remote control (for OXIBD/A)	1
ABF/A	Antenna for OXIBD/A receiver module	1
273C	Gate warning signs (UL requirement)	2
75500019	Cable ties (for warning signs)	4
210	Solar panel (10W)	1

1.3 MERCURY 310 ACUTATORS AND ACCESSORIES

LINEAR ACTUATOR

Each kit contains one of the two actuators shown below.



NOTICE

Actuator installation instructions are not included in this manual. Download actuator manuals from:

- **Apollo 816** Installation Manual (P/N MX4684): <https://support.hysecurity.com/hc/en-us/articles/360043678033-Apollo-816-Linear-Actuator-Installation-Reference-Manual>
- **TITAN 912L** Installation Manual (P/N MX4685): <https://support.hysecurity.com/hc/en-us/articles/360043164394-TITAN-912L-Actuator-Installation-Reference-Manual>

Linear Actuator Specifications		
	Apollo 816	TITAN 912L
Drive Type	Electro-mechanical Screw	Electro-mechanical Screw
Open/Close Time	14 - 16 Seconds	14 - 16 Seconds
Gate Max Length and Weight	16 foot (4.9m) leaf @ up to 600 lb. (272 kg)	<ul style="list-style-type: none"> • 20 foot (6m) leaf @ up to 600 lb. (272 kg) • 8 ft (2.4 m) leaf @ up to 1000 lb (453 kg)
Actuator Length (mount hole to mount hole)	Total Length: <ul style="list-style-type: none"> • Retracted - 42 inches (107.2 cm) • Extended - 66 inches (167.6 cm) 	Total Length: <ul style="list-style-type: none"> • Retracted - 42.5 inches (108 cm) • Extended - 69.3 inches (176 cm) Pin-to-Pin: <ul style="list-style-type: none"> • Retracted - 40.5 inches (103 cm) • Extended - 67.3 inches (171 cm)

KIT ACCESSORIES AND PARTS

Each kit, in addition to the control box and actuator, contains the following parts (except as noted):



Solar Panel - 10W
(SolarBOX only)



Remote Control
(P/N ON2E/A)



OXI Receiver
(P/N OXIBD/A)



Cable Ties
(P/N 75500019 for Warning Signs)



Gate Warning Signs
(P/N 273C)



Antenna
(P/N AFB/A)

2: IMPORTANT SAFETY INFORMATION

SAFETY MESSAGES

The safety messages below inform you about potential hazards that can result in injury. Safety messages specifically address level of exposure to operator and are preceded by one of four words: **DANGER**, **WARNING**, **CAUTION** or **NOTICE**.

DANGER

Indicates a hazardous situation which, if not avoided, **WILL** result in **DEATH** or **SERIOUS INJURY**.

WARNING

Indicates a hazardous situation which, if not avoided, **COULD** result in **DEATH** or **SERIOUS INJURY**.

CAUTION

Indicates a hazardous situation which, if not avoided, **COULD** result in **MINOR** or **MODERATE INJURY**.

NOTICE

Addresses practices not related to personal injury. Indicates damage to equipment is probable if the hazardous situation is not avoided.

COMMON INDUSTRIAL SYMBOLS

These international safety symbols may appear on product or in its literature to alert of potential personal injury hazards. Obey all safety messages that follow these symbols to avoid possible injury or death.

Symbol	Safety Hazard
	Attention - Take Notice
	Danger - Keep Away
	Entrapment Zone
	Possible Pinch Point

IMPORTANT SAFETY INSTRUCTIONS

Hazards, associated with automatic gates, can be reduced with proper site design, installation, and use. Installers, maintenance crews, and owners/users must read and follow the safety requirements found in HySecurity® product manuals.



It is important that only qualified installers handle installation of HySecurity Gate vehicular gate operators. A “qualified” installer has one of the following:



1. A minimum of three years experience installing similar equipment.
2. Proof of attending a HySecurity Technical Training seminar within the past three years.
3. Significant manufacturer endorsements of technical aptitude in gate operator installation and operation.

Underwriter Laboratories (UL) and the American Society for Testing and Materials (ASTM) are responsible for current safety standards and regulations regarding gate operators and automated gates. All aspects of gate installation must comply with the appropriate safety standard. For the most up-to-date ASTM F2200 Gate and Fence Standards, refer to www.astm.org. For UL 325 Safety Standard, refer to www.ul.com. Consult local government agencies for up-to-date rules and regulations as certain municipalities have established licensing, codes or regulations that regulate automated gate system design and installation.

GENERAL SAFETY INFORMATION

A gate operator is only a component in a gate system. The other parts of the gate system can include the gate, the external safety sensors, access controls, and vehicle detectors. To have a gate system that provides for safety, security, and reliable operation it is essential these components operate together as a system. It is the responsibility of the system designer and/or installer to ensure any safety or operational issues have been addressed.

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 the gate. **NO ONE SHOULD CROSS THE PATH OF THE MOVING GATE.**
4. Test the gate operator monthly. The gate **MUST** reverse on contact with a rigid object or stop when an object activates the non-contact sensors. After adjusting the force or the limit of travel, retest the gate operator. Failure to adjust and retest the gate operator properly can increase the risk of injury or death.
5. Use the emergency release only when the gate is not moving.
6. **KEEP GATES PROPERLY MAINTAINED.** Read the user'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.**

IDENTIFYING GATE OPERATOR CATEGORY AND UL 325 USAGE CLASS

The UL 325 standard covers gate operators. Within this safety standard several Usage Classes are described that define different types of installations where gate operators can be applied. Some operators are restricted in their usage application. Appropriate Usage Classes are shown in the Specifications.

Class I



Class I: Intended for use in a location of one to four single family dwellings or a parking area associated with one to four single family dwellings.

Class II



Class II: Intended for use in a commercial location or building such as a multi-family housing units (five or more single family units) hotels, garages, retail stores or other buildings servicing general public.

Class III



Class III: Intended for use in an industrial location or building such as factories or loading docks or other locations not accessible by the general public.

Class IV



Class IV: Intended for use in guarded industrial locations or buildings such as an airport security area or other restricted access location, not servicing general public, in which access is monitored by security personnel or via closed circuitry.

Mercury 310 Automated Gate System

Installation and Programming Manual

VEHICULAR TRAFFIC ONLY

WARNING

This automatic gate operator is not designed nor is it intended for pedestrian traffic. Vehicular gate operators must by their nature be powerful to function reliably. This power can cause injury or death. Accordingly, direct all pedestrian traffic to a separate walk-through gate.

Install this gate operator only when:

- The operator is appropriate for the construction of the gate and the usage Class of the gate.
- All openings of a horizontal slide gate are guarded or screened from the bottom of the gate to a minimum of 1.83 m (6 ft) above the ground to prevent a 57.2 mm (2-1/4 in) 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.
- All exposed pinch points are eliminated or guarded.
- 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 shall 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 or pressure relief valve to compensate for an improperly installed, improperly functioning, or damaged gate.

Permanently mounted controls intended for user activation must be located at least 1.83 m (6 ft) 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.

- Exception: 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.

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, in the area of the gate. Each placard is to be visible by persons located on the side of the gate on which the placard is installed.

For gate operators utilizing a non-contact sensor (Photo Eye):

- See instructions on the placement of non-contact sensors for each type of application.
- 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.
- One or more non-contact sensors shall be located where the risk of entrapment or obstruction exists, such as the perimeter reachable by a moving gate or barrier.

For a gate operator utilizing a contact sensor (Edge):

- One or more contact sensors shall be located where the risk of entrapment or obstruction exists, such as at the leading edge, trailing edge, and postmounted both inside and outside of a vehicular horizontal slide gate.
- 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.
- A wireless device 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 obstruction. A wireless device shall function under the intended end-use conditions.
- One or more contact sensors shall be located on the inside and outside leading edge of a swing gate. Additionally, if the bottom edge of a swing gate is greater than 152 mm (6 in) but less than 406 mm (16 in) above the ground at any point in its arc of travel, one or more contact sensors shall be located on the bottom edge.

USE OF VEHICLE DETECTORS

Use of vehicle detectors (loop detectors) is strongly encouraged to prevent damage to vehicles caused by gates closing on them. This is not considered to be a safety item as vehicle detectors cannot provide protection to pedestrians. In some situations, photoelectric devices may be used as vehicle detectors, but should be wired accordingly.

GATE CONSTRUCTION AND SAFETY

Gate construction plays a very important role in ensuring the safety of any automated gate system. The standard for gate construction is ASTM F2200. Below are key areas to address in gate design for safety. For complete information consult the standard. Copies of the standard are available at:

<https://www.astm.org/Standards/F2200.htm>.

Mercury 310 Automated Gate System

Installation and Programming Manual

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Another source of information is available from DASMA, the Door and Access System Manufacturer's Association. The Association publishes Technical Data Sheets, one of which concerns ASTM F2200. For more information, see:

<http://www.dasma.com/PDF/Publications/TechDataSheets/OperatorElectronics/TDS370.pdf>.

General Requirements for gate construction:

- Gates shall be constructed in accordance with the provisions given for the appropriate gate type listed. Refer to ASTM F2200 for additional gate types.
- Gates shall be designed, constructed and installed to not fall over more than 45 degrees from the vertical plane, when a gate is detached from the supporting hardware.
- Gates shall have smooth bottom edges, with vertical bottom edged protrusions not exceeding 0.50 in (12.7 mm) other than the Exceptions listed ASTM F2200.
- The minimum height for barbed wire shall not be less than 6 ft (1.83 m) above grade. The minimum height for barbed tape shall not be less than 8 ft (2.44 m) above grade.
- An existing gate latch shall be disabled when a manually operated gate is retrofitted with a powered gate operator.
- A gate latch shall not be installed on an automatically operated gate.
- Protrusions shall not be permitted on any gate. Consult ASTM F2200 for exceptions.
- Gates shall be designed, constructed and installed such that their movement shall not be initiated by gravity when an automatic operator is disconnected.
- For pedestrian access in the vicinity of an automated vehicular gate, a separate pedestrian gate shall be provided. The pedestrian gate shall be installed in a location such that a pedestrian shall not come in contact with a moving vehicular access gate. A pedestrian gate shall not be incorporated into an automated vehicular gate panel.
- Any non-automated gate that is to be automated shall be upgraded to conform to the provisions of this specification.
- This specification shall not apply to gates generally used for pedestrian access and to vehicular gates not to be automated.
- Any existing automated gate, when the operator requires replacement, shall be upgraded to conform to the provisions of this specification in effect at that time.

The following provisions shall apply to Class I, Class II, Class III, and Class IV vehicular horizontal swing gates:

Gates shall be designed, constructed and installed so as not to create an entrapment area between the gate and the supporting structure or other fixed object when the gate moves toward the fully open position, subject to the following provisions.

The width of an object (such as a wall, pillar or column) covered by a swing gate when in the open position shall not exceed 4 inches (102 mm), measured from the centerline of the pivot point of the gate. Exception: For a gate that is not in compliance with this provision, the defined area shall be subject to the entrapment protection provisions of UL 325.

Except for the zone specified above the distance between a fixed object such as a wall, pillar or column, and a swing gate when in the open position shall not be less than 16 inches (406 mm). Exception: For a gate that is not in compliance with this provision, the defined area shall be subject to the entrapment protection provisions of UL 325.

EXTERNAL ENTRAPMENT PROTECTION SENSORS

Most Nice | HySecurity gate operators are equipped with a Type A, Inherent Entrapment Sensor (IES). UL 325 Safety Standard compliance requires an additional means of entrapment protection that includes installation of external entrapment protection sensors, the number of which depends on entrapment hazards that exist at each particular installation.

To comply with UL 325, the following external sensors may be used:

- Contact sensors, such as edge sensors
- Non-contact sensors, such as photo eyes
- Built-in Type C device (Mercury 310 only)

Site designer or installer can choose photo eyes, edge sensors, internal Type C sensor, or a combination of these devices. Whatever devices are used, protection in both opening and closing directions of gate travel must be provided, as well as and where a risk of entrapment is present.

UL 325 Safety Standard for automatic sliding gates specifically requires that edge sensors, photo eyes, or a combination of both devices be installed to protect against pedestrian entrapment in BOTH directions of gate travel and wherever entrapment hazards exist.

PHOTO EYES: One or more non-contact sensor (photo eyes) shall be located where entrapment risk or obstruction exists, such as perimeter reachable by a moving gate.

Care shall be exercised to reduce the risk of nuisance tripping, such as when a vehicle trips the sensor while the gate is moving.

Mercury 310 Automated Gate System

Installation and Programming Manual

EDGE SENSORS: One or more contact sensors (edge sensors) shall be located at leading edge, trailing edge, and post-mounted, both inside and outside of a sliding gate.

One or more contact sensors shall be located on the inside and outside leading edge of a swing gate. Additionally, if the bottom edge of a swing gate is greater than 6"(152mm) but less than 16"(406mm) above the ground at any point in its arc of travel, one or more contact sensors shall be located on the bottom edge.

SENSOR SECURITY: A hard-wired contact sensor shall be located and its wiring arranged so that communication between sensor and gate is not subjected to mechanical damage.

TYPE A ENTRAPMENT PROTECTION: In Type A entrapment protection, the controller monitors the electrical resistance of the actuator motors, so if a moving gate comes up against the physical resistance of an immovable object, it will cause the gate to stop, hence limiting the force..

TYPE C ENTRAPMENT PROTECTION: In Type C entrapment protection, the controller monitors the actuator encoder output, and if there is an unexpected decrease in speed, it will cause the gate to stop, hence limiting the force.

SENSOR FUNCTION and COMMUNICATION: A wireless sensor that transmits its signal to gate operator must be located so its signal is not impeded by building structures or other obstructions. All sensors must be installed so that they function as intended for end-use conditions.

UL 325 LISTING: Edge sensors and photo eyes must be tested and labeled as "Recognized Components" or otherwise certified to UL 325 requirements in order to

be deemed acceptable for use in a gate operator. Study Important Safety Instructions and consider your specific installation to determine where greatest entrapment risks exist. Locate edge sensors and/or photo sensors accordingly. Be certain that a sufficient number of sensors are used so that pedestrians are protected from entrapment in both directions of gate travel and all hazard areas are fully protected. Most HySecurity gate operators require external entrapment sensors that utilize Normally Closed (NC) contact means of monitoring. HySecurity gate operators utilizing the SmartCNX Controller require external entrapment sensors that have a 10k Ohm or 4-wire pulsed monitoring scheme. Refer to UL website at www.ul.com for most up-to-date list of gate operator safety standards (UL 325). Mercury 310 controller can monitor 10k sensors as well as BlueBus photo eyes.



CAUTION

A contact or non-contact sensor is also required to protect against possible entrapment if gate opens to a position less than 16 inches from any object, such as a post or wall.

RECOMMENDED EXTERNAL ENTRAPMENT PROTECTION SENSORS LIST

UL 325 Standard:

- The operator shall monitor for the presence of every device at least once during each open and close cycle (32.1.8).
- It shall not be possible to make simple modifications in the field by adding, suppressing or changing, either on the operator or external entrapment protection device(s), to bypass, interfere with, or otherwise defeat the monitoring function. (32.1.10).
- Entrapment zones are now defined for each gate type (4.23, 4.24, 4.29, 4.34).

Swing Gates: To enable fully automatic operation, all SWING gate operators will require a minimum of ONE monitored external entrapment protection sensor to protect entrapment zones in either the open or close direction of travel. However, an additional monitored sensor is required if there is a risk of entrapment in both directions of gate travel.

Preferred solution for swing gates: A photo eye for the close direction and/or a hard-wired wraparound edge sensor on the leading edge of the gate, which protects for both directions of gate travel.

IMPORTANT!

Installers must assess each specific site and install sensors that protect all potential entrapment zones.

Mercury 310 Automated Gate System

Installation and Programming Manual

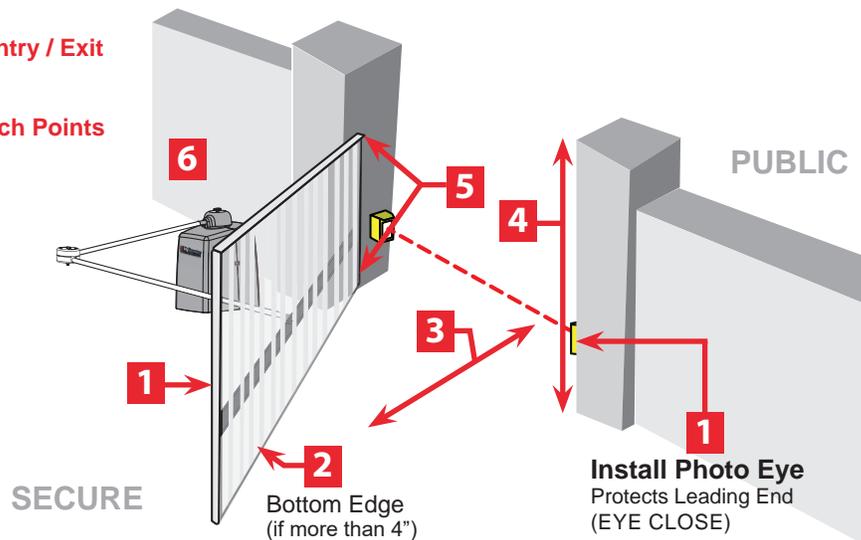
Nice

The sensors shown in the table below have been tested with Nice | HySecurity gate operators by an independent laboratory and certified to comply with UL 325 7th Edition. Select sensors from this list for UL compliant gate automation solutions. Contact the sensor manufacturer for specific recommendations for use.

Nice HySecurity Recommended Sensors					Control Boards					
	Mfg. Part # or Model	Brand	Nice Hysecurity	Max Range	Smart Touch	Smart DC	SmartCNX	936	1050	Mercury 310
Photo Eyes (Retro -reflective)	E3K-R10K4-NR-1	Omron	MX000999	40 ft	•	•	•			
	NIR-50-325	EMX	-	45 ft	•	•	•	•	•	•
	IRB-RET	EMX	-	53 ft	•	•	•	•	•	•
	E-931-S50RRGQ	Seco-Larm	-	46 ft	•	•	•			•
Photo Eyes (Thru-Beam)	Blue Bus Era Photo Eyes	Nice HySecurity	EPMB/A EPMOB/A EPLOB/A EPMAB/A	45 ft			•	•	•	•
	IRB-MON	EMX	MX3990	65 ft	•	•	•			•
	E-960-D90GQ	Seco-Larm	-	90 ft	•	•	•			•
Edge Sensors	Sentir Series	ASO Safety	"AS1502-* AS1501-*"		•	•	•	•	•	•
	CPT210-2U-#-T2	Miller Edge	-		•	•	•	•	•	•
Edge Sensor Converters	Hy2NC (Converts 10K to NC Monitoring)	HySecurity	MX4018		•	•				
	GEM103 (Converts 10K to Pulsed Monitoring)	Miller Edge	-					•	•	
Edge Wireless Kits	iGAZE RE Kit	Transmitter Solutions	-		•	•	•	•	•	•
	WEL-200	EMX	-		•	•	•	•	•	•
Multi-Input Module	The Solution – MIM-62	Miller Edge	-		•	•	•			•

Swing Gate Common Entrapment Zones

1. Leading Edge
2. Bottom Edge Entry / Exit
3. Posts
4. Post Pivot / Pinch Points
5. Arm Movement
6. Posts



Mercury 310 Automated Gate System

Installation and Programming Manual

ELECTRICAL SAFETY

- Turn gate operator and all circuit breakers OFF before performing maintenance on the gate operator or making contact with output receptacles.
- Never insert any objects into output receptacles during operation. The possibility exists of electrical shock, electrocution, or death.
- Never let power wires lay in water.
- Never use damaged or worn wire when connecting equipment. Inspect for cuts in the insulation.
- Never grab or touch a live power cord or cable with wet hands. The possibility exists of electrical shock, electrocution or death.
- Always make certain that proper power has been selected for the job. See Cable Selection Chart in this manual.



GROUNDING SAFETY

- Always make sure that electrical circuits are properly grounded to a suitable earth ground (ground rod) per the National Electrical Code (NEC) and local codes. Severe injury or death by electrocution can result from operating an ungrounded operator.
- Never use gas piping as an electrical ground.



BATTERY SAFETY

HySecurity operators use sealed Absorbed Glass Mat (AGM) batteries and HySecurity highly recommends replacing used batteries with new AGM-type batteries.

CAUTION

Batteries used with HySecurity gate operator contain materials considered hazardous to environment. Proper battery disposal is required by federal law. Refer to *Hazardous Waste Regulations* federal guidelines.

To reduce risk of fire or injury to persons:

- Observe polarity between batteries and charging circuit.
- Never mix battery sizes, types, or brands. Charging circuit on HySecurity DC operators is designed for AGM-type batteries, not flooded lead acid-type batteries.
- Exercise care in handling batteries. Be aware metal found in rings, bracelets, and keys can conduct electricity, short batteries, and cause potential injury.
- Do not open or mutilate batteries. Battery cells contain corrosive materials which may cause burns and other injuries. Material within batteries is toxic.
- Always dispose of batteries properly. Do not place batteries in fire. Battery cells may explode. Follow federal guidelines for proper disposal of hazardous waste.
- Always keep battery cables in good working condition. Repair or replace all worn cables.
- Replace batteries according to instructions found in *DC Battery Replacement*.
- Do not charge frozen battery. Battery can explode. If frozen, warm the battery to at least 61°F (16°C).



ENVIRONMENTAL SAFETY/HAZARDOUS MATERIALS AND PROPER DISPOSAL

Decommissioning is a controlled process used to safely retire a piece of equipment that is no longer serviceable. If the equipment poses an unacceptable and unrepairable safety risk due to wear or damage or is no longer cost effective to maintain (beyond life-cycle reliability) and is to be decommissioned (demolition and dismantlement), be sure to follow rules below.



- Do not pour waste or oil directly onto the ground, down a drain or into any water source.
- Contact your country's Department of Public Works or recycling agency in your area and arrange for proper disposal of any electrical components, waste or oil associated with this equipment.
- When the life cycle of this equipment is over, remove battery and bring to appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid.
- When the life cycle of this equipment is over, it is recommended that the frame and all other metal and plastic parts be sent to a recycling center.

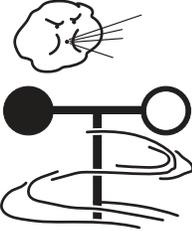
Metal and plastic recycling involves the collection of metal and plastic from discarded products and its transformation into raw materials to use in manufacturing a new product.

Recyclers and manufacturers alike promote the process

of recycling metal and plastic. Using a metal and plastic recycling center promotes energy cost savings.

WIND LOAD

When the IES (type A sensor) trips, it sends a signal to gate operator to stop and reverse direction. This feature may be falsely triggered in excessively windy conditions because wind itself, acting over surface area of gate panel, can provide necessary force to trigger IES.



CAUTION

Do not adjust IES sensitivity/Force setting to accommodate for inappropriately designed gate panels. Loss of IES sensitivity increases mechanical wear on gate hardware and gate operator. It may also pose a safety hazard. Compensating for wind loads by adjusting IES may set IES sensitivity to a level which, when encountering an obstruction, ignores obstruction and fails to reverse direction.

MAINTENANCE OF GATE SYSTEMS

To keep your automated gate system performing both safely and reliably it is important to ensure that the components of that system are functioning properly.

At least monthly:

- Disconnect the gate operator and manually move the gate through its range of travel. Note any squeaks from rollers or hinges or areas of binding. The gate should travel smoothly and quietly throughout its range. If it does not, contact a gate professional to correct the problem.
- Reconnect the gate operator and perform the following tests:
 - With the gate opening, block any photo eyes and/or depress any safety edges used to protect the open direction. The gate should stop and/or reverse.
 - With the gate closing, block any photo eyes and/or depress any safety edges used to protect the close direction. The gate should stop and/or reverse.
 - Using a suitable obstruction in the path of the gate (a solid, immovable object), run the gate in the open direction until it contacts the obstruction. The gate should stop and reverse, or it will just stop if a Type C sensor is engaged before the Type A sensor is tripped.
 - Using a suitable obstruction in the path of the gate (a solid, immovable object), run the gate in the close direction until it contacts the obstruction. The gate should stop and reverse, or it will just stop if a Type C sensor is engaged before the Type A sensor is tripped.

3: INSTALLATION SAFETY

CAUTION

- The gate operator installation is NOT a “do-it-yourself” project. Contract a qualified gate operator installation company to install this system to ensure a safe and reliable installation.
- Property owner is responsible to ensure installer is qualified to make a safe and professional installation.
- Consult local government agencies for up-to-date rules and regulations to satisfy licensing, codes or regulations that regulate automated gate system design and installation.
- The gate being modified should be level and plumb and the gate should open easily and evenly.
- Nice swing gate systems are NOT intended for installation on an incline.
- These instructions assume actuator(s) has been installed per the applicable actuator installation manual. Install actuator before performing the procedures in this manual.

