Programming and Operations Manual

WedgeSmart DC™

Surface mount parking wedge with electromechanical barrier arm operator
with Smart DC Controller

HySecurity®

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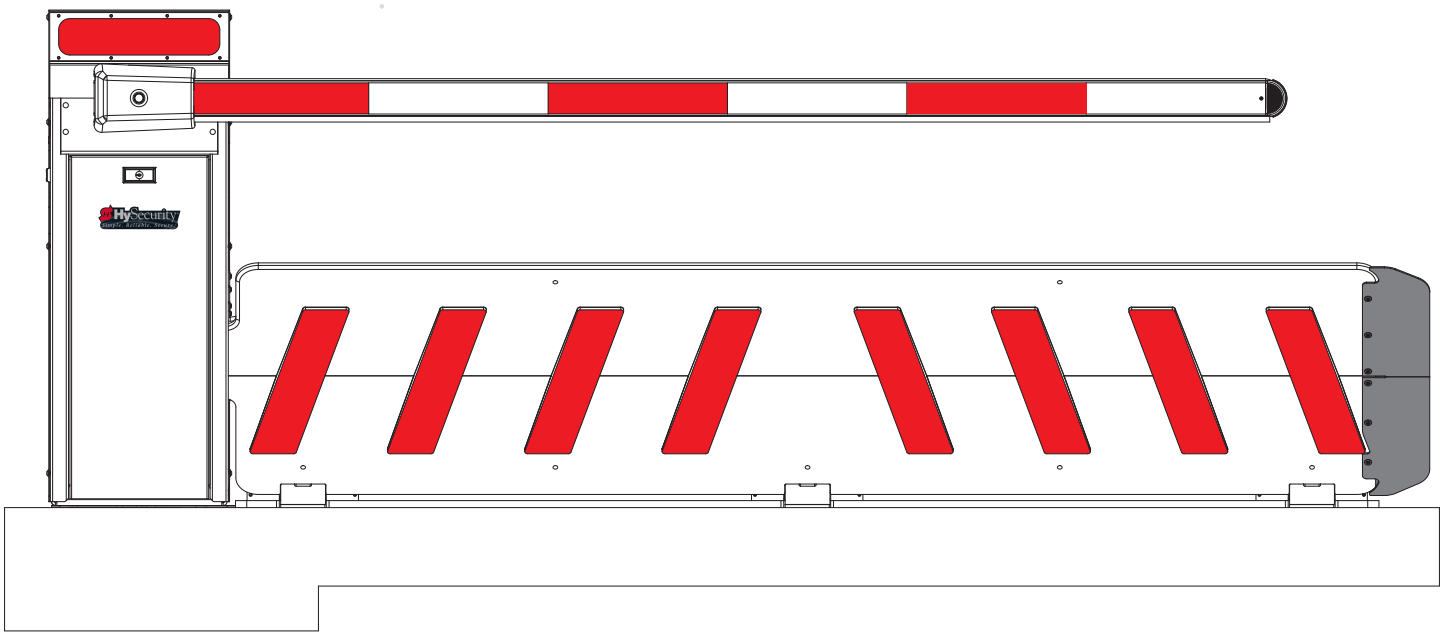
Industrial | Commercial | Crash | Parking | Residential

WedgeSmart DC™



Programming & Operations Manual
with
HySecurity Smart DC Controller
Revison C

This document provides *Important Safety Information, specifications, and references* along with an overview of programming user and installer menu options, designing vehicle loop layouts, troubleshooting, and maintaining the gate operator.