4: TOOLS AND MATERIALS

Below is a list of tools and materials necessary for installation of the control box:

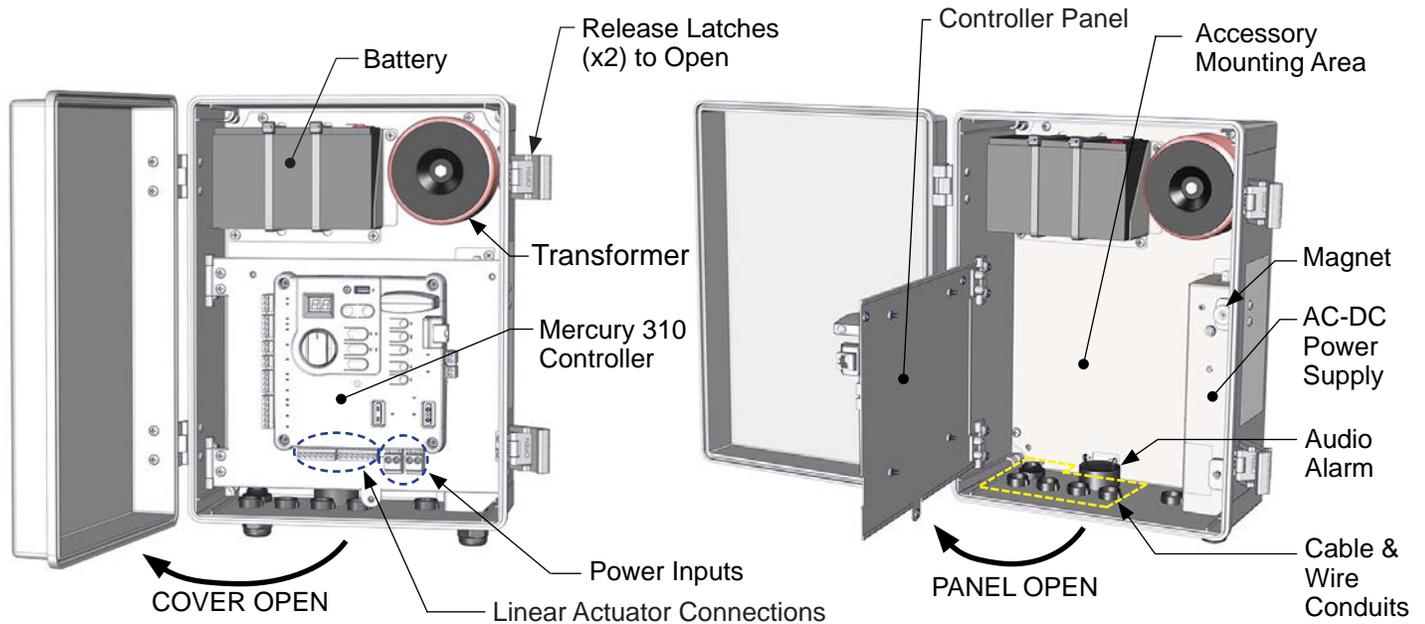
- Wire cutters/strippers
- Basic hand tools (screwdrivers, wrenches, pliers, etc..)
- Drill and assorted size bits
- Hardware for mounting control box
- Electrical conduits, wire nuts, grommets, asphalt patch, etc. as needed

Mercury 310 Automated Gate System

Installation and Programming Manual

5: ACBOX310 INSTALLATION

To open the front cover, unlatch the two door fasteners and swing to the left. To open the internal panel to access the accessory mounting area and power supply, grip and pull at top of controller panel to disengage it from the magnet, then swing panel to left (see image below).

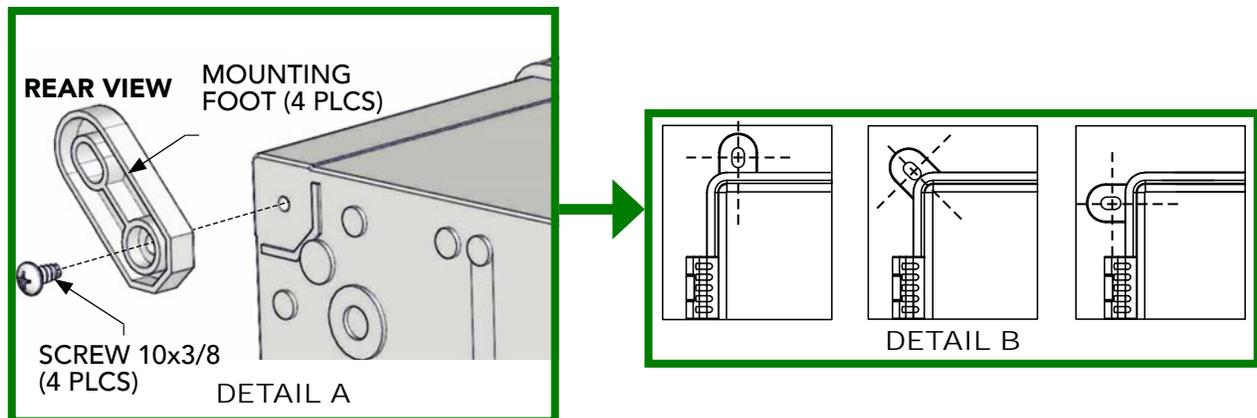


ACBOX310 Interior Features

1

Install Mounting Feet to Control Box

Secure each of the four mounting feet to the control box rear corners using the #10x3/8 inch screws (DETAIL A). Install at one of three preferred angles (DETAIL B).



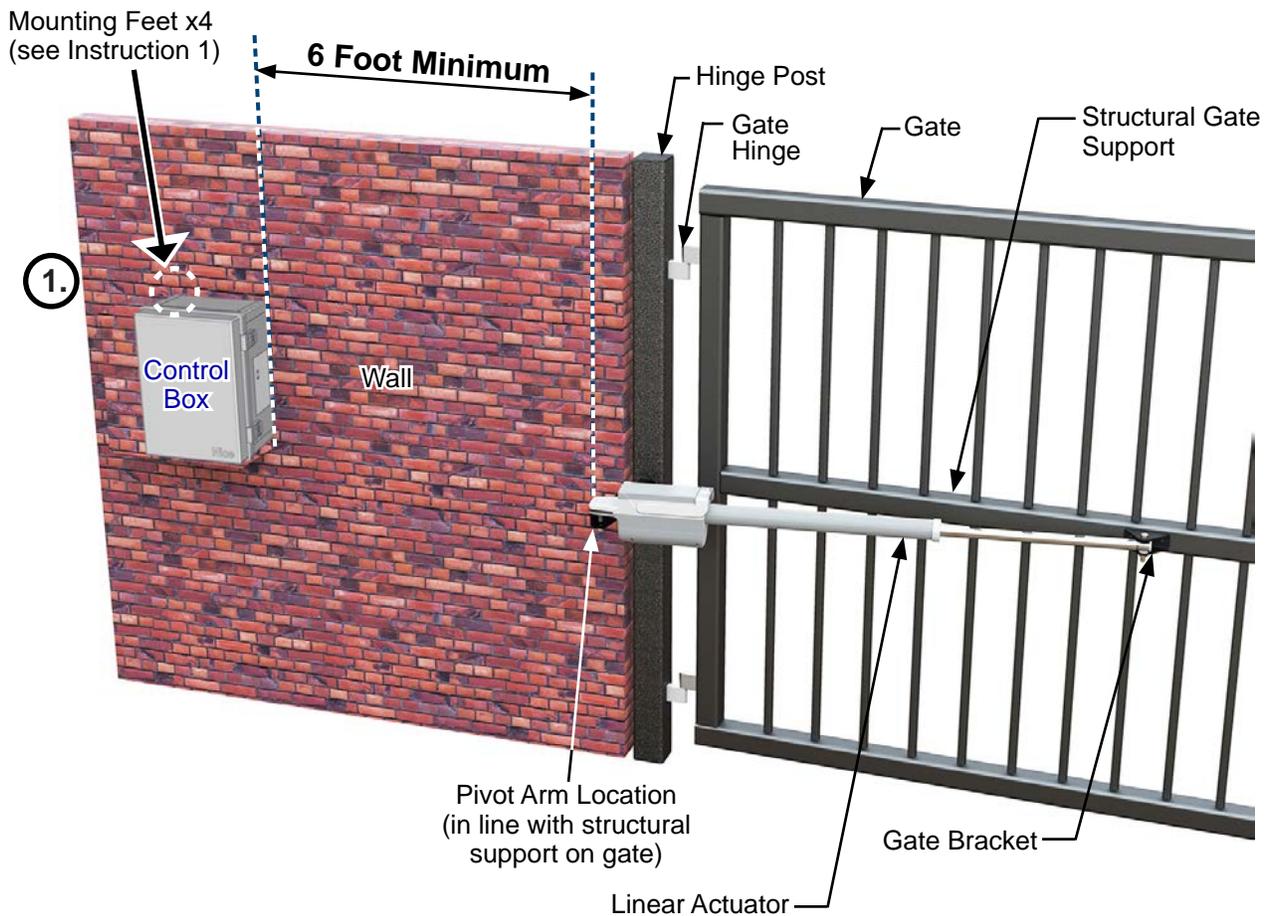
Mounting Feet Installation

2 Install ACBOX310

Mount control box on same side as primary actuator (for dual gate systems, the same side as the actuator with shorter harness) and at least six feet away from pivot arm or any moving part of the gate (see image below).

NOTICE

- This image shows a typical installation. The control box may be installed on either side of the wall depending on which direction the gate opens or where a person monitoring the gate will be located.
- Hardware for the control box is NOT included. Drill holes as needed in mounting surface and use hardware capable of supporting the weight of the control box (approximately 26.4 lbs [11 kg]).



ACBOX310 Installation Location

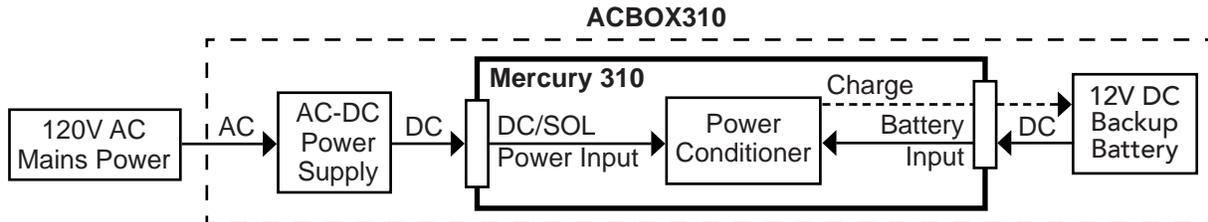
CAUTION

Do not mount the control box where the person using the control box to operate the gate can come in contact with the gate!

5.1 ACBOX310 POWER

5.1.1 Introduction and Warnings

The ACBOX310 features an AC-to-DC power supply and 12VDC 8Ah backup battery. The basic power flow through the ACBOX310 system is displayed in the diagram below:



ACBOX310 Power Diagram

The controller and linear actuator motors will run from the batteries during an AC power failure. The Mercury 310 controller itself operates ONLY on DC power.



WARNING



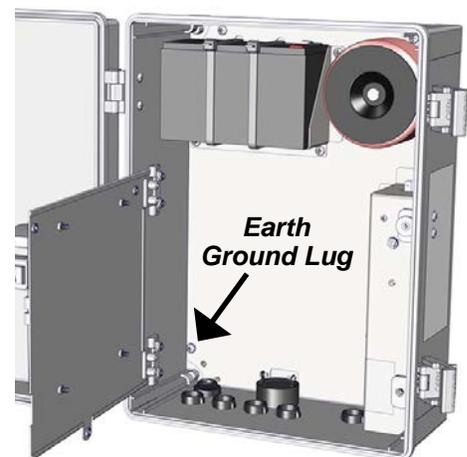
FOLLOW ALL SAFETY WARNINGS, AS FOLLOWS, WHEN INSTALLING AC POWER:

- Disconnect power to the gate operator by manually opening its dedicated circuit breaker and unplug the battery connector on the Mercury control board before making any mechanical or electrical adjustments.
- Use a 20 amp dedicated circuit breaker for each installed gate operator.
- Open dedicated circuit breaker supplying power to gate operator before a new installation or making any modifications to an existing installation of this gate operator.
- All wiring connections must be made by a qualified individual.
- Run individual circuits in separate U.L. Listed conduits. Do not combine high voltage (120VAC) power wiring and low voltage (+12VDC to +24VDC) control wiring in the same conduits.

1.1.1 Earth Ground

BECAUSE AC POWER IS BEING RUN INTO THE CONTROL BOX FOR CONVERSION TO DC, THE GATE OPERATOR SYSTEM SHOULD BE GROUNDED THROUGH THE EARTH GROUND IN THE AC MAINS WIRING SYSTEM (GREEN WIRE).

- This ground connection will prevent dangerous currents in the control box parts, the actuator, or the gate itself.
- Nice recommends an 8 foot copper rod driven all the way into the ground with a copper clamp and 12ga copper wire minimum.
- Connect ground wire to the grounding lug in the lower left corner of chassis interior (right).



Chassis Ground Location

5.1.2 Wire Run Sizing

Use the table below to determine high voltage wire size requirements.

- Distance shown in the chart is measured from the operator to the power source.
- If power wiring is greater than the maximum distance shown, a service feeder is recommended.
- When large gauge wire is used, a separate junction box must be installed for the operator connection.
- Wire table is based on stranded copper wire. Wire run calculations are based on a 120 VAC power source with a 3% voltage drop on the power line, plus an additional 10% reduction in distance to allow for other electrical losses in the system.

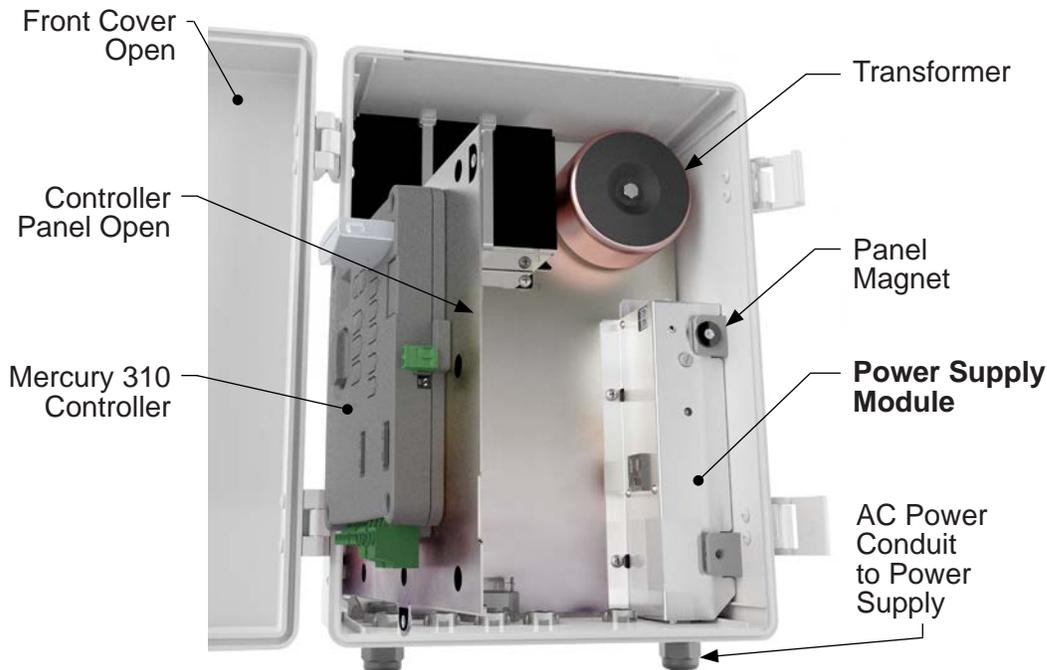
Maximum Run Per Wire Gauge						
120V/AWG GAUGE	14	12	10	8	6	4
MAX RUN	180 FT (54.8m)	280 FT (85.3m)	460 FT (140m)	700 FT (213.3m)	1150 FT (350.5m)	1800 FT (548.6m)

WARNING

Mercury 310 controller accepts low voltage (<24VDC) power only.

5.1.3 Power Supply Wiring

Access the power supply by opening the front cover, then pulling open the controller panel from the magnet.



Power Supply Module Location

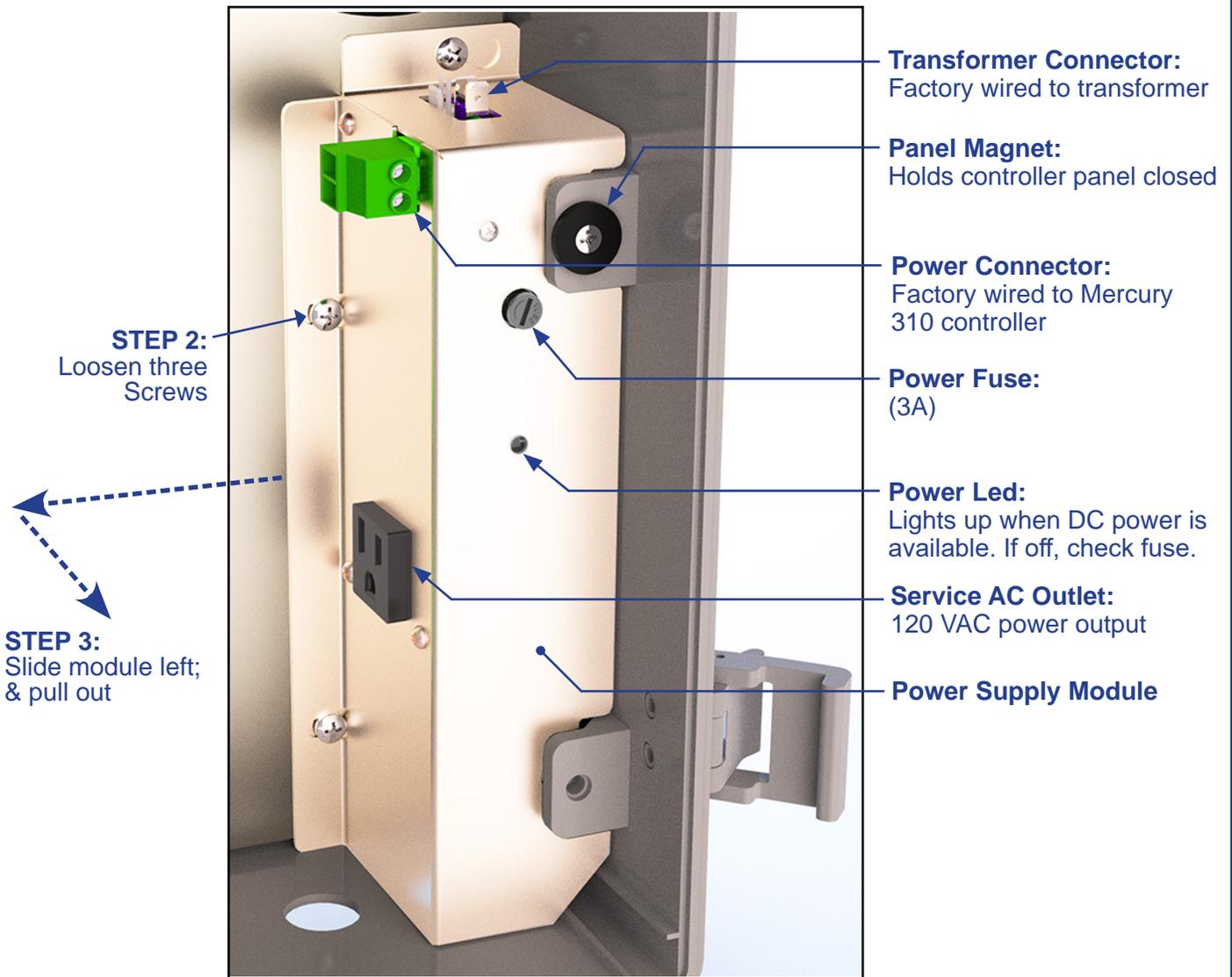
3

ACBOX310 Power Wiring

NOTICE

The power supply module must first be removed from the chassis before it can be wired.

1. Ensure all power sources are disconnected from the ACBOX310 and remove the battery leads from the Mercury 310 controller.
2. Loosen the three screws indicated in image below.
3. Slide the power supply cover a little to the left to disengage the loosened screws from slots, then pull it rearward out of the unit, being careful of existing wires and components.



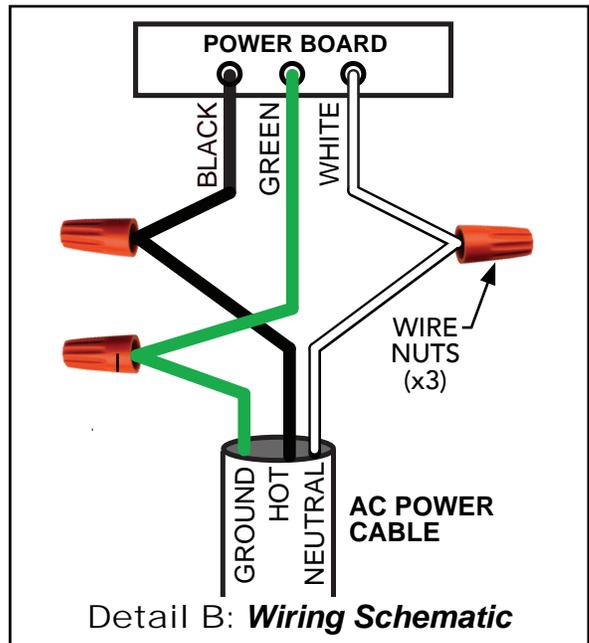
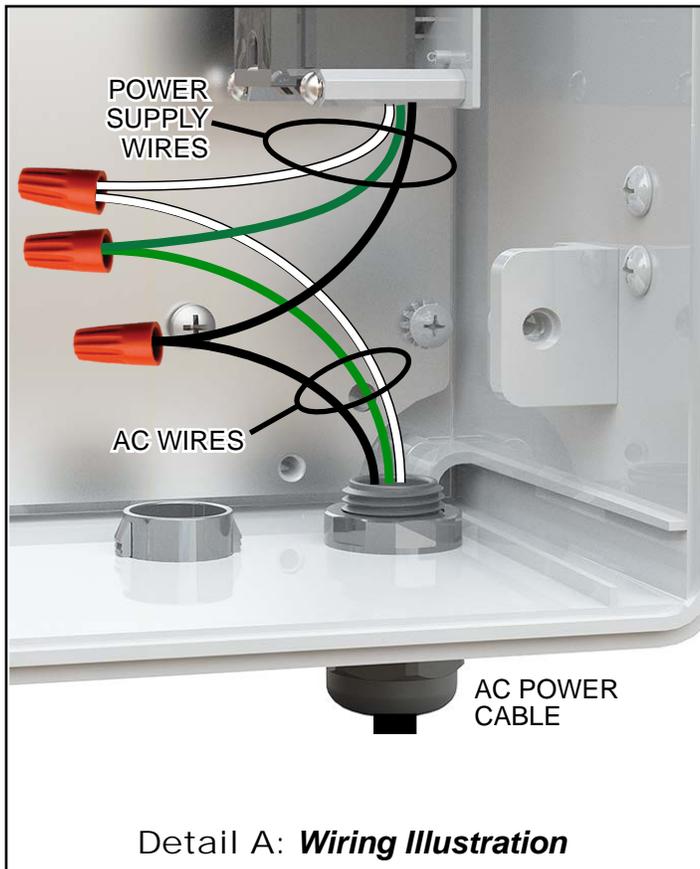
Power Supply Module And Features

(Continued)

3: ACBOX310 Power Wiring (Cont.)

(Continued)

4. Run the AC source line through cord grip under power supply module and secure cord grip (Detail A).
5. Use wire nuts to connect AC wires to power supply wires as shown below in the illustration (Detail A), schematic (Detail B), and wiring table.
6. After wiring, reinstall power supply module back into chassis by performing Steps 2 & 3 of Instruction 3 in reverse.



AC WIRING TABLE	
AC Wire	Power Supply Wire
Ground	Green
Hot	Black
Neutral	White

AC Mains to Power Supply Wiring

4 Attach Warning Signs to Gate

1. Place one warning sign (see right) on outside of gate and the other on inside of gate in high visibility locations (eye height) to warn of entrapment dangers. If signs cannot be attached to gate, ensure they are visible to pedestrians and anyone operating the gate.
2. Use two cable ties per sign, or alternative means, to securely affix signs to gate.

CAUTION

The warning signs provided in the installation kit are required by UL325 to be visible from both sides of gate!



5 Ensure Audio Alarm Connection

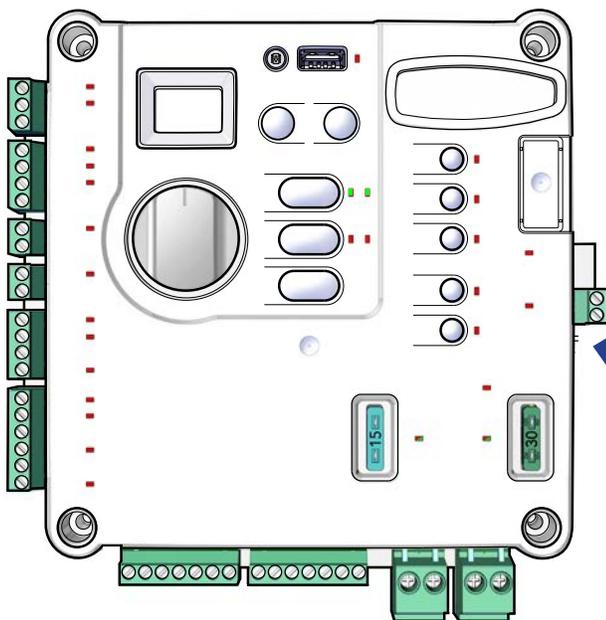
Check to ensure the factory wired connection between audio alarm (siren) and Mercury 310 controller is secure (see illustration below). The audio alarm is installed in the bottom of the chassis and used for the following:

- Signals a hard shutdown of the system, which is triggered by two consecutive entrapment events.
- Signals a gate movement when the “alarm” function is ON.
- Chirps to indicate various functions during programming.

The alarm is a piezoelectric device that can produce 100 dB @ 1 foot.

CAUTION

An alarm is **required** to be connected to the Mercury 310 controller for UL325 compliance!



Alarm Connector Location

SolarBOX310

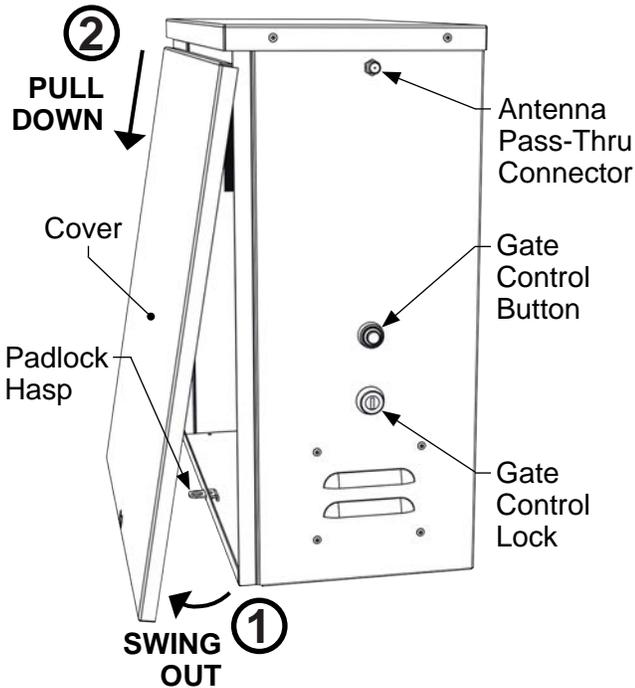
Installation and Solar Panel Wiring

SolarBOX310



6: SOLARBOX310 INSTALLATION

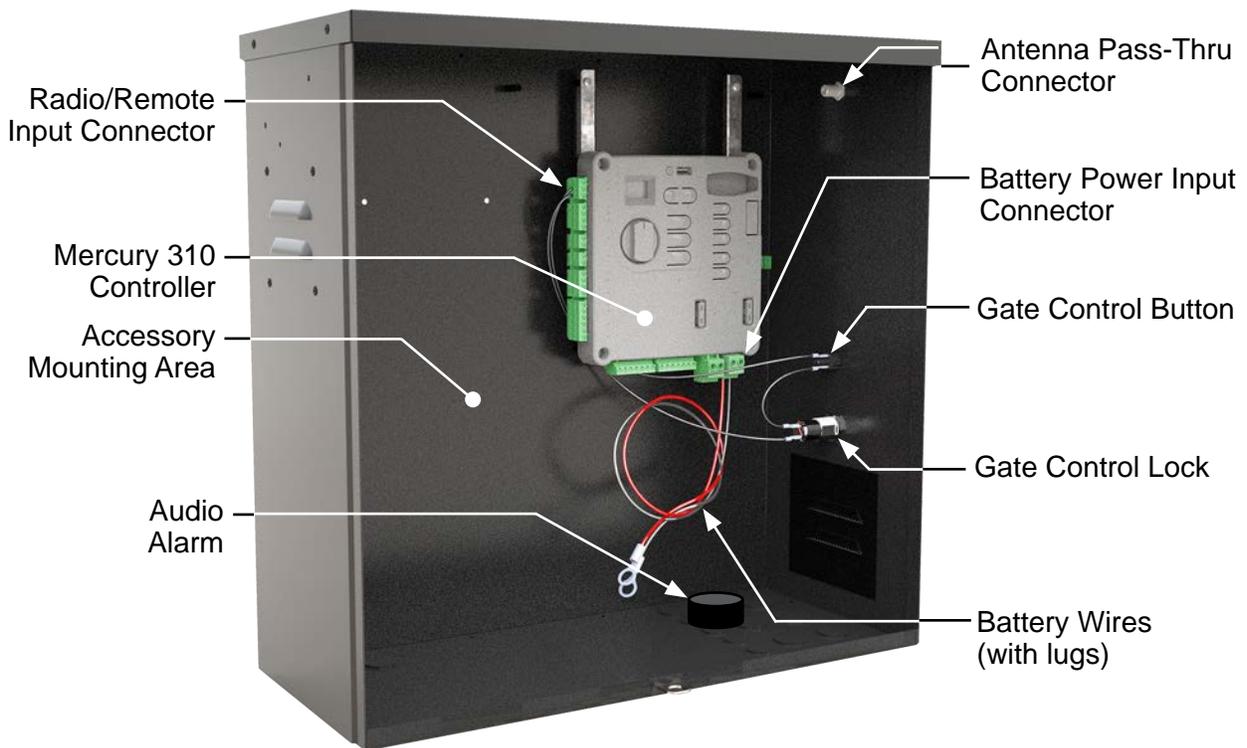
To remove the front cover, unlock (if locked) from the padlock hasp, then swing out cover and pull it downward to remove from the chassis (below).



NOTICE

The SolarBOX310 comes factory wired as follows:

- Two wires (red & black with battery lugs) are wired to the battery input connector for easy attachment to a backup battery.
- The gate control button is wired to the Remote/ Radio input on the controller for step-by-step operation of the gate out-of-the-box.
- A lock is wired between the gate control button and remote input on the controller, so the gate control button can be disabled by locking with a key. Be sure to provide this key to the end user!



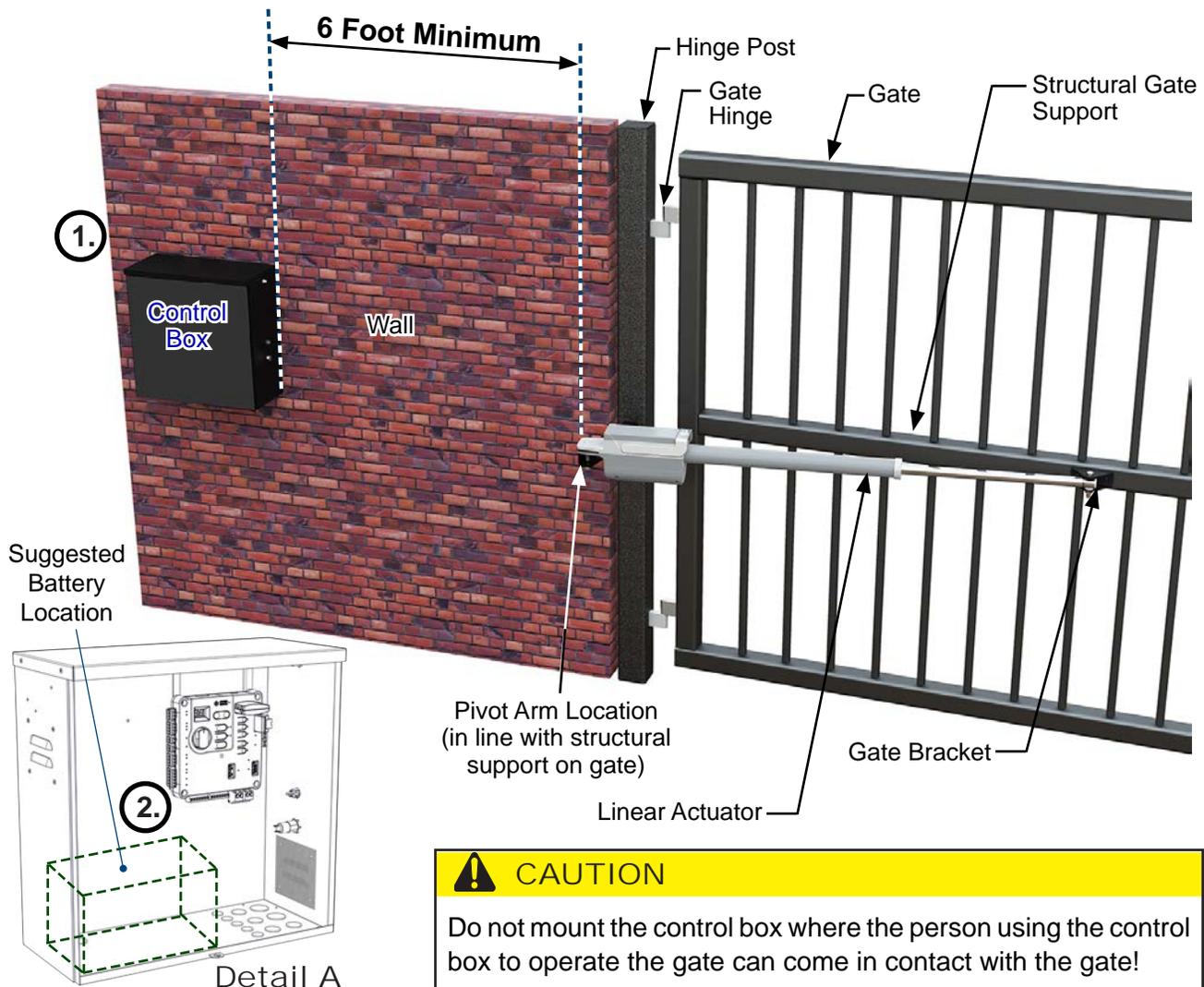
SolarBOX310 Exterior (Top) and Interior (Bottom)

1 Install SolarBOX310

1. Mount the control box on the same side as the primary actuator (for dual gate systems, the same side as the actuator with shorter harness) and at least six feet away from pivot arm and moving parts of the gate (see below).
2. Set 12V backup battery inside of control box with terminals toward the front (see Detail A below).

NOTICE

- The image below shows a typical install. The control box may be installed on either side of the wall depending on which direction the gate opens or where a person monitoring the gate will be located.
- Mounting hardware for the control box is NOT included. Drill holes as needed in mounting surface and use hardware capable of supporting weight of control box (23 lbs [10.5 kg]) PLUS the battery, which can add up to 66lbs (30 kg), depending on the battery selected.

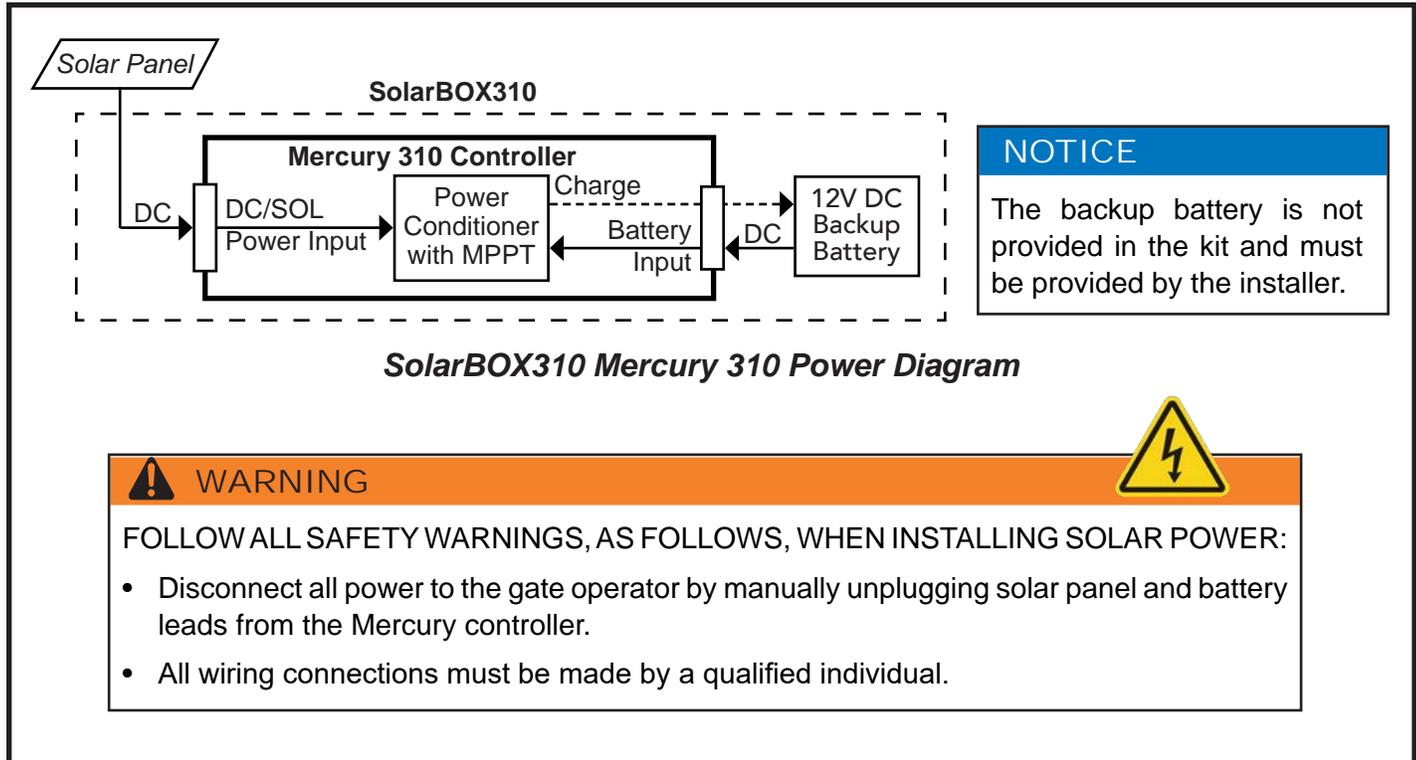


SolarBOX310 Installation Location

6.1 SOLARBOX310 POWER

6.1.1 Introduction and Warnings

The SolarBOX310 features a solar panel and backup battery charging capability. The basic power flow through the SolarBOX310 system is displayed in the diagram below:



6.1.2 Solar & Battery Requirements

The following are required to power the SolarBOX310 control box:

- 12VDC backup battery (not included)
- 12VDC rated (17-23.5V Open Circuit Voltage) solar panel providing at least 10 Watts (included)

NOTICE

20 and 30 watt solar panels are also available. Contact Nice for more information.

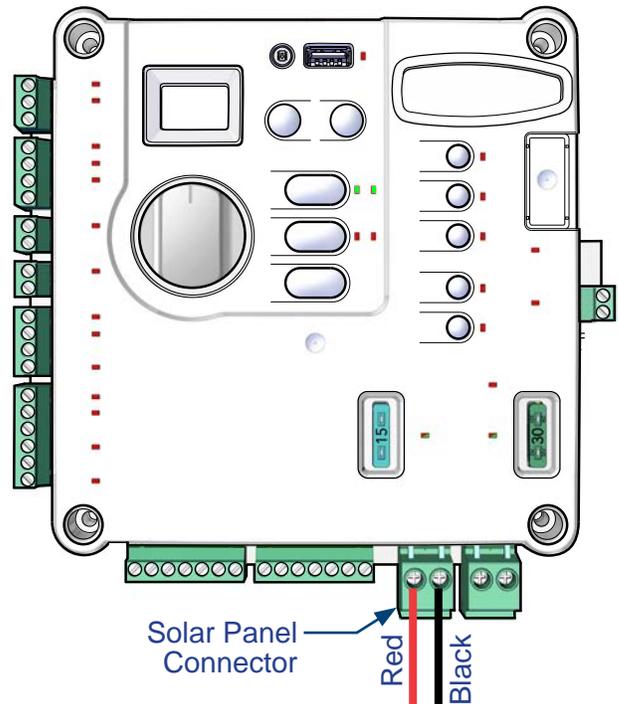
Recommended backup battery specifications are as follows:

- **Output:** 12 Volt DC
- **Type:** sealed lead acid (AGM)
- **Features:** terminal posts on top (not sides)
- **Size/Watts:** 70 amp hours (or larger). Larger batteries provide longer backups.

2 Install Solar Panel

Install the solar panel as follows:

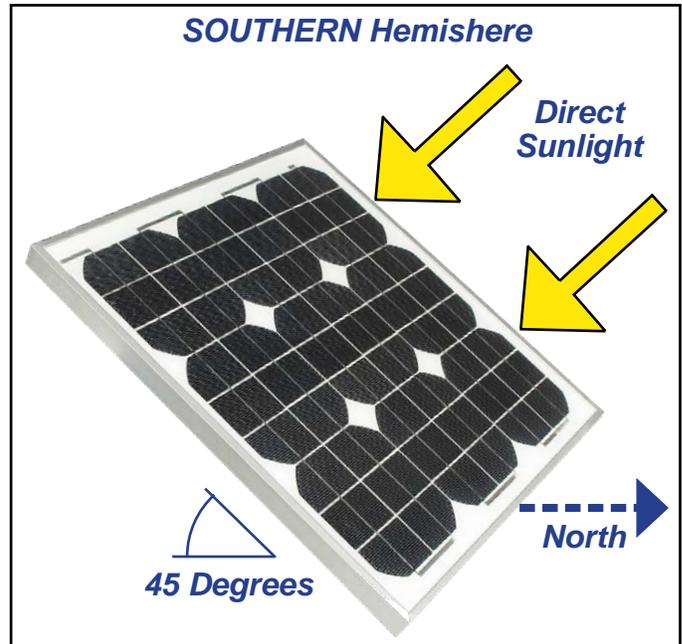
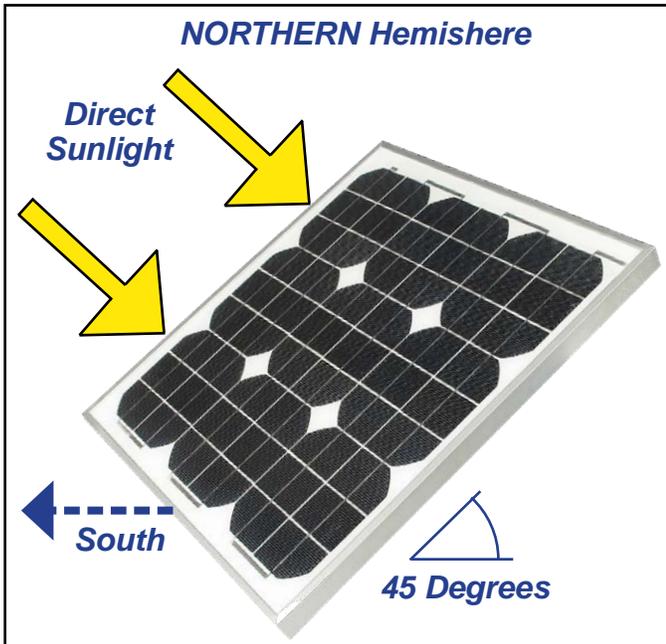
1. Assemble solar panel mounting bracket and panel with included hardware (instructions included).
2. Install solar panel (in bracket) on suitable surface out of shadows of surrounding buildings, walls, etc. Orient panel to collect maximum sunlight energy throughout the year. In the northern hemisphere, mount panels facing south at an upward angle of about 45 degrees. In the southern hemisphere orient panel to face north. See images below.
3. To prepare for wiring to the Mercury 310 controller, cut off two battery lugs from the end of the solar panel wires, strip the wires back 3/8-7/16" (10-11mm), and twist,
4. Install the solar panel wires (RED = +, BLACK = -) into the DC/SOL input screw terminals on the controller (see right).



Solar Panel Connections

NOTICE

If solar panel is wired in reverse polarity, the red DC/SOL LED will illuminate.



Solar Panel Orientation

Mercury 310 Automated Gate System

Installation and Programming Manual

4

Attach Warning Signs to Gate

1. Place one warning sign (see right) on outside of gate and the other inside of gate in high visibility locations (eye height) to warn of entrapment dangers. If signs cannot be attached to gate, ensure they are visible to pedestrians and anyone operating the gate.
2. Use two cable ties per sign, or alternative means, to securely affix signs to gate.

! CAUTION

The warning signs provided in the installation kit are required by UL325 to be attached to both sides of gate!



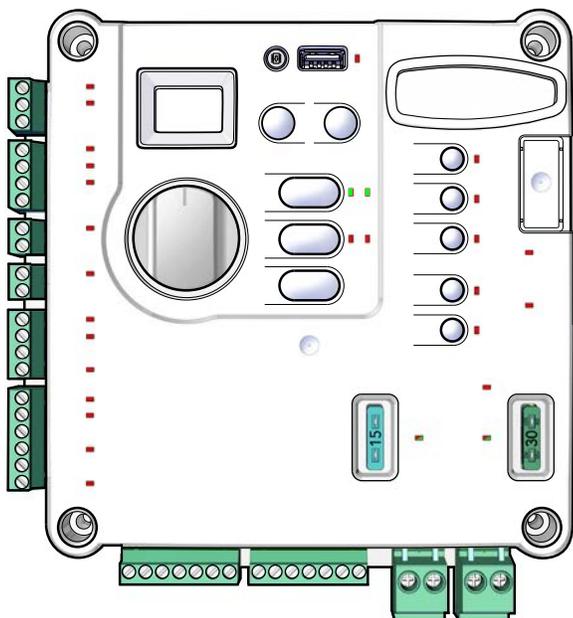
5

Ensure Audio Alarm Connection

Check to ensure a connection of the audio alarm (siren) to the Mercury 310 controller per the illustration below. The audio alarm is installed in the bottom of the chassis and used for the following:

- Signals a hard shutdown of the system, which is triggered by two consecutive entrapment events.
- Signals a gate movement when the “alarm” function is ON.
- Chirps to indicate various functions during programming.

The alarm is a piezoelectric device that can produce 100 dB @ 1 foot.



Alarm Connector Location

! CAUTION

An alarm is **required** to be connected to the Mercury 310 controller for UL325 compliance!



Linear Actuator Wiring Instructions



Apollo 816 Linear Actuator



TITAN 912L Linear Actuator

IMPORTANT NOTICE!

This section only provides instructions for wiring the Apollo 816 and TITAN 912 actuators to the Mercury 310 controller, but NOT the mechanical installation of the actuators to the gate.

For mechanical installation instructions, refer to separate linear actuator installation manuals, which can be accessed through the links below:

- Apollo 816 Linear Actuator Installation Instructions (P/N MX4684): <https://support.hysecurity.com/hc/en-us/articles/360043678033-Apollo-816-Linear-Actuator-Installation-Reference-Manual>
- TITAN 912L Linear Actuator Installation Instructions (P/N MX4685): <https://support.hysecurity.com/hc/en-us/articles/360043164394-TITAN-912L-Actuator-Installation-Reference-Manual>

7: LINEAR ACTUATORS

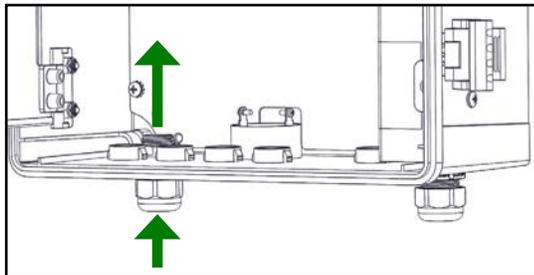
1 Install Linear Actuator and Run Cables

1. Refer to the linear actuator installation manual for the one used in the system and install (see note and links on previous page).
2. For a single gate installation,
 - **ACBOX310:** Run actuator cable through left cord grip and tighten (Detail A).
 - **SolarBOX310:** Run actuator cable through conduit hole with grommet or strain relief (Detail B).
3. Strip actuator cable wires back 1/4" to 5/16" (7 to 8mm), twist, and wire into the **Motor 1** connector screw terminals on the controller (see image below). If a dual gate system, wire in the second actuator to the **Motor 2** connectors.

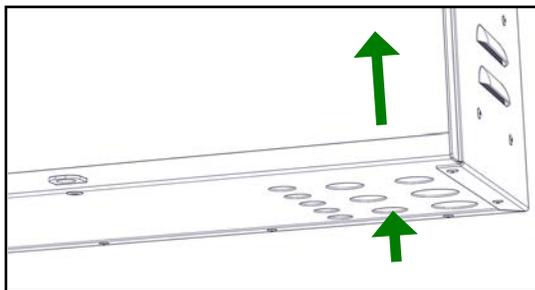
NOTICE

For a **DUAL GATE** installation (in addition to the above steps):

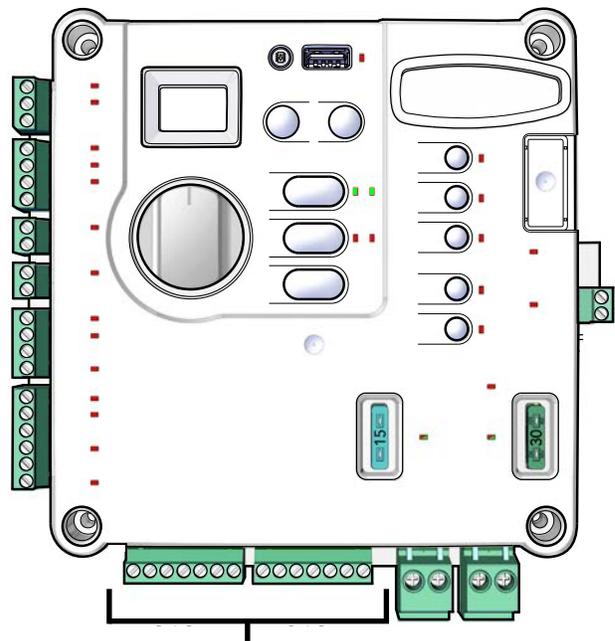
1. Dig a trench across driveway deep enough to accommodate the longer harness cable from the second actuator farthest from the control box.
2. Run the cable through a conduit and lay this in the trench.
3. Cover the trench and use asphalt patch if needed.
4. Run 2nd cable into the control box, and wire per diagram on next page.



Detail A: ACBOX310 Actuator Cable

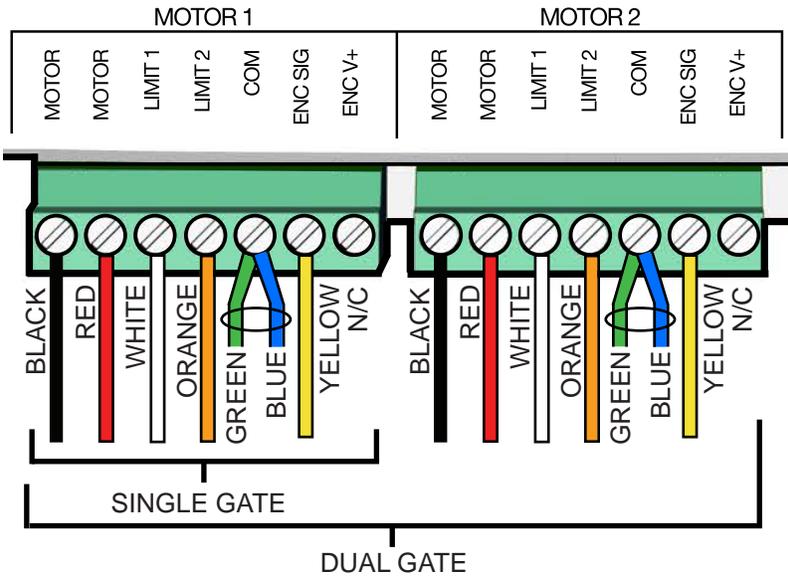


DETAIL B: SolarBOX310 Actuator Cable
(Use grommet or strain relief)

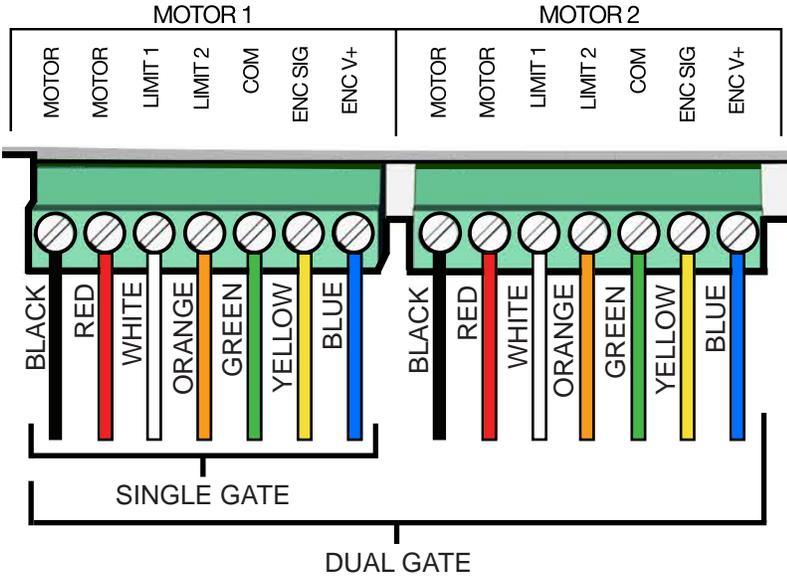


Actuator Connectors

TITAN 912L Linear Actuator Wiring



Apollo 816 Linear Actuator Wiring



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Mercury 310 Controller Installation and Operating Instructions



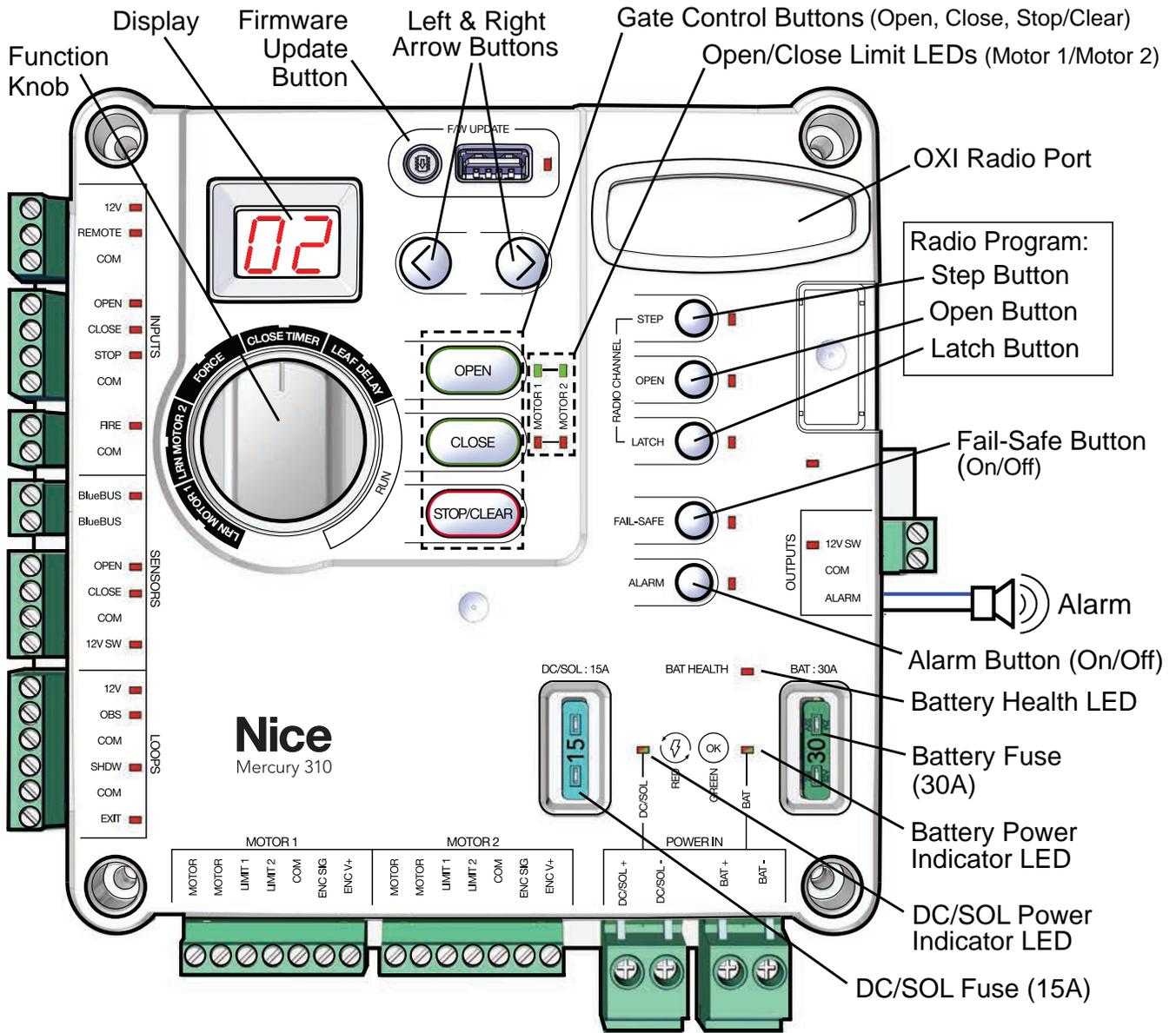
Applies to:

- ACBOX310
- SolarBOX310

Mercury 310 Automated Gate System Installation and Programming Manual

8: PROGRAMMING AND SETUP

Refer to the illustration below for identification of controls featured on the Mercury 310 controller. For operating and programming instructions, refer to the following pages.



Mercury 310 Controller Controls and Features

CAUTION

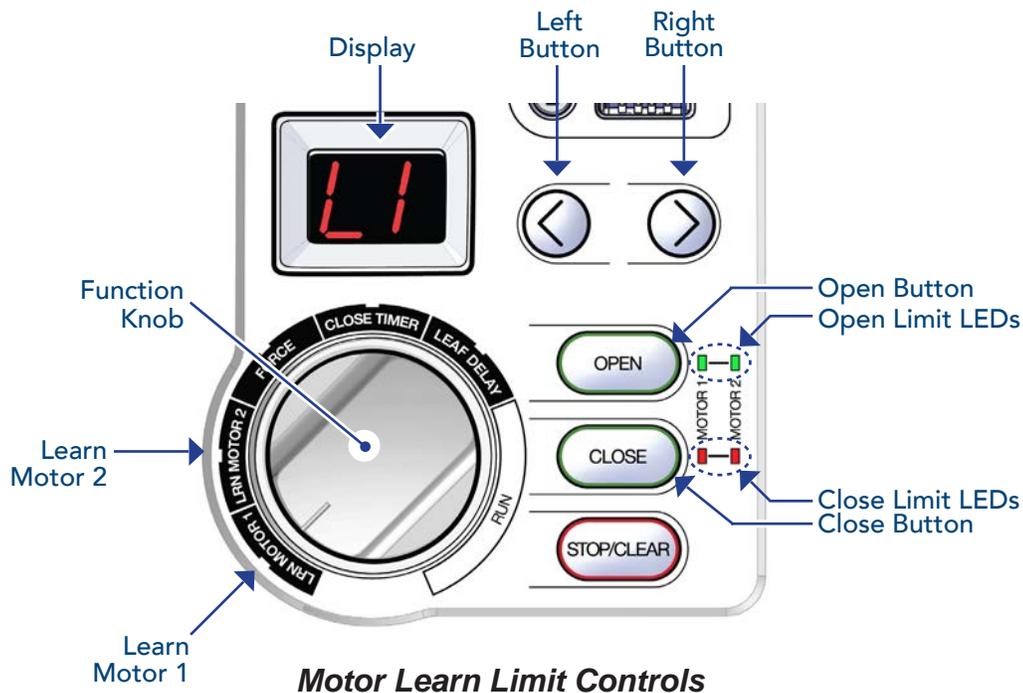
Use programming features only after understanding the manual in its entirety. Care should be taken whenever changes are implemented to ensure proper functionality and safety.

8.1 LIMIT LEARN PROCEDURE

After the control box and linear actuator has been installed and wired, the Mercury 310 controller must be programmed to recognize the gate *mechanical* limits, so that when the gate is operated, the controller knows when to stop at the mechanically set limit of travel.

NOTICE

Before the Mercury 310 controller limits can be properly set, the linear actuator(s) used in the installation must already have had *mechanical* limits set. That procedure is described in the separate installation manual for the specific linear actuator used.



NOTICE

Ensure gate opens and closes freely without binding and that actuators and any safety sensors and/or loops have been properly installed.

(Continued)

1

Limit Learn Procedure

NOTICE

Mechanical limits for actuator(s) must be set prior to starting controller learn limits procedure (see actuator installation manuals for instructions).

1. Set Mercury function knob to **LRN MOTOR 1** (display will flash **L1** if unlearned or glow solid if already learned. See note below to clear previously learned limits).
2. Press and hold Left or Right button to “jog” gate into position about halfway between open and close limits. (motor starts 2s after being pressed, and will stop when button is released).
3. Start learn procedure by pressing and holding both Left and Right Buttons for one (1) second.
4. Display will show solid **L1** and gate will run at slow speed to first limit.
5. After reaching first limit, display flashes between **OP** and **CL** (Open/Close LEDs also flash).
6. Observe the *current* position of the gate and do only one of the following:
 - If gate is at *open* limit, press the Open button.
 - If gate is at *close* limit, press the Close button.
7. Gate will now automatically run to the second limit at slow speed and stop, then run to the first limit at normal speed and stop, and finally run to the second limit at normal speed and stop.

NOTICE

During gate movement at normal speed, travel percentage is shown in display.

8. When finished, the display will show either **OP** or **CL**, depending on motor wiring and what button was pressed during the procedure.
9. To program the Learn Limits for Motor 2 of a dual gate system, set the function knob to **LRN MOTOR 2** and perform all the previous steps for that motor (display will show **L2**).
10. After the Limit Learn procedure is finished, the Mercury 310 controller automatically enters Standby Mode. Refer to the next page for more information, then proceed to the next Section (Function Knob Settings).

NOTICE

To *clear* Motor 1 learned limits:

1. Set the Function Knob to **LRN MOTOR 1**,
2. Press and hold both Left and Right Arrow buttons for one second until **L1** flashes in the display to indicate limits are cleared and can be re-learned.

This restarts the learn limits procedure, which erases the previous motor information. If the user does not wish to learn motors at this point, the Stop button may be pressed to cancel the procedure and leave the motor unlearned.

To clear Motor 2 learned limits (for dual gate system), set to **LRN MOTOR 2** (display will show **L2**) and repeat the above steps.

8.2 STANDBY MODE

Two seconds (2s) after limits are learned in the Mercury 310 controller, the controller automatically enters Standby Mode. Standby Mode puts the board into a “low power mode” when it’s not in use. This is a significant power saving feature for solar panel applications.

The controller also enters Standby Mode during normal operation after two minutes of controller inactivity or fifteen seconds after an actuator motor stops running after a gate operation.

When the controller is in Standby Mode:

- A red "heartbeat" decimal point will flash every two seconds in the lower right of the display to indicate the controller is on and in Standby Mode.
- Any active LEDs and 12V switched outputs are turned off.
- Pressing any button will “wake” the board and disable Standby Mode.

Standby Mode is disabled:

- for two minutes if the rotary switch position is changed or any on-board buttons are pressed.
- during a firmware update or if debug data is being captured.
- if there is an active error or event preventing normal operation.

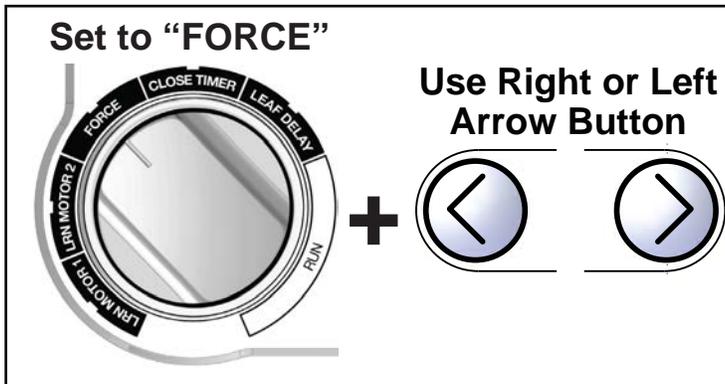
8.3 FUNCTION KNOB SETTINGS

Use the function knob to select the gate parameters for Force, Close Timer, and Leaf Delay per the instructions 2, 3, and 4.

2 Force Setting

The Force setting adjusts the amount of force the gate will exert on an immovable object before it will initiate a “Hard Shutdown” of the system. This is a very important safety feature and settings other than the default (2) should be carefully considered.

To set, place selection knob to “FORCE” and select values (0-5) using the Right or Left arrow buttons.



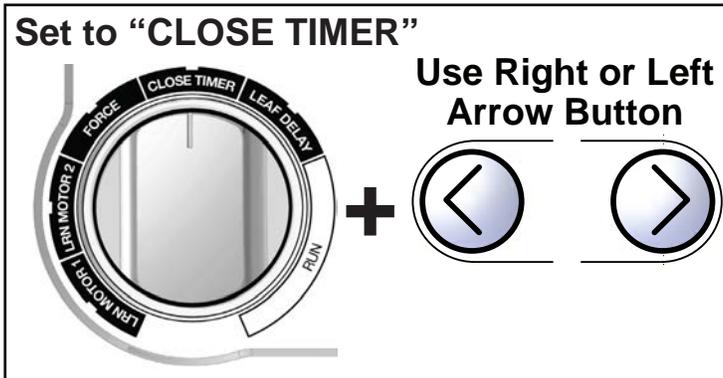
Force		
Values	Default	Details
0 - 5	2	Least force = 0 Most force = 5

NOTICE

Close timer does not count down after a Type A or Type C event.

3 Close Timer Setting

The close Timer setting determines how long the gate will remain open (0 - 90 seconds) after hitting the open limit before automatically closing again.



Close Timer		
Values	Default	Details
0 - 90 (seconds)	0 (OFF)	Increments = 1 (Press/hold = 5s increments)

4 Leaf Delay Setting

In a dual gate system, this setting sets a slight delay in gate response of the two gate “leaves”. It has no effect on a single gate installation. A setting of 0 turns this feature OFF.

To turn ON and set, place selection knob to “LEAF DELAY” and select values using the RIGHT arrow button.



Leaf Delay		
Values	Default	Details
0 - 5 (seconds)	0 (OFF)	Least Delay = 1 Most Delay = 5

NOTICE

The delay is applied to Motor 1 when opening, and to Motor 2 when closing.

Mercury 310 Automated Gate System Installation and Programming Manual

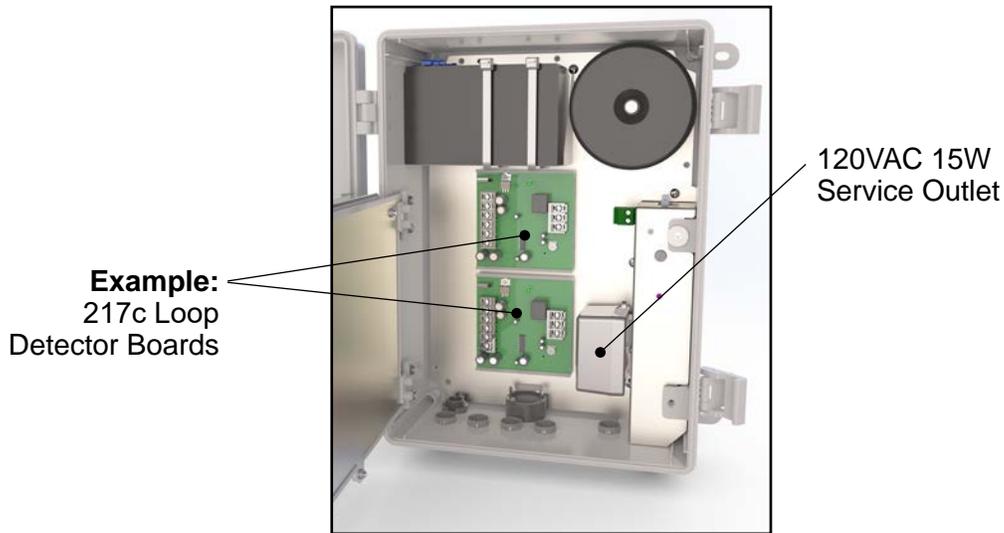
8.4 ACCESSORY INSTALLATION

Accessories, such as loop detector boards, may be installed onto the rear panel of the ACBOX310 behind the controller (see IMAGE 9-2). Drill holes and/or use appropriate hardware to affix the accessories inside the enclosure.

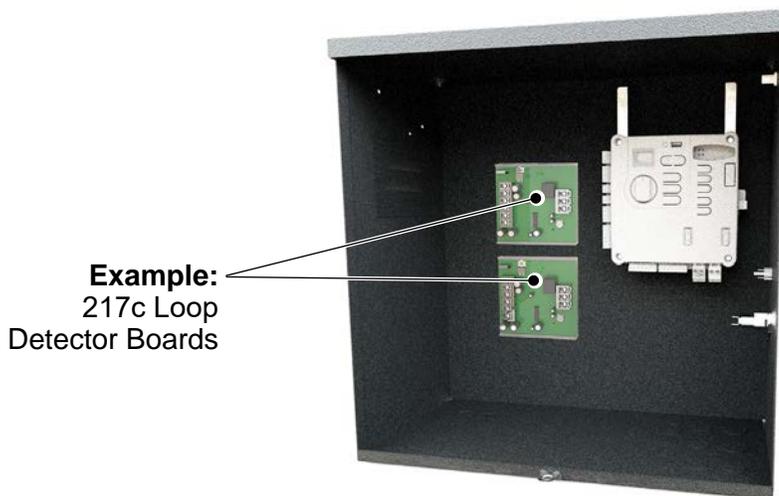
The ACBOX310 power supply features a standard 120VAC 15A service power outlet (on left side of power supply) that can be used to power tools during the installation.

 **WARNING** 

Disconnect the operator from power (both DC/Solar & Battery) when installing any accessory or external entrapment sensor.



ACBOX310 Accessory and AC Service Outlet Location



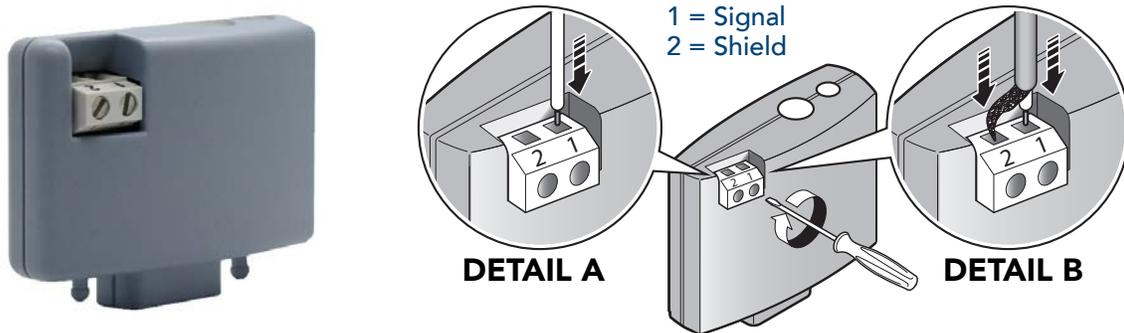
SolarBOX310 Accessory Location

5

Install OXI Radio Module

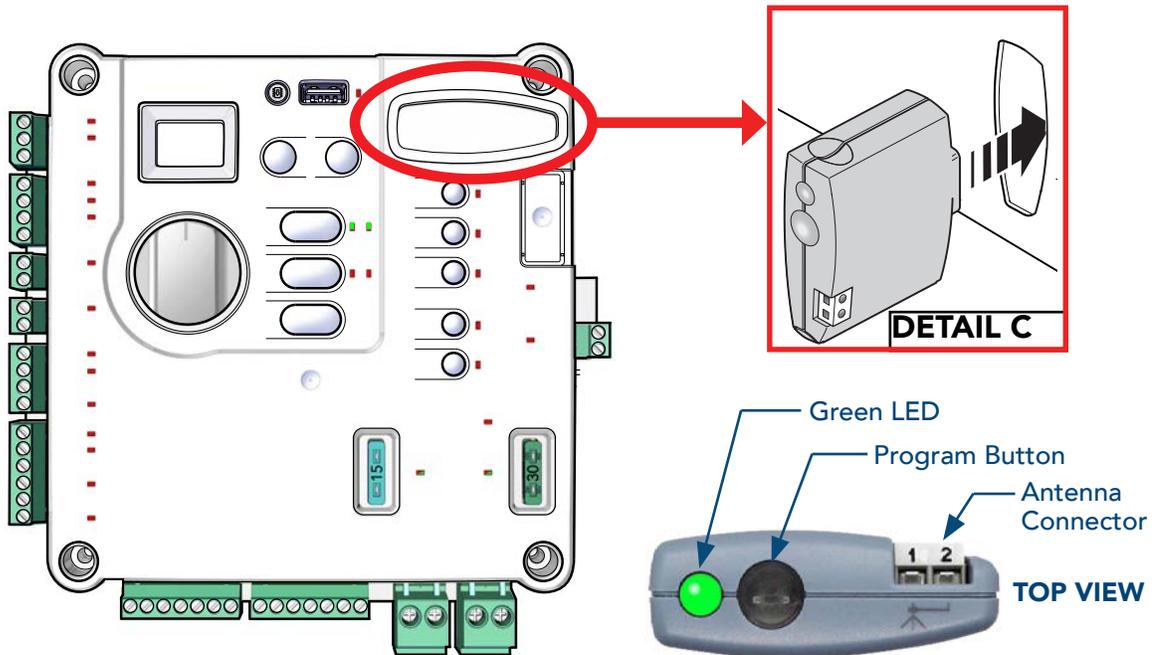
To install the OXI receiver, perform the following steps:

1. Ensure power to the controller is OFF.
2. Connect supplied antenna wire to terminal 1 of receiver (IMAGE 19-1, DETAIL A).
3. If installing the external antenna from the kit (P/N ABF/A), connect the 50Ω impedance coaxial cable directly to terminals 1 and 2, as shown in DETAIL B, below (lead = 1, shield = 2).



OXI Radio Module & Antenna

4. Remove the rubber cover from the OXI slot and Insert the OXI radio module into the slot, as shown below.



Installing the OXI Module

Mercury 310 Automated Gate System

Installation and Programming Manual

8.5 OXI RADIO PROGRAMMING

If OXIBD/A receiver module is installed, program transmitters (remote controls) for gate operation as described:

IMPORTANT NOTICE

Transmitters (remote controls) must be “learned” by the OXIBD/A radio receiver **before** other radio accessories (i.e. wireless keypads) to avoid errors. To reset in event of an error, press & hold down Program button (on OXIBD/A top) and release *after* green LED flashes five times, then re-learn a remote *before* other devices.

STEP Button (Radio Channel)

Used to program a remote control button to operate like a garage door opener (1st press = OPEN, 2nd press = STOP, 3rd press = CLOSE).
To program:

1. Press and hold the desired button on the remote control.
2. Within 2 seconds press & release the STEP button on the Mercury.

If programming is successful, **dn** (done) is displayed, the Step LED will flash twice, and the alarm will chirp for successful pairing. If programming fails, error code **ER + 08** is displayed.



OXIBD/A Radio Receiver & 2-Button Remote

OPEN Button (Radio Channel)

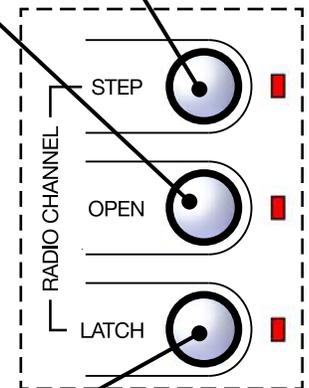
Used to program a remote control button to open the gate. To program:

1. Press and hold the desired button on the remote control.
2. Within 2 seconds press & release the OPEN button on the Mercury.

If programming is successful, **dn** (done) is displayed, the Open LED will flash twice, and the alarm will chirp for successful pairing. If programming fails, error code **ER + 08** is displayed.

NOTICE

The Open function will only open a gate or reverse a closing gate; it will not have any effect on a gate in Hard Shutdown.



LATCH Button (Radio Channel)

Used to program a remote button to “latch” gate in the open or closed position, until pressed a second time.

1. Press and hold the desired button on the remote control.
2. Within 2 seconds, press and release the LATCH button on the Mercury.

If programming is successful, **dn** (done) is displayed, the Latch LED will flash twice, and the alarm will chirp for successful pairing. If programming fails, error code **ER + 08** is displayed.

NOTICE

Latch function will be ignored on a moving gate or a gate stopped in mid-travel. The audio alarm will “chirp” whenever Latch transmitter is activated or gate is locked and an operate command is received and ignored.

8.5.1 Deleting Transmitters

Transmitters (remote controls) may be deleted from the programming of the OXIBD/A radio receiver using the Mercury 310 Radio Buttons as follows:

Delete ALL Transmitters:

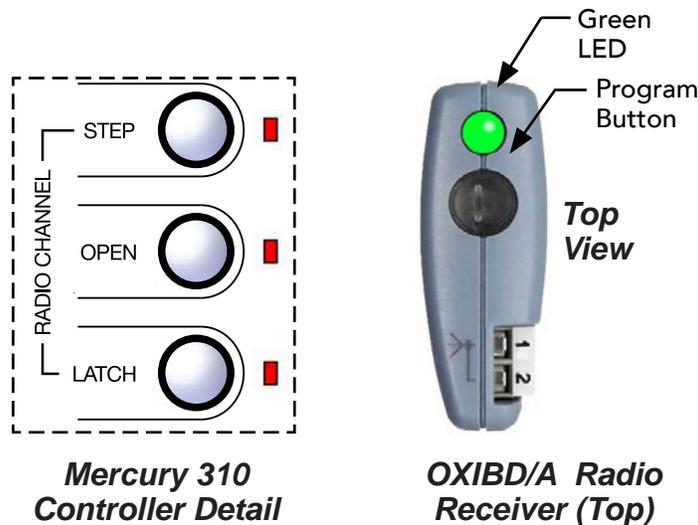
Simultaneously press and hold down the Step, Open, and Latch buttons for at least three (3) seconds, until **rE** (Remote Erase All) is displayed. All three LEDs will flash twice.

- If deletion is successful, **dn** (done) is shown in Mercury display.
- If deletion fails, **Er + 09** is shown in Mercury display.

Delete SINGLE Button from Transmitter:

Press and hold any one of three radio channel buttons on the Mercury 310 controller for at least three (3) seconds until **rD** (Remote Delete Button) is displayed, then press the button on the remote to be deleted.

- If deletion is successful, **dn** (done) is shown in Mercury display.
- If deletion fails, **Er + 09** is shown in Mercury display.



Mercury 310 Radio Programming Buttons and OXIBD/A Controls

Mercury 310 Automated Gate System

Installation and Programming Manual

8.6 FIRMWARE UPDATE

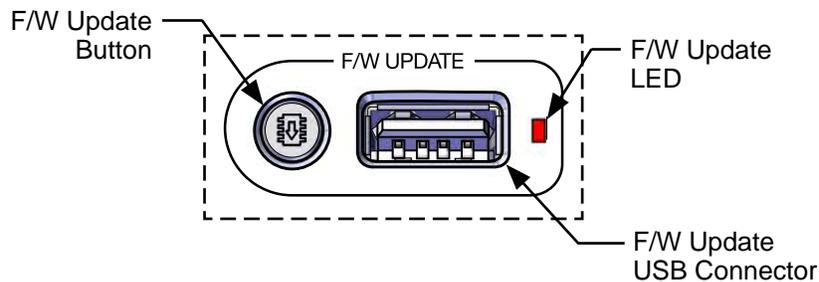
Firmware updates are sometimes released to upgrade the controller with new features or optimizations. These firmware updates are announced via technical bulletins and are available for downloading from the Nice website when they are released.

NOTICE

Nice recommends that all controllers are updated to the latest firmware revision to ensure reliable operation.

Equipment needed:

- USB capable computer (with internet access)
- USB flash drive (formatted in FAT32)



Mercury 310 Firmware Update Features

Firmware update instructions are as follows:

1. Use a computer to download and save the firmware update from <https://support.hysecurity.com/hc/en-us/categories/360003202873-Software>.
2. Copy downloaded file onto a USB drive (FAT32 format). Save/copy to *root directory* of USB drive (not in a folder). An empty flash drive is recommended. Nice is not responsible for any data loss.

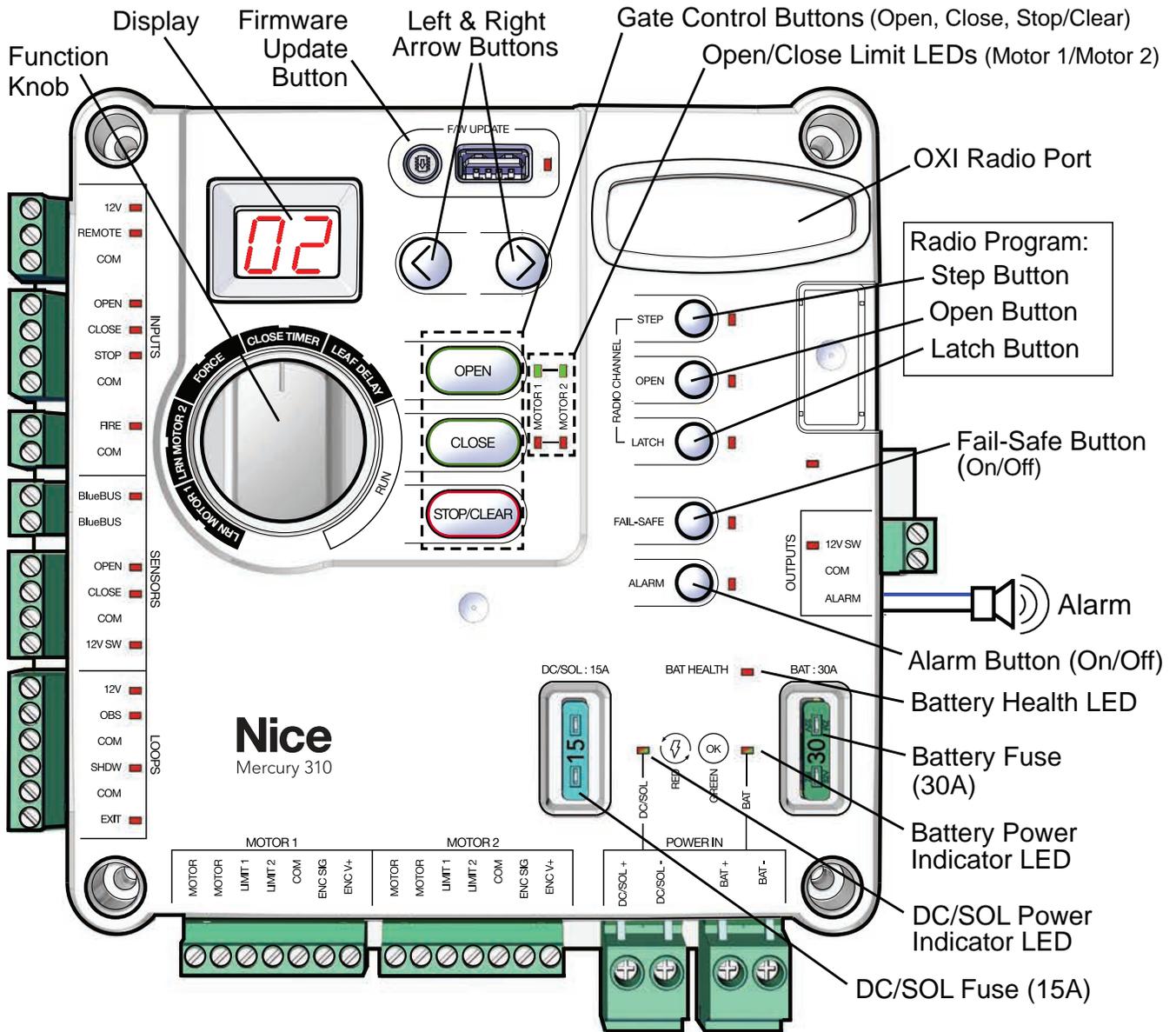
NOTICE

The USB drive being used to update the firmware should have only one file version of the Mercury 3xx series firmware in the root directory.

3. Press and hold the F/W Update button on the Mercury 310 controller for about 5 seconds. The display will show "bL" and the F/W Update LED will flash to indicate that the board is ready to be updated.
4. Plug USB drive (with update) into the F/W Update connector (see image above). When the USB is detected, firmware will automatically be updated, and the board will reset.
5. After reset, the firmware version will show in the display and debug data logging will automatically start. During the logging of debug data, the F/W Update LED will turn on when data is written to the USB drive.
6. When the display returns to normal behavior and the LED stops flashing, the update is complete. The USB drive can be safely removed when the F/W Update LED remains off.

9: CONTROLLER OPERATION

Refer to the illustration below for identification of controls featured on the Mercury 310 controller. For operating and programming instructions, refer to the following pages.



Mercury 310 Controller Controls and Features

CAUTION

Use programming features only after understanding the manual in its entirety. Care should be taken whenever changes are implemented to ensure proper functionality and safety.

9.1 GATE CONTROL BUTTONS

The OPEN, CLOSE, and STOP/CLEAR buttons are used to operate the gate from the control box. Each is described below.

OPEN Button

Press and release to open the gate.

NOTICE

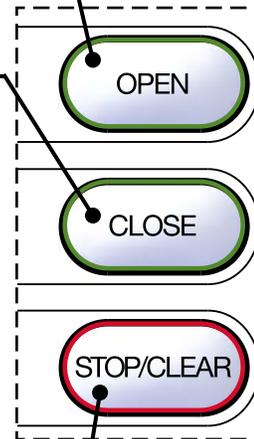
Pressing the OPEN button on a closing gate will reverse gate direction and open the gate.

CLOSE Button

Press and release to close the gate.

NOTICE

Pressing the CLOSE button on an opening gate will close the gate.



STOP/CLEAR Button

- **Press and release** to stop the gate.
- **Press and release** to clear a hard shutdown.
- **Press and hold (3s)** for clearing the sensor registry.
- **Press and hold Stop/Clear with Fail-Safe button (5s)** for factory reset to default settings.



NOTICE

- A hard shutdown is when the moving gate encounters an immovable object or a sensor is tripped and the gate system shuts down as a safety measure.
- Hard shutdown will only occur when the Type A sensor is tripped twice, or if a sensor input trips, followed by one Type A sensor trip.

CAUTION

DO NOT reset a hard shutdown without first determining what obstructed the gate or tripped a sensor to cause the shutdown and that the situation has been safely resolved!

9.2 POWER STATUS LEDS

The power indication LEDs display the power status for the solar, DC, and battery power sources, and each is described below.

Battery Health LED

RED LED:

- Glows solid when battery power OK.
- Flashes when:
 1. No battery connected;
 2. Battery fuse is blown; or
 3. Battery voltage is too low (<10.5V).

NOTICE

Battery replacement should only be performed by a professional installer.

DC/Solar Power LED

GREEN = ON and polarity OK.

RED = Polarity reversed.

OFF = No power or 15A fuse blown or other hardware failure.

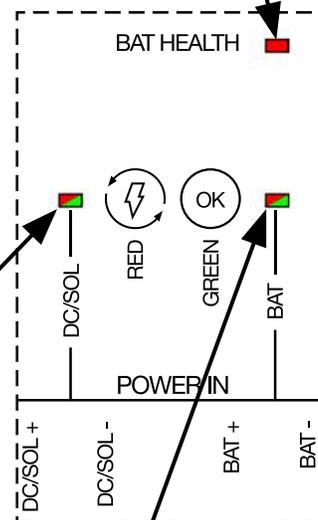
Battery Power LED

GREEN = ON and polarity OK.

RED = Polarity reversed.

Flashing **RED** = Battery Voltage below 12.5V.

OFF = No power or other hardware failure.



9.3 FAIL-SAFE & ALARM BUTTONS

The Fail-Safe and Alarm buttons operate as described below. These should be set according to user preference.

FAIL-SAFE Button (On/Off)

RED LED = ON:

Fail-Safe is enabled, and gate will automatically move to the **open limit** if the battery voltage falls below a certain limit.

RED LED = OFF:

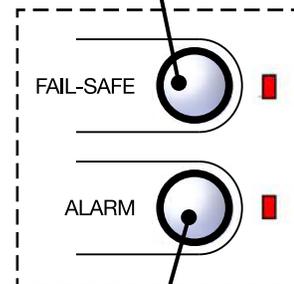
Fail-secure is enabled and the gate will automatically move to the **close limit** if the battery voltage falls below a certain limit.

RED LED = FLASHING:

Fail-Secure or Fail-Safe is currently activated.

NOTICE

An automatically opened gate might not be desirable if gate *security* has a priority over gate *access*. See **Section 6** for instructions for manually opening a gate in the event of a power failure.



ALARM Button (On/Off)

RED LED = ON:

When ON, the warn-before-operate alarm will sound for three (3) seconds before the gate starts moving when an OPEN or CLOSE command is made, either by pressing the gate buttons or when a sensor, such as a ground loop, is tripped. The alarm will continue to sound for two (2) seconds after the gate starts moving, then turn off.

CAUTION

The alarm connected to the Mercury 310 Controller should never be disconnected! This alarm functions as the entrapment alarm and is a requirement under UL325 requirements.

NOTICE

Alarm will sound during safety critical scenarios regardless of this setting.

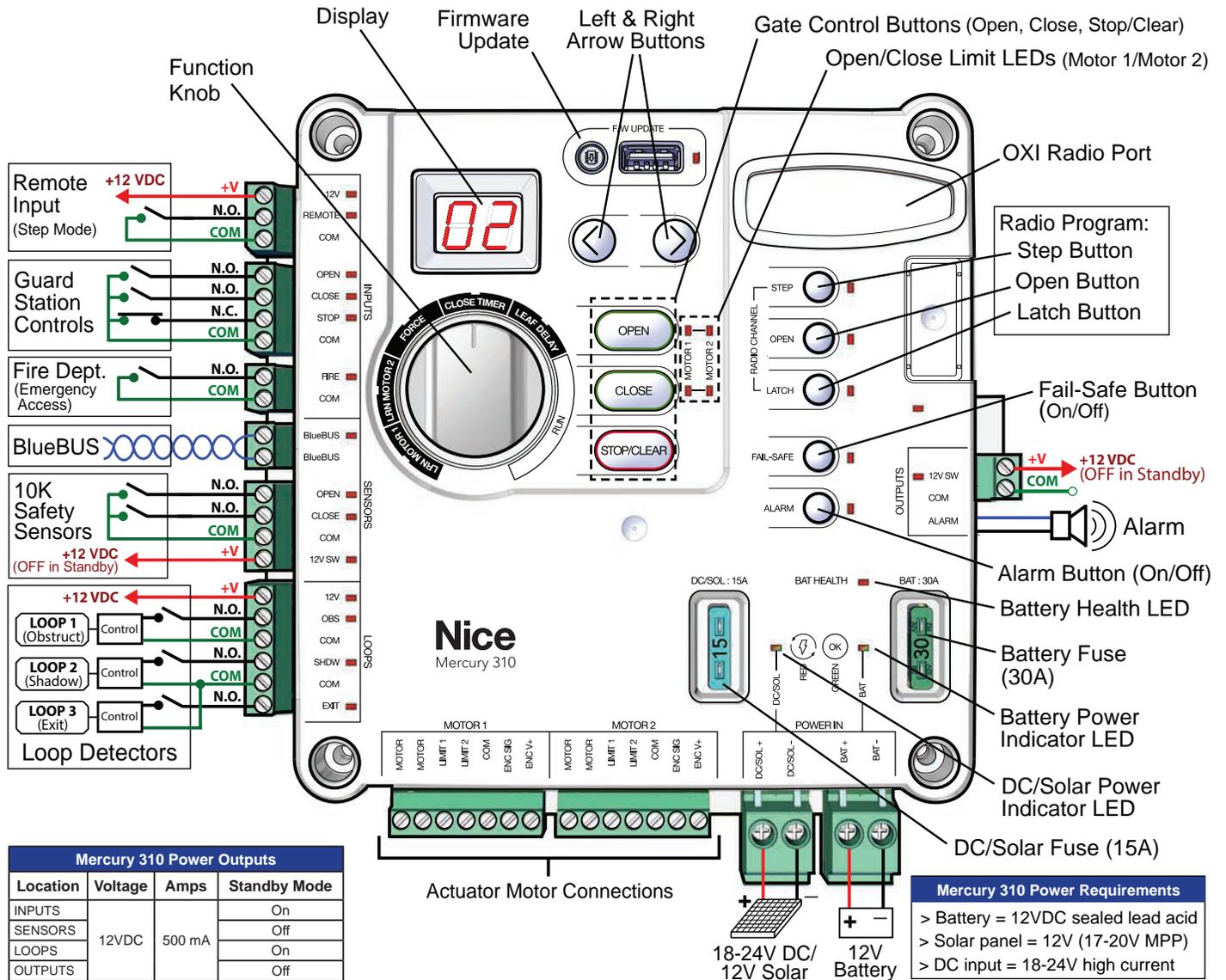
Mercury 310 Automated Gate System

Installation and Programming Manual

Nice

10: INPUTS AND OUTPUTS

Refer to the illustration below for identification of inputs and outputs featured on the Mercury 310 controller, and on the next page for an example of accessories available. For a description of functions and wiring, refer to the following pages.



Mercury 310 Inputs and Outputs

Mercury 310

Mercury 310 Automated Gate System Installation and Programming Manual

WARNING

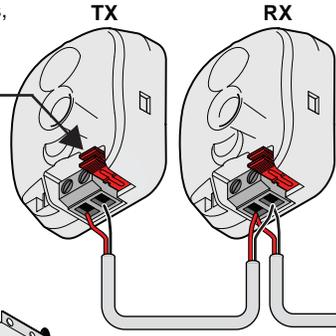


Disconnect the operator from power (both DC/Solar & Battery) when installing any accessory or external entrapment sensor.

Nice BlueBUS Photo Eyes

Transmitter & receiver bus, no polarity, up to 6 pairs

2 open direction & 4 close direction available by setting jumpers.



Radio/Remote
(Step-By-Step input for misc. remote devices)

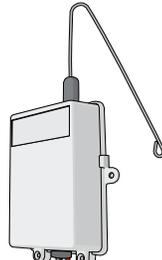
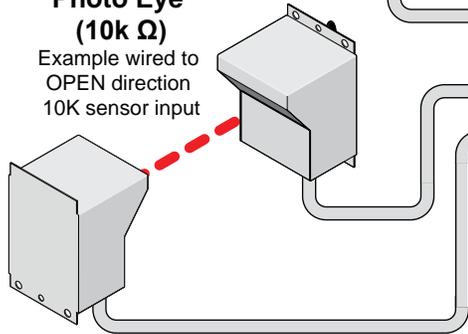


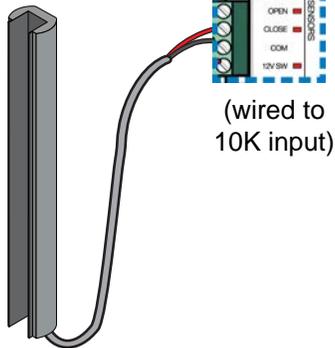
Photo Eye (10k Ω)

Example wired to OPEN direction 10K sensor input



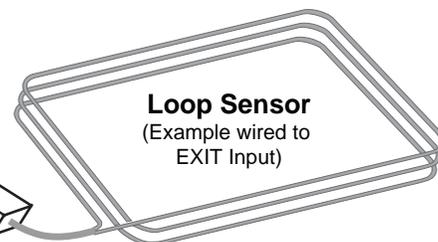
Edge Sensor (10k Ω)

Example wired to CLOSE direction 10K sensor input



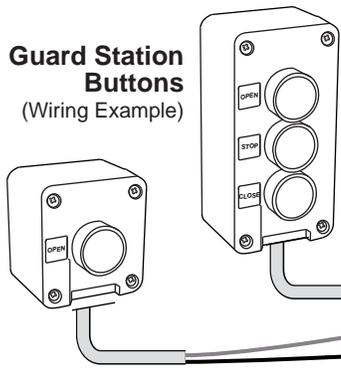
Vehicle Detector Device

Loop Sensor
(Example wired to EXIT Input)



Guard Station Buttons
(Wiring Example)

Emergency Access Button
(Fire Input Wiring Example)



Sensor and Control Input Wiring Examples

10.1 CONTROL INPUTS

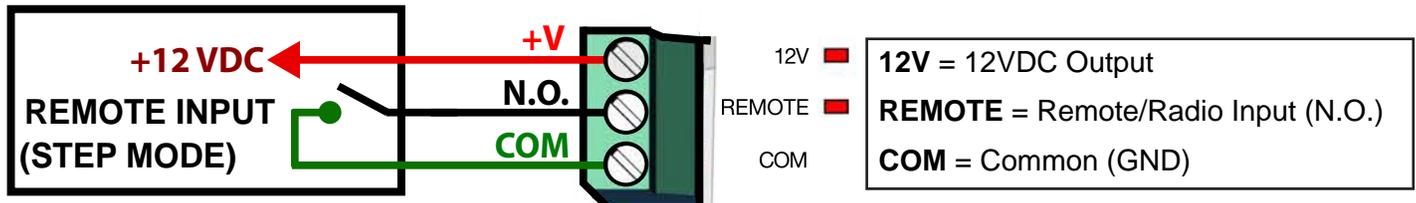
The Control Inputs, which are used to control some Mercury 310 gate operations, are listed below and described on the following pages:

- Remote/Radio Input
- Guard station Input
- Fire Input

NOTICE

- This section also covers emergency access and manual opening of the gate system.
- Any sensor LED will flash if the sensor is active while an actuator motor is operating.

10.1.1 Remote/Radio Input



This input is used to connect an auxilliary radio receiver or remote switch and is Normally Open. When it closes, the input will be active and the associated LED will turn on. The Radio/Remote input will operate in a “step” mode, like a garage door opener as follows:

- **1st activation:** Starts the gate moving in the open-direction.
- **2nd activation:** Stops gate.
- **3rd activation:** Starts gate moving in the close-direction.
- **4th activation:** Stops gate.

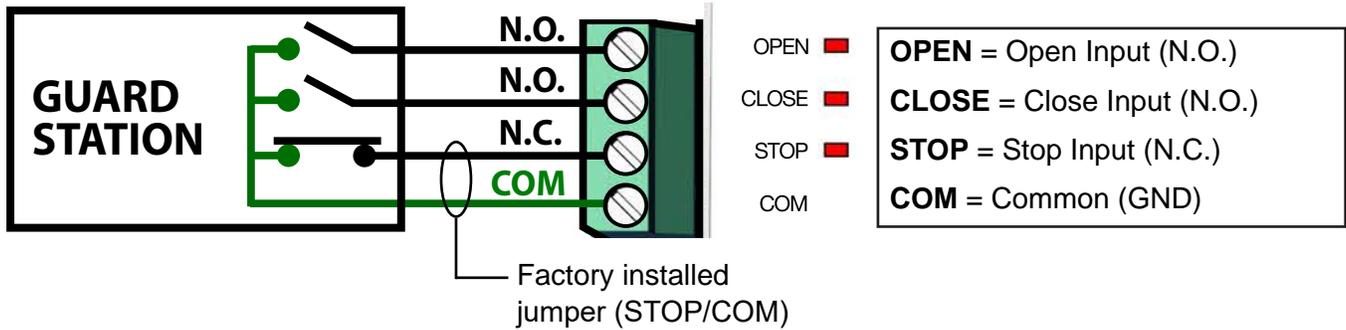


Example: Nice 318M
2-Ch. Radio Receiver

NOTICE

- If more than 15 seconds pass between activations, the next activation will start the gate moving in the open-direction. If the open limit is active, the gate will close on the first activation.
- The radio/remote input will be ignored if there is an active stop command, an active entrapment sensor, a BlueBus device in the commanded direction of travel, or Latch mode has been activated.
- The radio/remote input will have no effect when the operator is in Hard Shutdown mode (Type A sensor tripped twice).

10.1.2 Guard Station Input



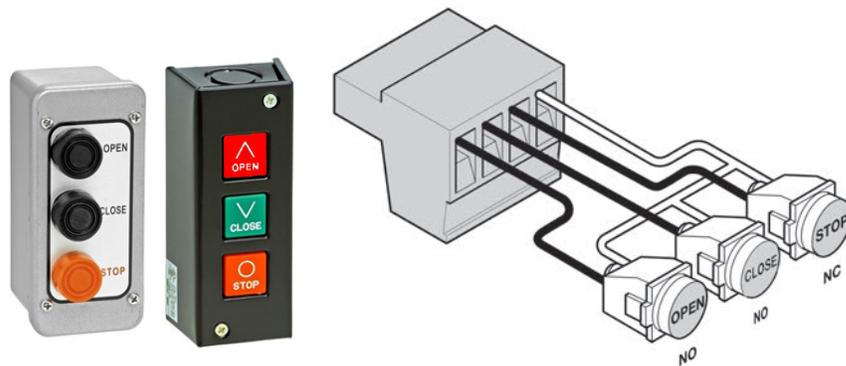
With the Guard Station contact switches installed, the user can operate the gate by pushing the respective button for the command that is desired (open, close, or stop).

Gate Open and Close are controlled by Normally Open (NO) momentary switches and Stop is controlled by a Normally Closed (NC) momentary switch.

- **OPEN Input:** Dry contact input (normally open) for a guard station open switch. Momentarily shorting the Open input to COM opens the gate(s).
- **CLOSE Input:** Dry contact input (normally open) for a guard station close switch. Momentarily shorting the Close input to COM (GND) closes the gate(s).
- **STOP Input:** Dry contact input (normally closed) for a guard station stop switch. Momentarily opening the Stop input stops the opening gate at its current position. While this input is activated, all other inputs are disabled and are not functional.

NOTICE

When wiring in a Stop button, first remove the factory installed jumper (between Stop and COM). Reinstall a jumper if the Stop button is removed from the input.



Guard Station Examples and Wiring

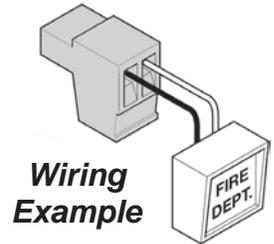
10.1.3 Fire Input



The fire input is meant to allow emergency personnel the ability to open the gate in an emergency situation without needing assistance. See the following section, "Emergency Gate Access", for more information.

NOTICE

- Auto-close is disabled when this input is activated.
- When Fire input is activated, it clears a hard shutdown
- An audible alarm will activate when fire input is active.



10.1.4 Emergency Gate Access

CAUTION

The gate system **MUST** be designed to allow access to emergency vehicles under different operating conditions. Read all the following information. Make sure that your gate operating system is compliant with all local codes and regulations and that access for emergency vehicles is assured.

READ THE FOLLOWING:

During normal operation, emergency vehicles access the gate by using an emergency vehicle access device installed on your gate system. The type of device that is used in your community is dependent on local city codes. These devices may include (but are not limited to) Fire Department lock boxes, Click-to-Enter radio receivers, strobe light sensors, siren sensors, etc. Some examples are shown below.



Examples: Emergency Access Device Examples

Ensure the gate system is equipped with a back-up power system. In the event of a primary (AC) 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. The release device must be accessible from either side of the gate and must be present so that emergency personnel can gain access through the gate under this condition.

Manual opening instructions for the appropriate linear actuators are provided on the following two pages.

10.2 SAFETY SENSOR INPUTS

The Sensor Inputs, which are used to connect safety sensors, are listed below:

- BlueBUS Input
- 10K Ω Monitored Sensor Input (photo eyes, edge sensors, etc.)



CAUTION

The Mercury 310 controller Type A and Type C internal entrapment protection meets the minimum UL 325 requirements, **HOWEVER**, a safe installation free of hazards to persons and animals is required, so additional external entrapment sensors may be needed to cover possible entrapment zones.



WARNING



Disconnect the operator from power (both DC/Solar & Battery) when installing any accessory or external entrapment sensor.

10.2.1 Auto Sensor Scan

When power is applied to the Mercury 310 controller, it performs a scan for connected external entrapment sensors at the sensor inputs and “learns” the sensor by registering it in an internal sensor registry.

If the sensor input is tripped at power up, the sensor input LED will flash and power must be removed from the controller and sensor wiring or alignment must be corrected before re-powering the controller and relearning the sensors. The display will show what sensor is tripped and the associated LED will Flash.

10.2.2 Manual Sensor Scan / Clear

Once the controller has a stored sensor at a specific input, the power-up scan will always expect to see that sensor at the same input. The only way to remove that sensor, and clear the sensor registry, is to disconnect the sensor and perform a manual scan as follows:

- *Press and hold the Stop/Clear button for five (5) seconds. This will relearn the connected sensors.*

NOTICE

Only a manual scan will uninstall learned sensors.

The following section describes the behavior of the gate when the 10K and BlueBUS open and closed sensors are activated.

10.2.3 Sensor Activation (10K / BlueBUS)

Activation of an open-direction or close-direction 10K or BlueBUS sensor input will stop an opening gate within two seconds and reverse it toward the opposite direction until the limit is reached.

Sensor inputs will only be functional if a sensor is detected at power-up or during a manual learn of sensors. Appropriate sensors detected at these inputs will be treated as Type B2 external entrapment devices per UL325.

When learned, the sensor connected to the 10K input must have a 10K terminated sensor connected for monitoring purposes. These inputs are normally open, and when closed, will be active and the associated LED(s) will turn on.

Open-direction sensor activation behavior includes:

- The associated LED will flash three times if activated and preventing gate operation.
- The reversal toward the close limit will be limited to 0.5s if any loop or open inputs are active, and the full reversal will be completed when all the inputs are clear.
- If the close-direction sensor input is activated during the reverse to close, then the gate will stop and perform a 0.5s reversal toward open.
- The close timer will be disabled until a renewed run command (open, close, loop, etc.) is received.
- If the Type A inherent current sensor is tripped while the gate is reversing toward close, then the operator will perform a 0.5s reversal and stop in “hard shutdown”.
- A fire open input will still attempt to open the gate even if the open-direction sensor input is activated.
- Activation of the open-direction sensor input (shorted to common or closed) will prevent the gate from opening normally unless the controller did not learn the input with a sensor.

Closen-direction sensor activation behavior includes:

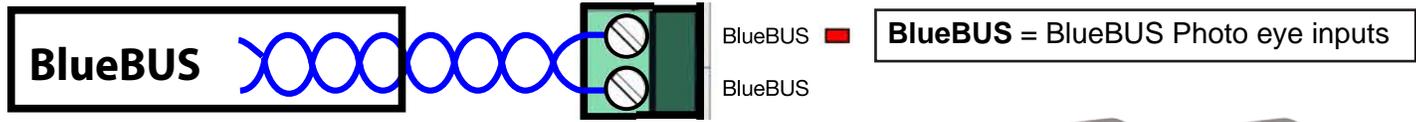
- The associated LED will flash three times if activated and preventing gate operation.
- If an open-direction sensor input is activated during the reverse to open, then the gate will stop and perform a 0.5s reversal toward close.
- The close timer will be disabled until a renewed run command is received.
- If the Type A inherent current sensor is tripped while the gate is reversing toward open, then the operator will perform a 0.5s reversal and stop in “hard shutdown”.
- Activation of the close-direction sensor input (shorted to common or open) will prevent the gate from closing normally unless the controller did not learn the input with a sensor.



Mercury 310 Automated Gate System

Installation and Programming Manual

10.3 BLUEBUS INPUT



Nice BlueBUS™ photo eyes offer useful features, such as:

- Up to six (6) BlueBUS photo eye pairs may be wired together along a single two wire cable.
- Jumper settings on each photo eye pair allow two (2) open-direction addresses and four (4) close-direction addresses.
- Wiring connections are non-polarized.



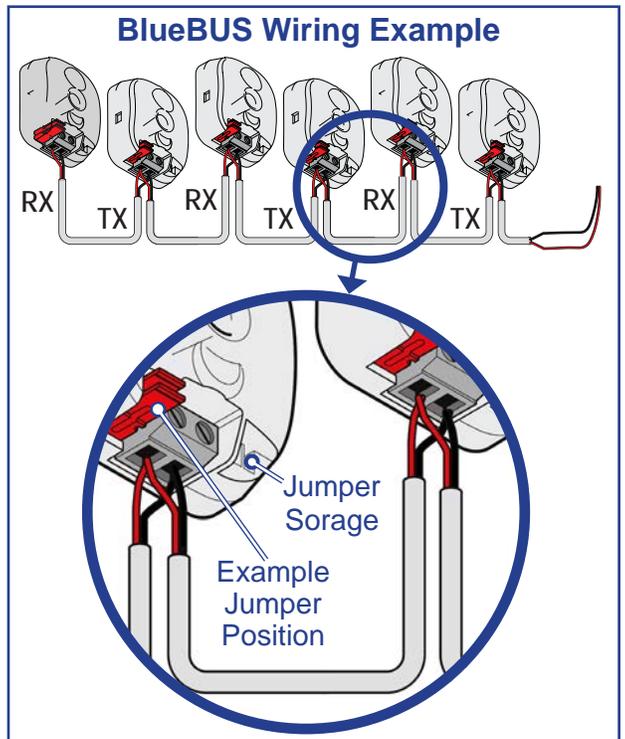
Example: Nice BlueBUS Photo Eyes

10.3.1 BlueBUS Intallation

Installing BlueBUS photo eye sensors:

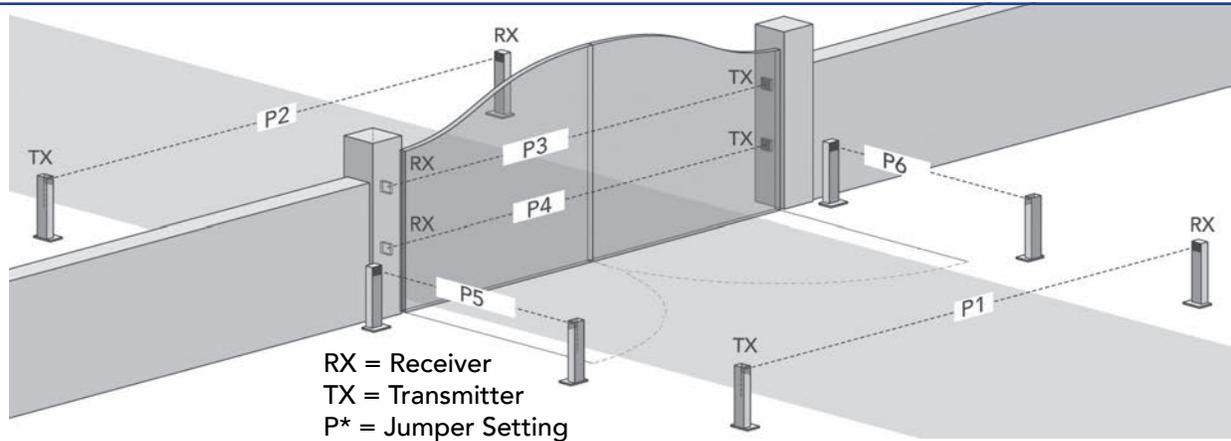
1. Remove power sources from controller (battery and DC/Solar inputs).
2. Install photo eye pairs in appropriate locations (see gate diagram on next page).
3. Wire BlueBUS photo eyes as shown in example below.
4. Set jumpers of each pair of photo eyes (P1 - P6). Refer to table below and gate diagram on next page.
5. Route sensor wires into control box and install sensor wires to BlueBUS input (no polarity required).
6. Reapply power to the controller.
7. At power-up, sensor inputs are scanned, and If BlueBUS detected, sensors are registered & red LED lights.
8. Test function of each sensor by interrupting the infrared beam while the gate is opening or closing.

Table of BlueBUS Jumper Settings	
Close-Direction	Open-Direction
P1 	P5
P2 	P6
P3 	 Not Used
P4 	



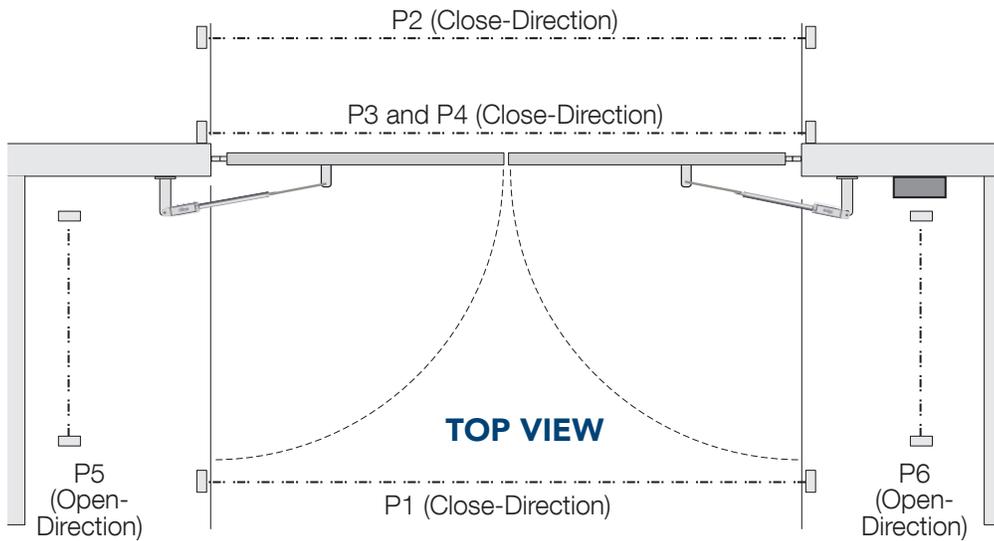
NOTICE

- To remove BlueBus sensors from the controller sensor registry: unplug sensors, then perform a registry clear by pressing and holding the Stop/Clear button for five (5) seconds, after which the sensors are relearned.
- When a BlueBus device is detected, it must always be present and not tripped before the gate will run in that direction.



NOTICE

These diagrams show only *examples* of sensor locations. The installer needs to determine the appropriate sensor location for a specific installation to ensure safe gate operation.

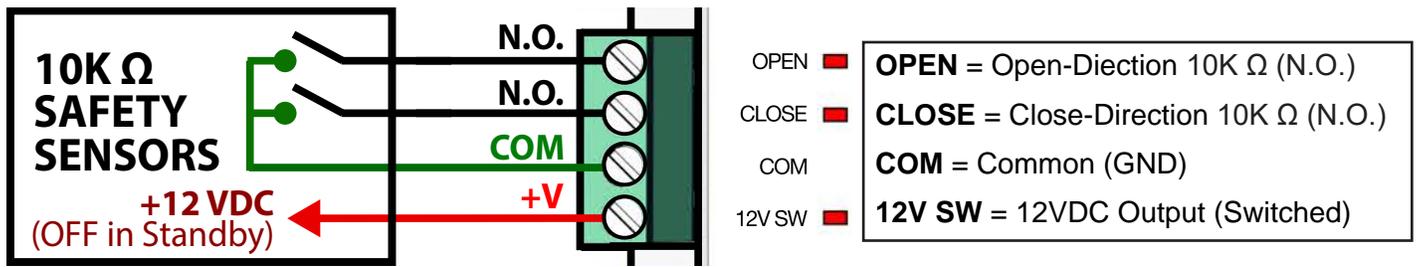


BlueBUS: Sensor Locations

Mercury 310 Automated Gate System

Installation and Programming Manual

10.4 10K Ω SENSOR INPUTS



10.4.1 10K Ω Sensor Installation

1. Remove power sources from controller (battery and DC/Solar inputs).
2. Install photo eye pairs or edge sensors as appropriate (See page 11).
3. Wire sensors per manufacturer's instructions. Wiring diagrams of various compatible sensors can be found on the following pages.
4. Route sensor wires into control box and install into 10K input.
5. Reapply power to the controller.
6. At power-up, sensor inputs are scanned, and if 10K device is detected, sensors are registered and associated input red LED lights.
7. Test the function of each sensor according to manufacturers instructions.

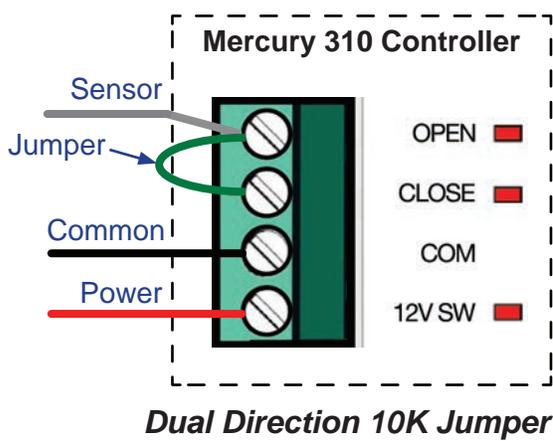


Example 10K Ω: EMX IRB MON Photo Eye

NOTICE
The Mercury 310 controller requires sensors with 10K terminated outputs to meet the monitoring requirements of UL325.

Dual Direction 10K Sensor Wiring

A 10K sensor may be wired to provide simultaneous open-direction and close-direction sensing for a single sensor by placing a jumper (i.e. wire) between the Open and Close 10K inputs. With the jumper in place, the sensing lead may be installed to either input (Open or Close). This is the suggested way of wiring a wraparound edge sensor on the leading end of a swing gate.



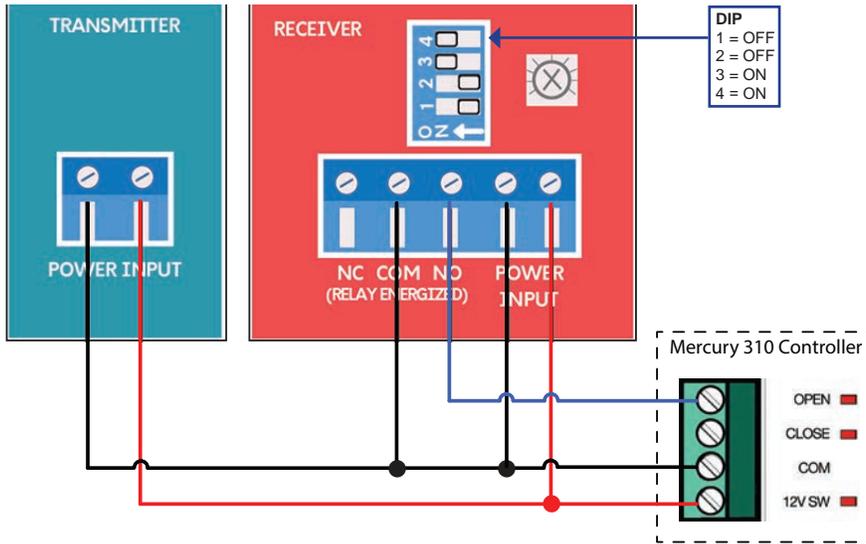
Mercury 310 Automated Gate System

Installation and Programming Manual

Nice

Mercury 310

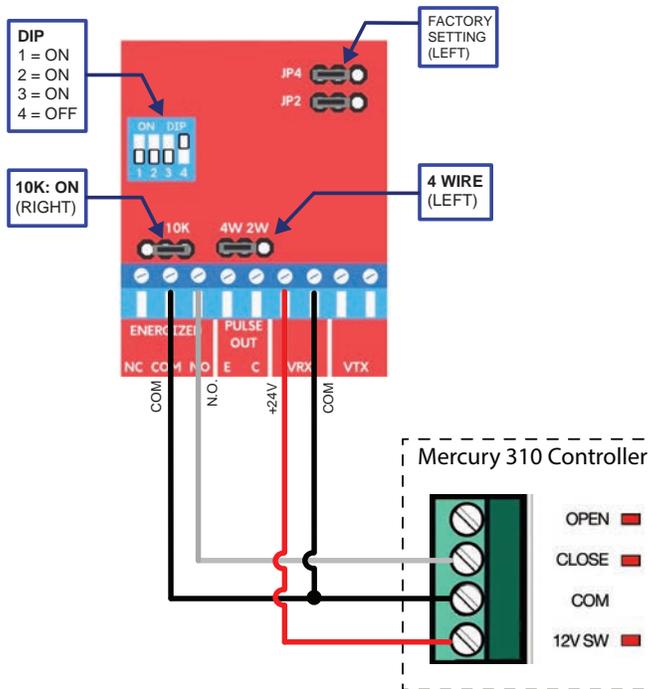
EMX IRB-MON (Photo Eye) Wiring



NOTICE

Wiring shown is for sensor in the open-direction. For a close-direction sensor, use the Close input. For dual direction sensing, jumper Open & Close inputs together.

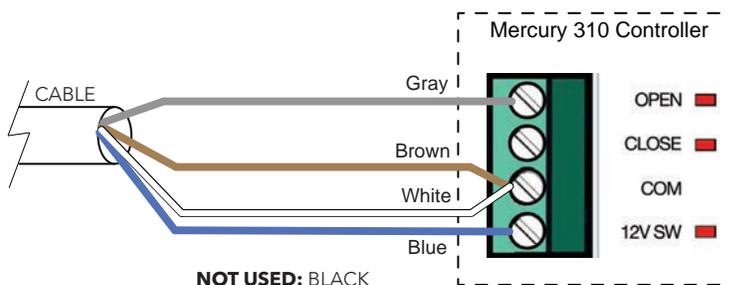
EMX IRB-RET (Photo Eye) Wiring



NOTICE

- Set board as shown in diagram at left. Jumpers are three pin type, and placed as indicated (left or right).
- Wiring shown is for sensor in the close-direction. For an open-direction sensor, use the Open input. For dual direction sensing, jumper Open & Close inputs together.

EMX NIR-50-325 (Photo Eye) Wiring



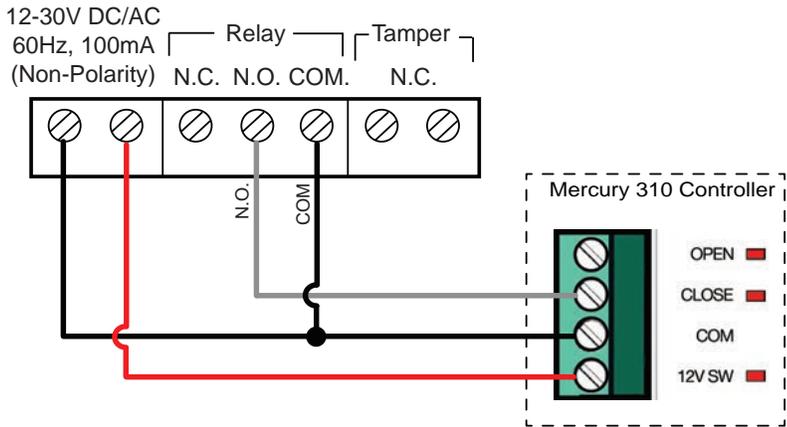
NOTICE

Wiring shown is for sensor in the open-direction. For a close-direction sensor, use the Close input. For dual direction sensing, jumper Open & Close inputs together.

Mercury 310 Automated Gate System

Installation and Programming Manual

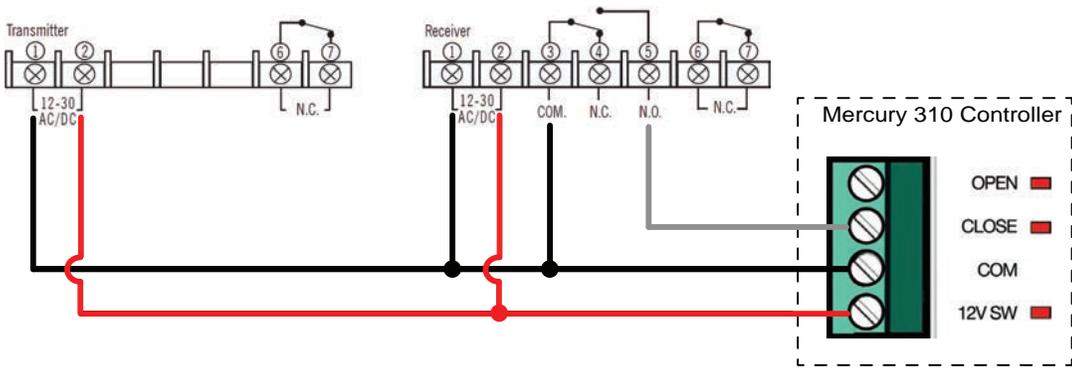
Seco-Larm Enforcer Retro-Reflective (E-931-S50RRGQ) (Photo Eye) Wiring



NOTICE

Wiring shown is for sensor in the close-direction. For an open-direction sensor, use the Open input. For dual direction sensing, jumper Open & Close inputs together.

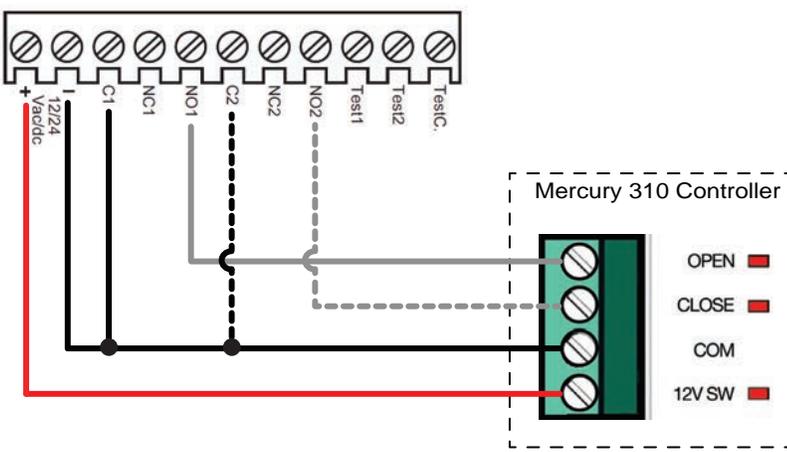
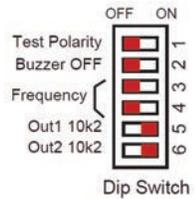
Seco-Larm Enforcer Through-Beam (E-960-D90GQ) Wiring



NOTICE

Wiring shown is for sensor in the close-direction. For an open-direction sensor, use the Open input. For dual direction sensing, jumper Open & Close inputs together.

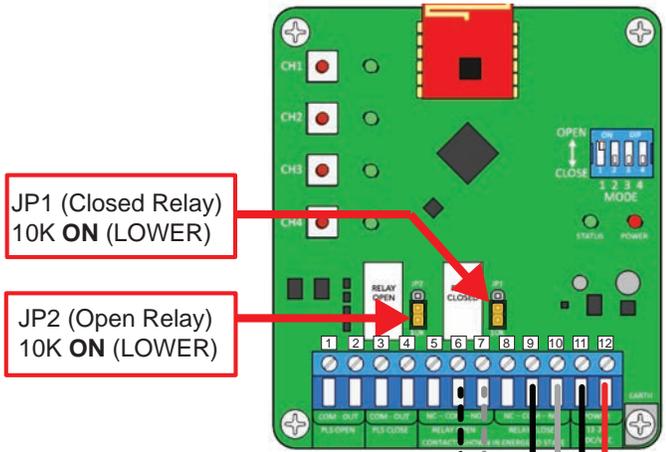
Transmitter Solutions iGaze RE Kit (Photo Eye) Wiring



NOTICE

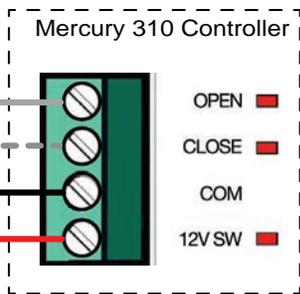
- Dashed lines indicate the secondary wiring connections if an additional sensor is wired to the inputs. See manufacturer's instructions for details.
- Wiring shown is for sensor in the open-direction. For a close-direction sensor, use the Close input. To *add* a close-direction sensor, wire as shown with secondary wiring (dotted lines). For dual direction sensing, jumper Open & Close inputs together.

EMX WEL200 (Edge Sensor) Wiring



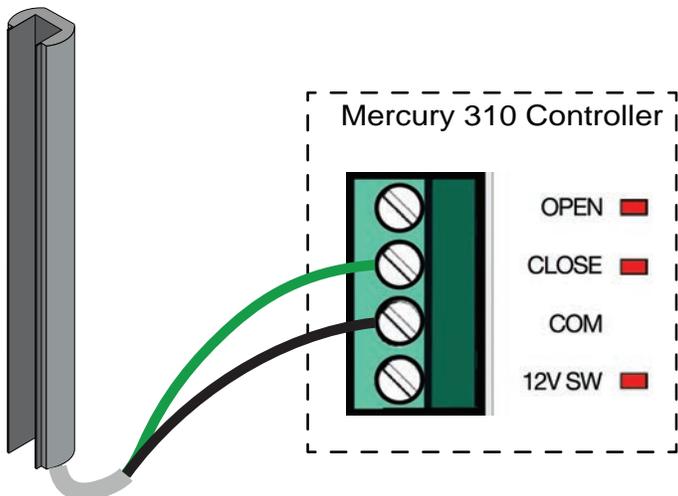
NOTICE

- Set board as shown in red boxes per diagram. Jumpers are three pin type, and placed LOWER as indicated for 10K operation. Dashed lines indicate the secondary wiring connections if an additional sensor is wired to the input. See manufacturer's instructions for details.
- Wiring shown is for sensor in the open-direction. For a close-direction sensor, use the Close input. To *add* a close-direction sensor, wire as shown with secondary wiring (dotted lines). For dual direction sensing, jumper Open & Close inputs together.



Generic 2-Wire Edge Sensor Wiring

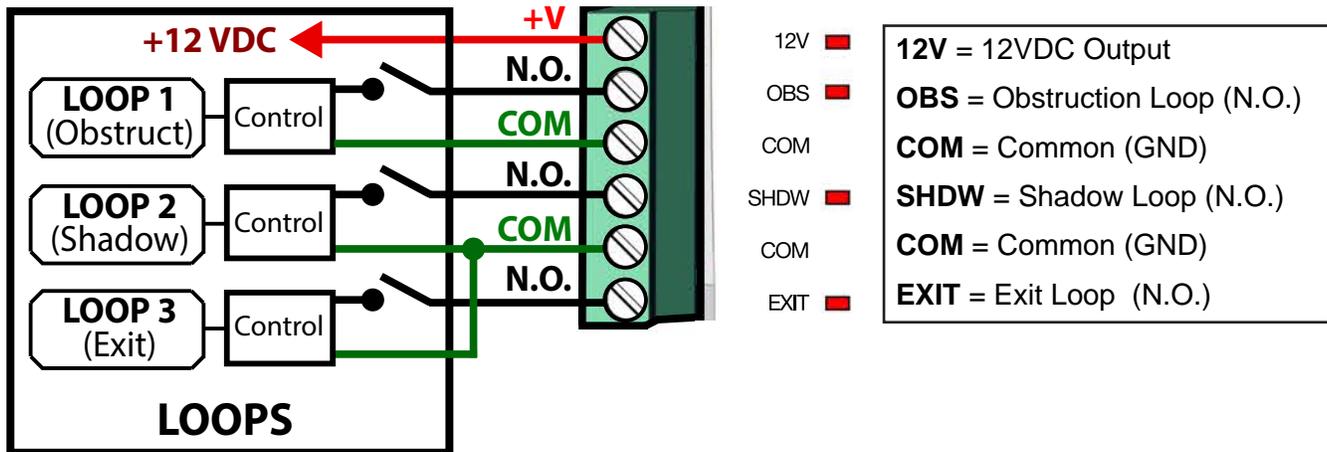
Generic 2-wire edge sensors must be 10K Normally Open (N.O.) devices and may be wired to the Sensor Inputs as shown below.



NOTICE

Wiring shown is for sensor in the close-direction. For an open-direction sensor, use the Open input. For dual direction sensing, jumper Open & Close inputs together.

10.5 LOOP INPUTS



The Mercury 310 is capable of three types of loop response:

- **Obstruction:** Keeps a gate open if activated, OR if a gate is closing, reverses it to open. No effect on an opening gate.
- **Shadow:** Prevents a gate from opening if it is on the close limit, OR keeps it from closing if on the open limit. No effect on a gate in mid-travel.
- **Exit:** If gate is closed, opens it and if gate is closing, reverse it to open.

10.5.1 Obstruction Loop Input

The Obstruction Loop is intended to prevent a gate from closing onto a vehicle that is activating the sensor. Refer to loop examples on next page. When activated, the Obstruction Loop input;

1. Prevents an open gate from closing (suspends close timer during activation).
2. Stops a closing gate and reverses it to open limit (suspends close timer during activation).

The associated red LED will FLASH three times if the gate is prevented from closing by the activation. Activation of this input has no effect on an opening gate or stopped gate that has received an open command.

NOTICE

Activation of the obstruction loop re-enables the close timer function.

10.5.2 Shadow Loop Input

The Shadow Loop input is intended to prevent a fully closed gate from opening onto a vehicle or a fully open gate from closing on a vehicle. Refer to loop examples on next page. When activated, the Shadow Loop input;

1. Prevents a fully closed gate (at close limit) from opening.
2. Prevents a fully open gate (at open limit) from closing (suspends close timer during activation).

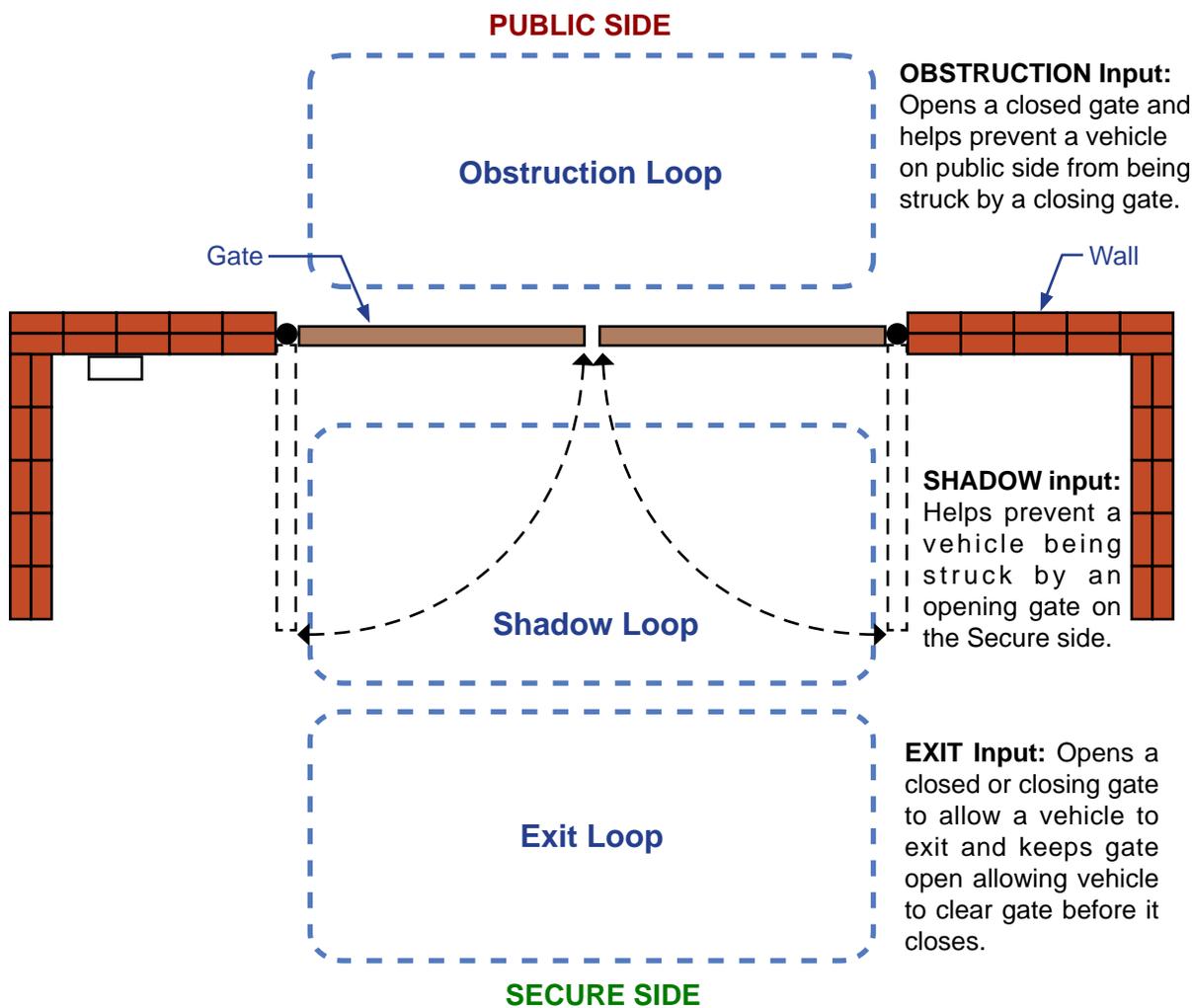
The associated red LED will FLASH three times if the gate is prevented from operating by the activation. Activation of this input has no effect when the gate has started closing, when the gate is opening, or when the gate is stopped mid-travel (no active limit).

10.5.3 Exit Loop Input

The Exit Loop input is used to open a fully closed gate for a vehicle, open a closing gate to prevent the gate from hitting a vehicle, or to prevent an open gate from closing onto a vehicle. Refer to loop examples below. When activated, the Exit Loop input;

1. Starts a stopped gate moving in the open-direction.
2. Stops and reverses a closing gate toward the open-direction.
3. Prevents an open gate from closing (resets close timer and suspends it during activation).

The associated red LED will FLASH three times if the gate is prevented from operating by the activation. Activation of this input has no effect if there is an active stop command or an open-direction entrapment sensor or BlueBus device.



Obstruction, Shadow, and Exit Loop Examples

10.6 LOOP INSTALLATION

NOTICE

The following are general instructions for installing generic vehicle loops detectors. If installing loop detectors, the manufacturer's instructions should have priority over these guidelines.

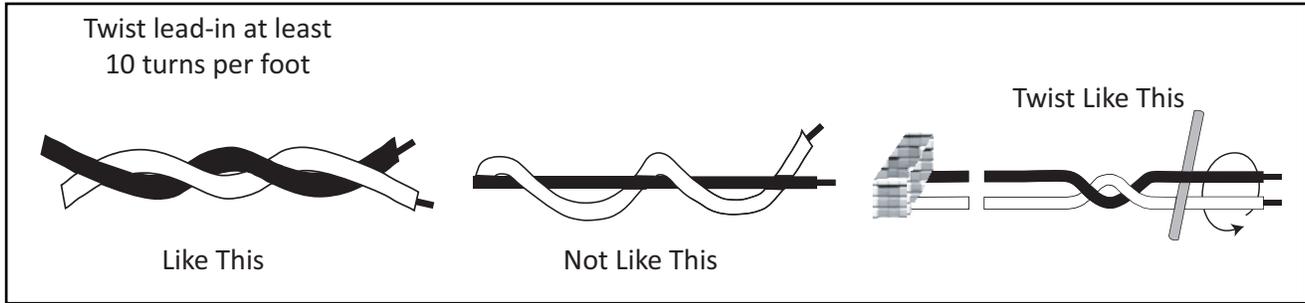
10.6.1 Vehicle Detectors And Loops

A vehicle detector passes a small current flow through the “loop” of wire, which then becomes an inductive coil. When a vehicle passes over the loop, the detector senses resultant drop in inductance and actuates detector output.

Loop Configurations: Configurations differ depending on application. In parking applications, a loop may be as small as 4 x 6 ft (122 x 183cm). In traffic applications employing one of our swing or slide gate operators, the smallest loop should not be less than 6 x 6 ft (183 x 183cm) in order to detect high bed vehicles.

10.6.2 Security Gate Application Rules

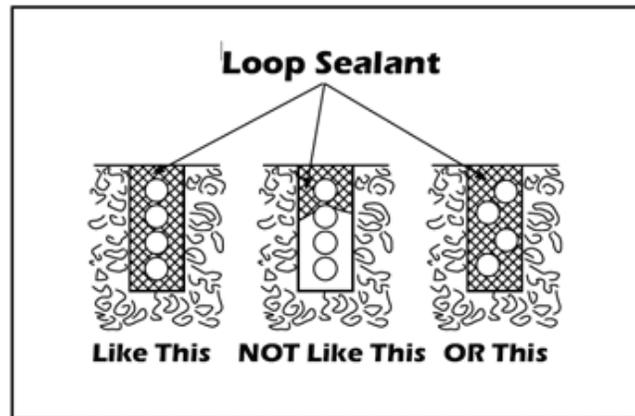
- Side of the loop closest to the gate must be located at least 4 feet from the gate when gate is closed.
- Shortest side of loop should be between 6 and 8 feet (1.8m and 2.4m) in length. Longest side of loop should be between 6 and 20 feet (1.8m and 6.1m) in length. For applications that need to span a wide area, use several smaller loops. Do not connect more than 200 square feet (18.6sq. m) of loop area to a single detector.
- In applications with multiple loops, keep each loop 4 ft (122cm) to 6 ft (188cm) apart. This avoids “cross talk”. It is possible to have loops closer together by selecting different frequencies.
- For greater sensitivity and less chance of false calls caused by the motion of the gate, it is better to use multiple smaller loops, connected in a series circuit, to one detector instead of a single large loop.
- To avoid interference, keep loops at least 2-inches (5cm) above any reinforcing steel. Do not route loop wires with, or in close proximity to, any other conductors, including other loop leads, unless shielded lead-in cable is used. Never route high voltage circuits in PVC conduit near a loop.
- Loop and lead-in wire should be one continuous piece. Avoid splices, if possible. If a splice is necessary for any reason, “pot” the splice in epoxy or use heat shrink to ensure that the quality of the splice covering is the same as the original wire jacket.
- Use 14, 16, or 18 gauge stranded wire with a direct burial jacket. Cross linked polyethylene insulation types, such as, XLPE or XHHW, will last much longer and are less prone to damage during installation than conventional insulation types. Preformed loops can be used before road surfacing or under pavers.
- Twist loose tails of lead-in wires tightly, approximately ten times per foot. See Figure 63.
- Follow this guide for the correct number of turns in the loop:
 - 12 to 20 sq. feet (3.7 to 6.1 sq. m) = 5 turns
 - 20 to 60 sq. feet (6.1 to 18.3 sq. m) = 4 turns
 - 60 to 240 sq. feet (18.3 to 73.1 sq. m) = 3 turns



Wire Twist Lead-ins

This guide is written from a design perspective, but installation workmanship practices are equally important to insure proper operation and long loop life. The best way to insure a quality installation is to employ a professional installer experienced with detector loops. A few important practices are:

- The slot in the surface of the road should be cut ¼-inch wide x 1½-inch deep (6.3mm x 38.1mm).
- The corners of the cut must be at an angle or core drilled to relieve stress on the wires.
- After the wire is installed, the slot must be completely backfilled with a non-hardening sealer. If the loop wires are able to move in the slot after the sealer has set, the detector may give false calls.



Loop Sealant

10.6.3 Detector Logic

Nice recommends that vehicle detectors be used for free open and obstruction sensing logic only. Because of their slower speeds, closing logic is a poor choice for security gate systems. Since there are several ways that the gate may be left standing open and because there is a loss of safety, our circuit has not been designed to accommodate “detect to close” logic.

10.6.4 Loop Diagnostics

The following tests cannot guarantee a functioning loop, but failure of either test means that the loop is definitely suspect, even though it may still be functioning at the time.

- Test the resistance of the loop and lead-in wire. It should not exceed 4 Ω.
- Test the resistance between the loop and earth ground with a 500V Megohm meter. It should be 100 Megohms or more. Loops may function at 100 Megohms or less but will not be reliable (e.g. when the ground is wet from rainfall). Low resistance indicates broken or moisture saturated insulation. This is common if inappropriate wire insulation has been used.
- A schematic for a swing gate loop layout is shown on the next page.



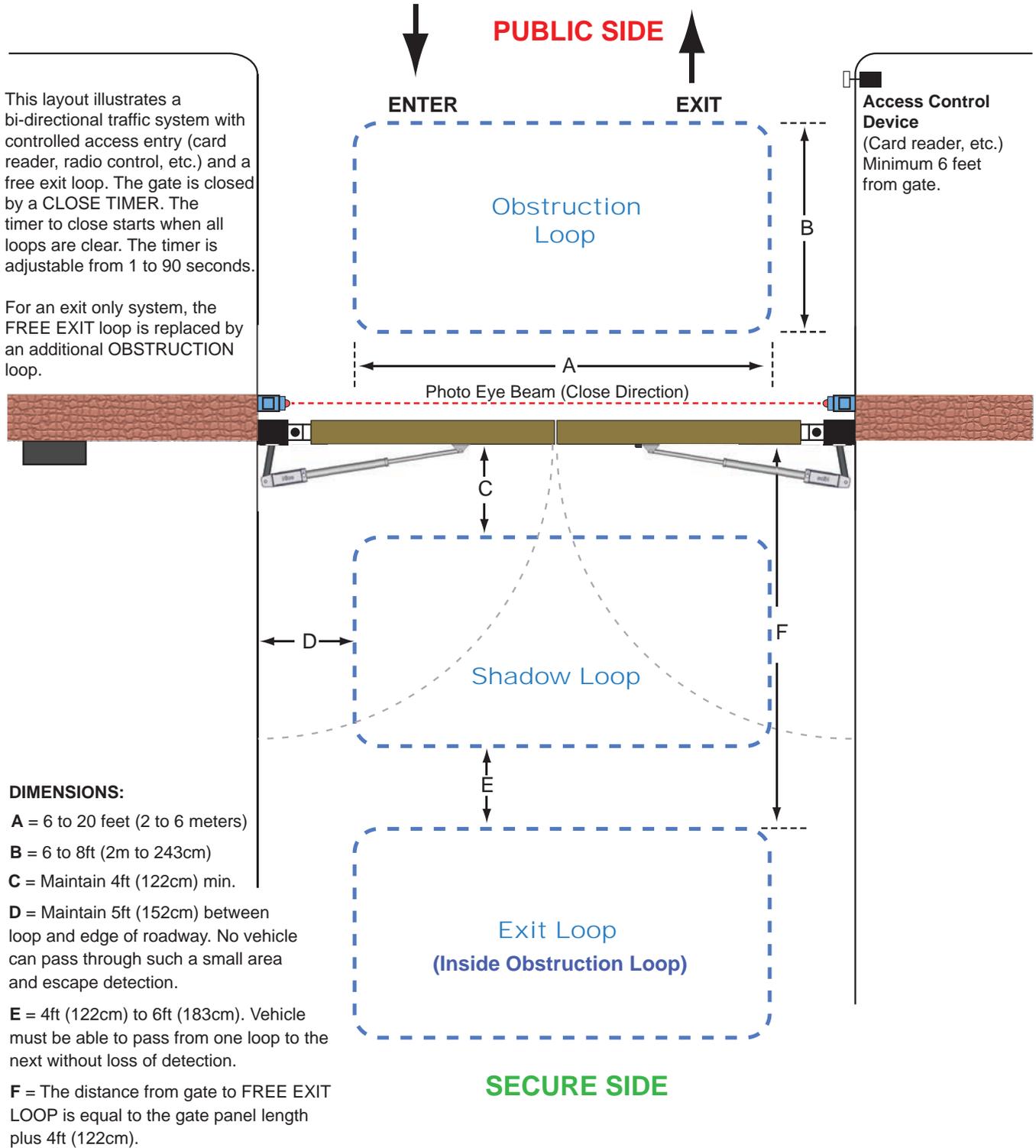
Mercury 310 Automated Gate System

Installation and Programming Manual

10.6.5 Loop Layout Example (Dual Swing/TITAN)

This layout illustrates a bi-directional traffic system with controlled access entry (card reader, radio control, etc.) and a free exit loop. The gate is closed by a CLOSE TIMER. The timer to close starts when all loops are clear. The timer is adjustable from 1 to 90 seconds.

For an exit only system, the FREE EXIT loop is replaced by an additional OBSTRUCTION loop.



DIMENSIONS:

A = 6 to 20 feet (2 to 6 meters)

B = 6 to 8ft (2m to 243cm)

C = Maintain 4ft (122cm) min.

D = Maintain 5ft (152cm) between loop and edge of roadway. No vehicle can pass through such a small area and escape detection.

E = 4ft (122cm) to 6ft (183cm). Vehicle must be able to pass from one loop to the next without loss of detection.

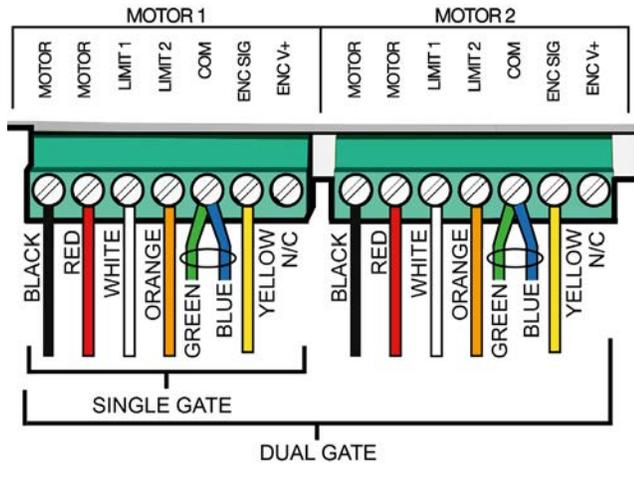
F = The distance from gate to FREE EXIT LOOP is equal to the gate panel length plus 4ft (122cm).

Vehicle Detectors and Loop Layout for Dual Gate Openings less than 28 feet* or Single Gate Openings less than 20 feet*

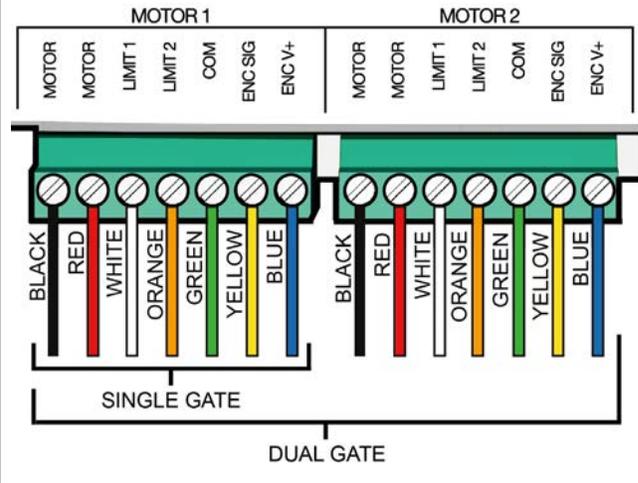
* NOTE: A minimum of three (3) detectors are required for this type of gate.

10.7 LINEAR ACTUATOR INPUTS

TITAN 912L Linear Actuator Wiring



Apollo 816 Linear Actuator Wiring



Linear Actuator Input Functions

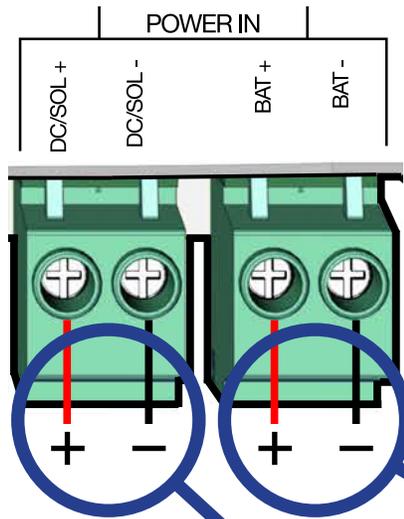
POS#	MOTOR	FUNCTION
1	MOTOR 1	Motor Power (+ or -)
2		Motor Power (- or +)
3		Limit 1
4		Limit 2
5		Common
6		Encoder Signal
7		Encoder Power (V+)

POS#	MOTOR	FUNCTION
8	MOTOR 2	Motor Power (+ or -)
9		Motor Power (- or +)
10		Limit 1
11		Limit 2
12		Common
13		Encoder Signal
14		Encoder Power (V+)

NOTICE

POS# in table represents the pin positions from left to right (1-7 and 8-14).

10.8 POWER INPUTS



DC/SOL+ = High Current DC/Solar Input (Positive)
DC/SOL- = High Current DC/Solar Ground (Negative)
BAT+ = +12VDC Battery Input (Positive)
BAT- = Battery Ground (Negative)

Battery Input: Must be a 12VDC sealed lead acid (SLA) battery.

Solar/DC Input: Must be a 12V rated solar panel (23.5V Open Circuit Voltage) or a 18-24V high current DC power source.

NOTICE

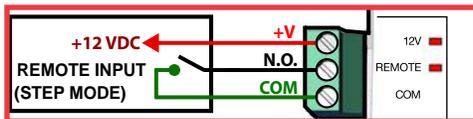
Refer to the separate installation sections for the ACBOX310 and SolarBOX310 for model specific power requirements and wiring.

10.9 POWER OUTPUTS

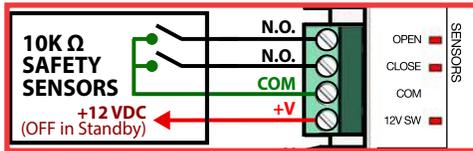
12VDC power outputs are provided at four locations, as shown below for powering additional accessories and sensors. Two of the power outputs switch off when the controller enters Standby Mode and the other two outputs remain powered during Standby Mode, as shown below.

Mercury 310 Power Outputs			
Location	Voltage	Amps	Standby Mode
INPUTS	12VDC	500 mA	On
SENSORS			Off
LOOPS			On
OUTPUTS			Off

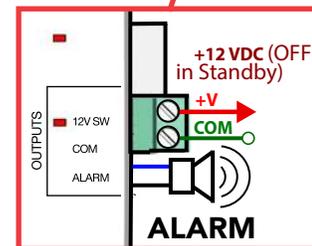
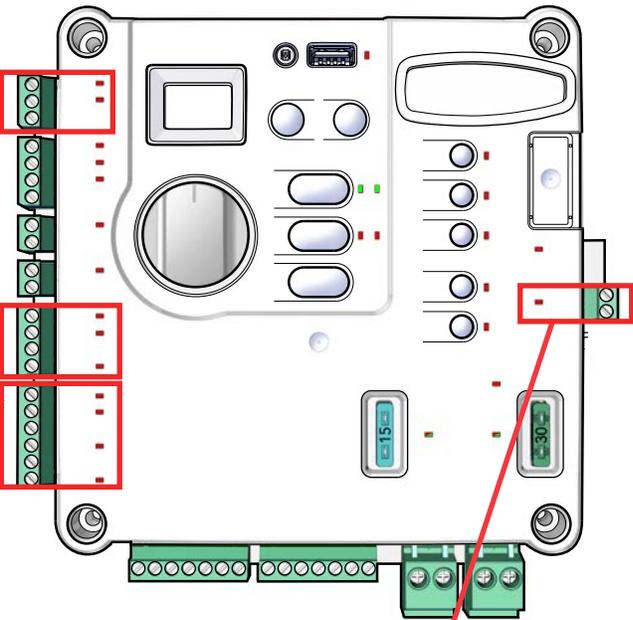
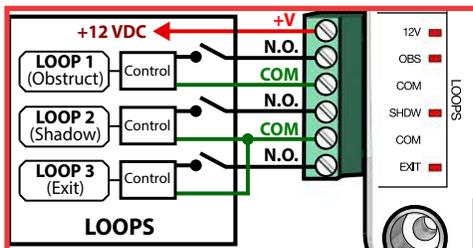
INPUTS: ON in Standby Mode



SENSORS: OFF in Standby Mode



LOOPS: ON in Standby Mode



OUTPUTS: OFF in Standby Mode

Mercury 310 Automated Gate System

Installation and Programming Manual

10.10 ACTUATOR MANUAL RELEASE INSTRUCTIONS

To manually open the gate in the event of a full power outage, follow the instructions in this section according to the type of actuator in your kit. The Apollo 816 linear actuator instructions are below and the TITAN 912L linear actuator instructions are on the next page.

Apollo 816 Linear Actuator Manual Release

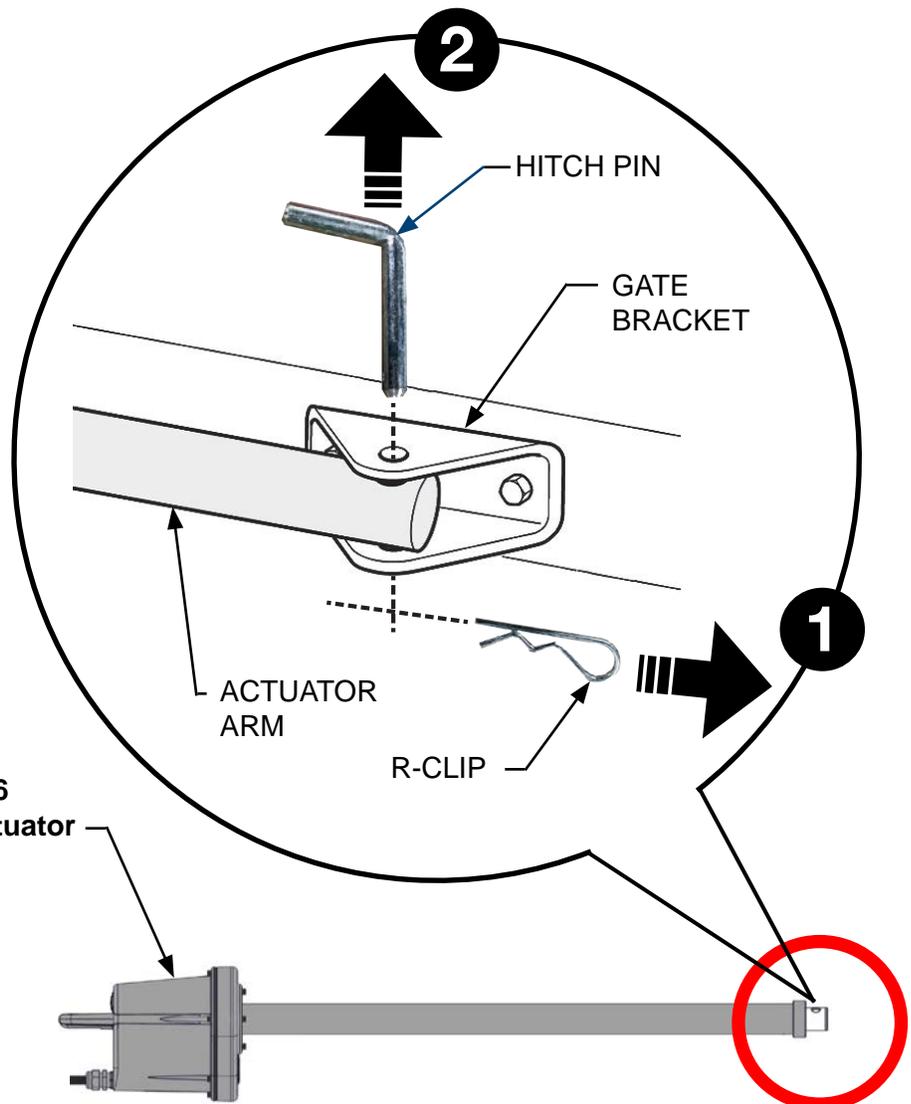
1. Pull the R-Clip from the hole in the hitch pin (See illustration below).
2. Pull the hitch pin from the gate bracket and actuator arm.
3. Swing the actuator assembly entirely out of the way and the gate can now be moved by hand.
4. Reverse the procedure to re-affix the actuator to the gate.

NOTICE

This procedure will only work if the gate has been installed using the hitch pin and R-clip.

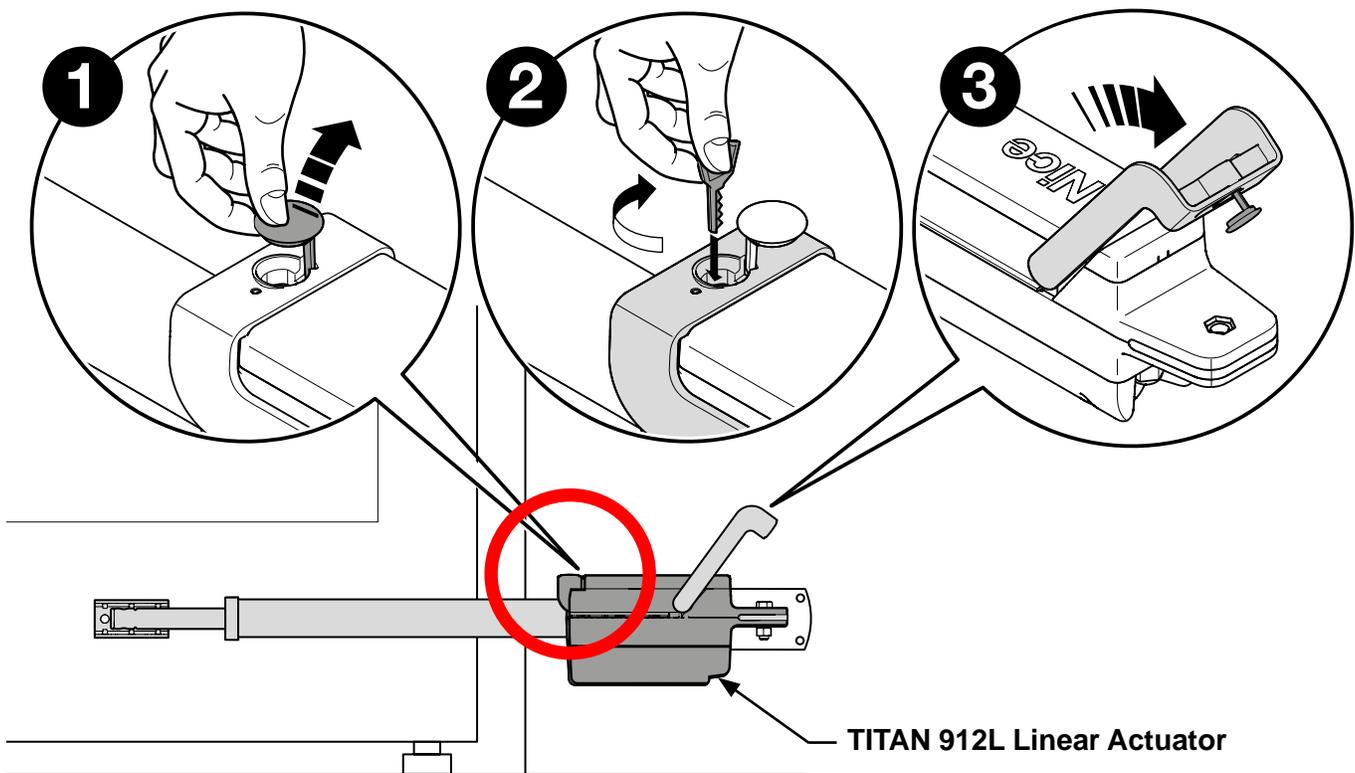
Contact your gate installer to disconnect or replace other hardware configurations.

Apollo 816
Linear Actuator



TITAN 912L Linear Actuator Manual Release

1. Lift up the rubber key cap (See illustration below).
2. Insert key and turn 90° clockwise.
3. Lift up the mechanical release.
4. After mechanical release is opened, the actuator arm can now be freely extended, and the gate can now be moved by hand.
5. To re-enable the actuator, reverse the above instructions.



CAUTION

While it is entirely possible to use the gate system with the TITAN 912L actuator unlocked, it is inadvisable in order to ensure security and safety. Be sure to store the actuator key in a secure place that will be remembered when needed.

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Mercury 310

Appendix

11: ERROR, STOP, AND LED CODES

Error Codes

Error codes are very useful for communicating information to your gate installer in the event of a gate error. When there is an error, the display will alternately flash **Er** and a two number code, as shown in the Display column in the table below.

ERROR CODES				
Display		Error Condition	Possible Cause	
Er	01	01	<ul style="list-style-type: none"> Learn limits started without motor 1 connected. Normal gate operation - motor not detected after start. 	<ul style="list-style-type: none"> Motor not connected to motor 1 connector. Wiring fault Defective motor Mechanical release is open (Titan 912L)
	02	02	<ul style="list-style-type: none"> Learn limits started without motor 2 connected. Normal gate operation - motor not detected after start. 	<ul style="list-style-type: none"> Motor not connected to motor 2 connector. Wiring fault Defective motor Mechanical release is open (Titan 912L)
	03	03	Normal gate operation - Encoder frequency below nominal.	<ul style="list-style-type: none"> Obstruction preventing gate movement. Wiring fault Defective encoder.
	04	04	Normal gate operation - Motor current exceeds force threshold.	<ul style="list-style-type: none"> Obstruction preventing gate movement. Wiring fault Defective motor.
	05	05	IES Type A activated twice prior to reaching a limit.	<ul style="list-style-type: none"> Obstruction preventing gate movement. Defective motor.
	06	06	Learn limits started when the motor is at limit.	<ul style="list-style-type: none"> Learn limits started when the motor is at limit. Wiring fault
	07	07	Learn limits started and an encoder is not detected.	<ul style="list-style-type: none"> Learn limits started and an encoder not detected. Wiring fault
	08	08	Programming OXI step, open, or latch to key FOB failed.	<ul style="list-style-type: none"> OXI not plugged in. Key FOB Button not pushed. Key FOB Button not detected by OXI receiver.
	09	09	Erasing single button or all fobs failed.	<ul style="list-style-type: none"> OXI not plugged in. Key FOB Button not pushed. Key FOB Button not detected by OXI receiver.
	10	10	<ul style="list-style-type: none"> OXI not connected. OXI communication error with Mercury. 	OXI not plugged in.
	11	11	Battery voltage too low.	<ul style="list-style-type: none"> Battery voltage below 12.5V without gate cycle during battery health check. Battery voltage below 12.0V with gate cycle during battery health check.
	12	12	12V Regulator Failure	Defective component.
	13	13	Accessory power (unswitched) fuse tripped	Excessive current draw. (disconnect accessory power, restart controller, reconnect).
	14	14	Accessory power (switched) fuse tripped	Excessive current draw. (disconnect accessory power, restart controller, reconnect).
	15	15	Alarm fuse tripped	Excessive current draw. (disconnect alarm connector, restart controller, reconnect).

Error Codes (Continued)

Er	16	16	24V Power Supply Failure	Defective component. (Only for Mercury 500 series)
	17	17	Lock fuse failure	Excessive current draw. (Only for Mercury 500 series)
	18	18	Open & close limits active same time.	Open and close limits both active (check connections).
	19	19	DC input voltage too high at motor start.	<ul style="list-style-type: none"> DC input voltage is greater than 25V and no battery is connected. AC/DC power supply problem.
	20	20	USB Power Supply Fault	---

Stop Codes

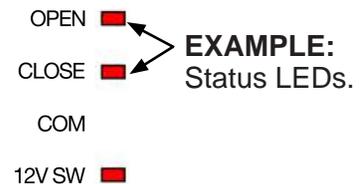
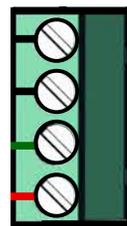
When a gate stops because of an input, one of the following two digit codes will show in the display to indicate which input caused the gate to stop.

STOP CODES		
Display	Code	Description
oE	oE	Open Entrapment: Entrapment sensor connected to Open Sensor input is active and preventing gate from opening.
cE	cE	Close Entrapment: Entrapment sensor connected to the Close Sensor input is active and preventing gate from closing.
bo	bo	BlueBus Open: BlueBus device in open-direction is active and preventing gate from opening.
bc	bc	BlueBus Close: BlueBus device in close-direction is active and preventing gate from closing.
FS	FS	Fail-Safe (or Fail-secure): BlueBus Close sensor preventing gate operation.

Sensor LED Flash Codes

LEDS indicate the status of inputs and outputs as follows:

- LED **OFF**= Inactive
- LED **ON** = Active
- LED **FLASHING** = Error or preventing operation



Radio Program Display Codes

When programming the OXI receiver and remote(s), the current program status is displayed as shown in the table below.

RADIO PROGRAMMING DISPLAY CODES		
Display	Code	Description
rA	rA	Remote Add: Learn a single remote button.
rd	rd	Remote Delete: Remove a single button function from a remote.
rE	rE	Remote Erase All: Erase all remotes from OXI radio.

12: SOLAR REQUIREMENTS

3

Calculating Solar Requirements

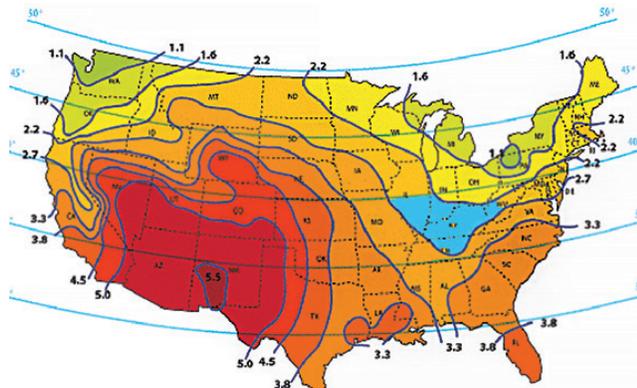
1. Estimate the gate traffic measured in open/close cycles per the table below.

Solar Panel Watt/Cycle Chart						
DAILY CYCLES	1-10	1-20	1-40	1-60	1-80	80+
5 Watt Solar Panel	X					
10 Watt Solar Panel		X				
20 Watt Solar Panel			X			
30 Watt Solar Panel				X		
40 Watt Solar Panel					X	

NOTICE

- Table (above) should be used as only a guide. Alternative gate operator configurations may reduce or increase the daily power usage.
- For dual gate operators, double the amount of required solar wattage.

2. Estimate the amount of sunlight available per the Solar Map (right).
3. Use the solar wattage calculator found on the HySecurity website at <https://support.hysecurity.com/hc/en-us/articles/360057403914-Solar-Calculator> to determine battery and solar panel size needed to serve the installation in question.



13: MAINTENANCE

The table below lists maintenance procedures that the gate installer should perform over time. It is the responsibility of the end user to ensure maintenance is performed by an appropriate automated gate uninstaller professionals.

Installer Maintenance Schedule			
Component	Maintenance Action	6 Months	Annually
Alarm	Activate (inherent) reverse system by blocking gate with a solid object. Gate should reverse momentarily, then stop. Restart gate & block again with solid object. Gate should reverse momentarily, stop, and go into hard shutdown with alarm.	X	X
Backup System	If operator is equipped with battery backup system, check to be sure the system opens the gate upon loss of AC power.	X	X
Battery	If operator is equipped with battery backup system, check the batteries for any leakage or loose connections. Batteries should be replaced every two years.	X	X
Fire Dept	Check emergency vehicle access device for proper operation.	X	X
Loop(S)	Check vehicular loops for proper operation.	X	X
Release	Check manual release for proper operation.	X	X
Photo Eyes	Break the beam near the transmitter, receiver, and in the middle of travel to ensure the gate stops and reverses.	X	X
Mounting Hardware	Check screws and nuts.		X
Gate	Inspect for damage.		X

User Monthly Maintenance Operations	
Component	Maintenance Action
Gate	Visually inspect gate system for damage, wear, and corrosion.
Gate Travel	Manually release actuators (see pages 70 and 71), then move the gate by hand through its range of travel. Note any squeaks from rollers or hinges or areas of binding. Gate should travel smoothly and quietly throughout range. If not, contact a gate professional. Re-engage actuator for normal operation.
Photo Eyes: Open Direction	With the gate opening, block any photo eyes and/or depress any safety edges used to protect the open direction. The gate should stop and/or reverse.
Photo Eyes: Close Direction	With the gate closing, block any photo eyes and/or depress any safety edges used to protect the close direction. The gate should stop and/or reverse.
Inherent Entrapment Systems	<ul style="list-style-type: none"> ➔ Open direction: Using a suitable obstruction in the path of the gate (a solid, immovable object), run the gate in the open direction until it contacts the obstruction. The gate should stop and reverse. ➔ Close direction: Using a suitable obstruction in the path of the gate (a solid, immovable object), run the gate in the close direction until it contacts the obstruction. The gate should stop and reverse.

14: TROUBLESHOOTING

Troubleshooting Procedures

Problem	Possible Solution
Gate opens a short distance, then stops and reverses.	<ul style="list-style-type: none"> • Check the 10K sensor input on the gate controller • Ensure limits are properly set • Check for obstructions • Adjust Force Settings
Gate opens but will not close.	<ul style="list-style-type: none"> • Check the input LEDs. Any lit LED indicates sensor activation, which will hold the gate open. • Check the external safety devices. Any activated safety devices will hold the gate open and may indicate a problem with the safety device. • Ensure limits are properly set. • Check the loop detectors. Any activated safety devices can hold the gate open and may indicate a problem with the loop detector or ground loop.
Battery backup system will not open gate upon AC power outage.	<ul style="list-style-type: none"> • Check batteries for proper voltage. Replace if necessary. • Check battery connections to controller.
Hard Shutdown (two back to back obstructions) LED blinking, Buzzer sounds for 5 minutes.	Clear any obstructions from the path of the gate, then Press STOP/CLEAR button on controller to clear the Hard Shutdown.
Gate opens by itself.	<ul style="list-style-type: none"> • Check accessory inputs and clear them as necessary. • Delete all key fobs from the OXI receiver and learn them in again.
Gate moves in direction opposite expected.	Perform the gate learning procedure, taking care during step 6 on page 36

15: INSTALLATION CHECKLIST

The installer and customer must each ensure that all of the following actions have been completed. Left box is for installer check off and the right box is for customer check off.

Installation Checklist		
<input type="checkbox"/>	<input type="checkbox"/>	The gate(s) has been checked to make sure it is level and moves freely in both directions.
<input type="checkbox"/>	<input type="checkbox"/>	Potential pinch areas have been guarded so as to be inaccessible OR have contact and/or non-contact external entrapment devices installed.
<input type="checkbox"/>	<input type="checkbox"/>	If pedestrian traffic is expected, a separate pedestrian gate has been installed, a minimum of seven feet from the gate. The customer has been informed that all pedestrian traffic must use the pedestrian gate.
<input type="checkbox"/>	<input type="checkbox"/>	Warning signs have been installed on each side of the gate in highly visible locations. The customer has been informed that these signs must remain at all times.
<input type="checkbox"/>	<input type="checkbox"/>	There are no controls installed within 6 feet of the gate.
<input type="checkbox"/>	<input type="checkbox"/>	The installer has properly adjusted the obstruction sensing feature and has tested the gate to make sure that the gate stops and reverses a short distance with minimal resistance applied on a swing gate, at the end of the gate.
<input type="checkbox"/>	<input type="checkbox"/>	The installer has instructed the customer in the proper use of the gate operator and reviewed all of the operational functions, obstruction sensing devices, external entrapment sensors, warning buzzer and reset, etc.
<input type="checkbox"/>	<input type="checkbox"/>	The installer has instructed the customer in the proper way of disconnecting the operator. Manual disconnect must never be used while the gate is in motion. The power must be turned off and battery disconnected before disengaging the operator.
<input type="checkbox"/>	<input type="checkbox"/>	The installer has answered any questions the customer has regarding the operation of the gate operator and gate operator safety precautions.
<input type="checkbox"/>	<input type="checkbox"/>	The installer has explained to the customer that a regular maintenance schedule for both the gate and the gate operator is recommended.
<input type="checkbox"/>	<input type="checkbox"/>	The installer has given the keys for the control box and TITAN actuator release, if applicable.

16: WARRANTY

LIMITED WARRANTY—NICE-BRANDED PRODUCTS

1. Warranty.

Hy-Security Gate, Inc. (“HySecurity”) warrants that at the time of sale, each Nice-branded gate operator product that it sells will, in all material respects, conform to the then applicable specification for the product and will be free from defects in material and manufacture.

The following additional durational warranties apply to products purchased through a distributor authorized by HySecurity to sell Nice products (“Authorized Distributor”), depending on whether (1) the product is purchased through an Authorized Distributor and (2) whether a timely and complete product registration is submitted to HySecurity.

It is therefore important that you register your product with HySecurity, online at www.hysecurity.com/warranty, within the 60-day period described below.

1(a) Nice-branded Products Purchased Through Authorized Distributors and Properly Registered

For any gate operator product that is purchased from an Authorized Distributor (this excludes product purchased through internet resellers or any distributor not authorized by HySecurity to sell Nice products), if the product registration is completed by the Dealer/Installer or End User within 60 days of the date of purchase, the following warranty terms will apply. HySecurity warrants that the product will remain serviceable for the following periods:

- a) Electromechanical pad-mounted Slide and Swing operators: Three years after the date of installation,
- b) Electromechanical linear actuator Swing operators: Three years after the date of installation,
- c) Electromechanical barrier arm operators: Three years after the date of installation,
- d) Nice-branded accessories: Three years after the date of installation, *provided that* the Three-Year warranty period in (a), (b), or (c) will not extend beyond four years from the date that the product was shipped from HySecurity.

The preceding warranty durations do not apply to the products or components described below (e-f), which have a shorter warranty period:

- e) Batteries: One Year from date of shipment from HySecurity.
- f) Components subject to normal wear including, but not limited to, chains, belts, idler wheels, sprockets and fuses: One Year from date of installation.

1(b) Nice Products Not Purchased Through an Authorized Distributor or Not Properly Registered within 60 Days

For any product that is not purchased from an Authorized Distributor or for which the product registration was not completed by the Dealer/Installer/End User within sixty (60) days of the date of purchase, the following **Two-Year Limited Warranty** will apply: HySecurity warrants that the product will remain serviceable for Two Years from the date that the product was shipped from HySecurity.

1(c) Replacement Parts

HySecurity warrants that replacement parts (whether new or reconditioned) will remain serviceable for One Year from the date that the part was shipped from HySecurity or the remaining period of the Gate Operator warranty, whichever is longer.

1(d) Limitations and Exclusions Applicable to Each of the Preceding Warranties.

The preceding warranties shall not apply to equipment that has been (1) installed, maintained, or used improperly or contrary to instructions; (2) subjected to negligence, accident, vandalism, or damaged by severe weather, wind, flood, fire, terrorism or war; or (3) damaged through improper operation, maintenance, storage or abnormal or extraordinary use or abuse. Any modification made to products will void the warranty unless the modifications are approved in writing by HySecurity in advance of the change (this exclusion does not apply to normal installation of approved accessories and/or protective devices or sensors). It is the responsibility of the Distributor, Dealer/Installer, or End User to ensure that the software version in the product is maintained to the latest revision level.

The preceding warranties do not extend to accessories when those items carry the name plate of a manufacturer other than HySecurity or Nice and they are not a part of the base model. HySecurity disclaims all warranties for such accessory components, which carry only the original warranty, if any, of their original manufacturer. HySecurity hereby assigns its rights under such manufacturer warranties—to the extent that such rights are assignable—to Buyer.

This warranty gives you specific legal rights, and you may also have other rights which vary from State to State.

These warranties extend to HySecurity’s Distributors, to the Dealer/Installer, and to the first End User of the product following installation. They do not extend to subsequent purchasers. **2. Limitation of Certain Implied Warranties and Exclusion of Other Warranties.**

The warranties contained in Section 1 are the exclusive express warranties given by HySecurity and supersede any previous, contrary or additional representations, whether oral or written. Any prior or extrinsic representations or agreements are discharged or nullified. ANY IMPLIED WARRANTIES, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO PERIOD OF THE APPLICABLE EXPRESS WARRANTY FOR THE PRODUCT OR COMPONENT. HYSECURITY HEREBY DISCLAIMS AND EXCLUDES ALL OTHER WARRANTIES—INCLUDING ANY LIABILITY FOR INFRINGEMENT, AND ANY WARRANTIES OTHERWISE ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

3. Buyer’s Exclusive Remedies for Any Nonconformity.

If a Nice product fails to conform to the warranties in Section 1, Buyer must notify and order replacement parts from the Distributor through which the product was purchased within a reasonable time and in no event more than thirty (30) days after the discovery of the nonconformity. HySecurity will investigate and, in the event of a breach, will provide, within a reasonable period of time, one of the following: (1) repair or replacement of any nonconforming products or components or (2) refund of the price upon return of the nonconforming items. HySecurity reserves the right to supply used or reconditioned material for all warranty claims. HySecurity will not be considered to be in breach of or default under this Warranty because of any failure to perform due to conditions beyond its reasonable control, including any force majeure. This warranty does not cover any incidental expenses, including fines or penalties, temporary security, labor, shipping, travel time or standby time that are incurred for inspection or replacement of any nonconforming items. As a condition of warranty coverage, warranty claims must be submitted in accordance with the procedures described on the HySecurity form, “RMA Procedures.”

THE REMEDY SELECTED BY HYSECURITY IN ACCORDANCE WITH THIS PARAGRAPH SHALL BE THE EXCLUSIVE AND SOLE REMEDY OF BUYER FOR ANY BREACH OF WARRANTY.

4. Exclusion of Consequential and Incidental Damages.

HYSECURITY AND NICE SHALL NOT BE LIABLE FOR ANY INCIDENTAL, SPECIAL, OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM NONDELIVERY OR FROM THE USE, MISUSE, OR INABILITY TO USE THE PRODUCT OR FROM DEFECTS IN THE PRODUCT OR FROM HYSECURITY’S OR NICE’S OWN NEGLIGENCE. This exclusion applies regardless of whether such damages are sought for breach of warranty, breach of contract, negligence, or strict liability. This exclusion does not apply to claims for bodily injury or death.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you.

5. Severability.

If any provision of this warranty is found to be invalid or unenforceable, then the remainder shall have full force and effect.

6. Proprietary Rights.

HySecurity and Nice retain and reserve all right, title, and interest in the intellectual property rights of their products, including any accompanying proprietary software. No ownership of any intellectual property rights in the products or accompanying software is transferred to Distributor, Dealer/Installer, or End User.

7. Applicable Law.

This warranty will be interpreted, construed, and enforced in all respects in accordance with the laws of the State of Washington, without reference to its choice of law principles. The U.N. Convention on Contracts for the International Sale of Goods will not apply to this warranty.