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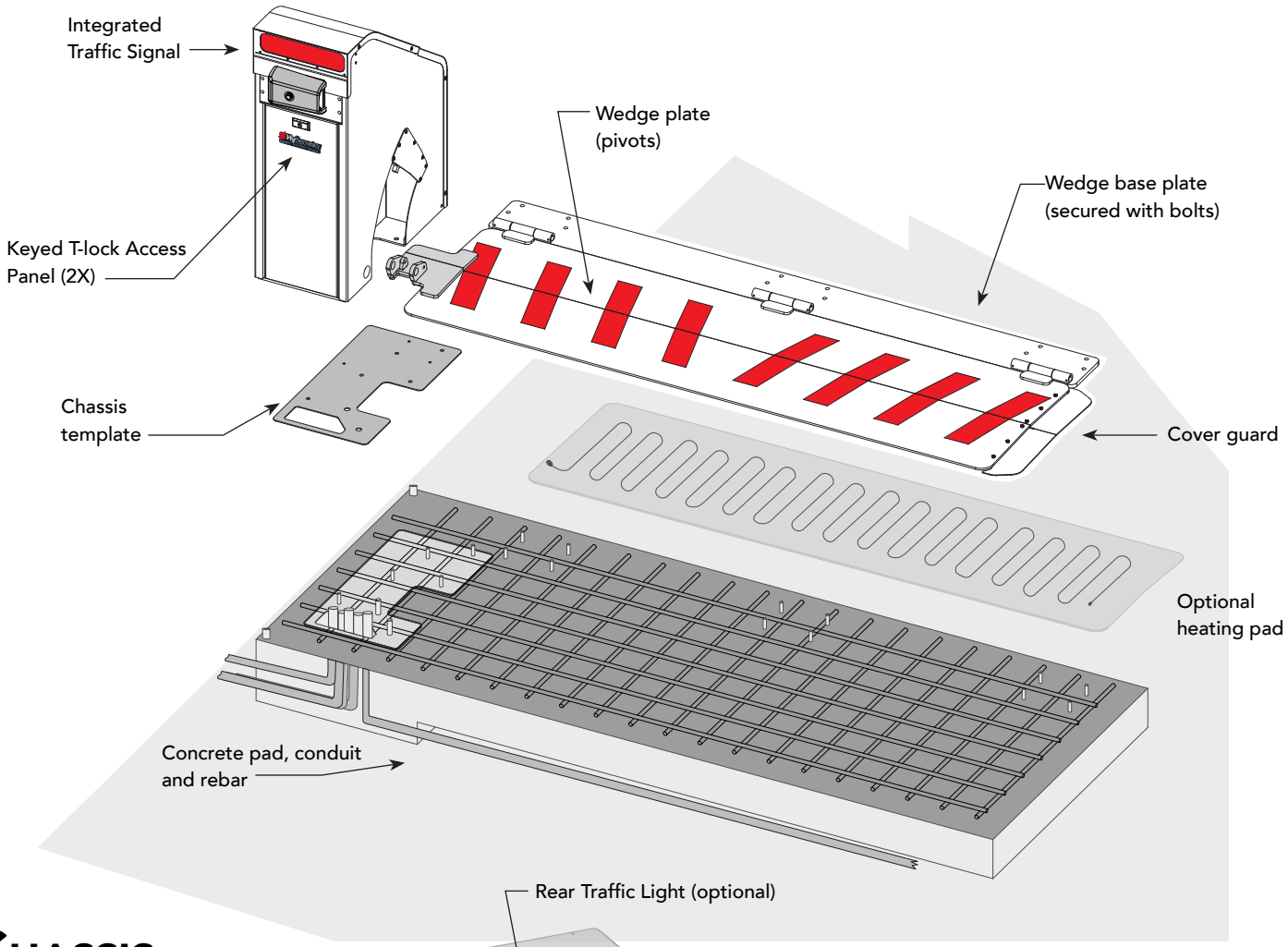
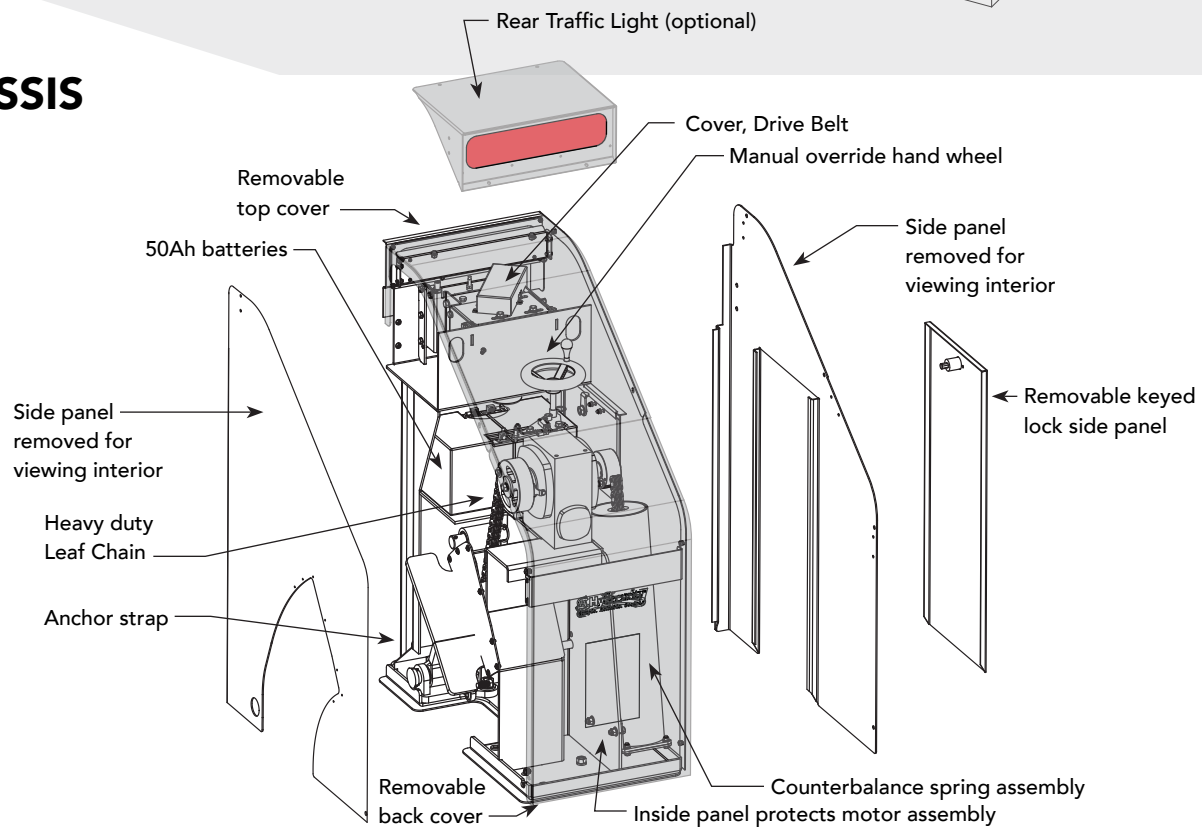
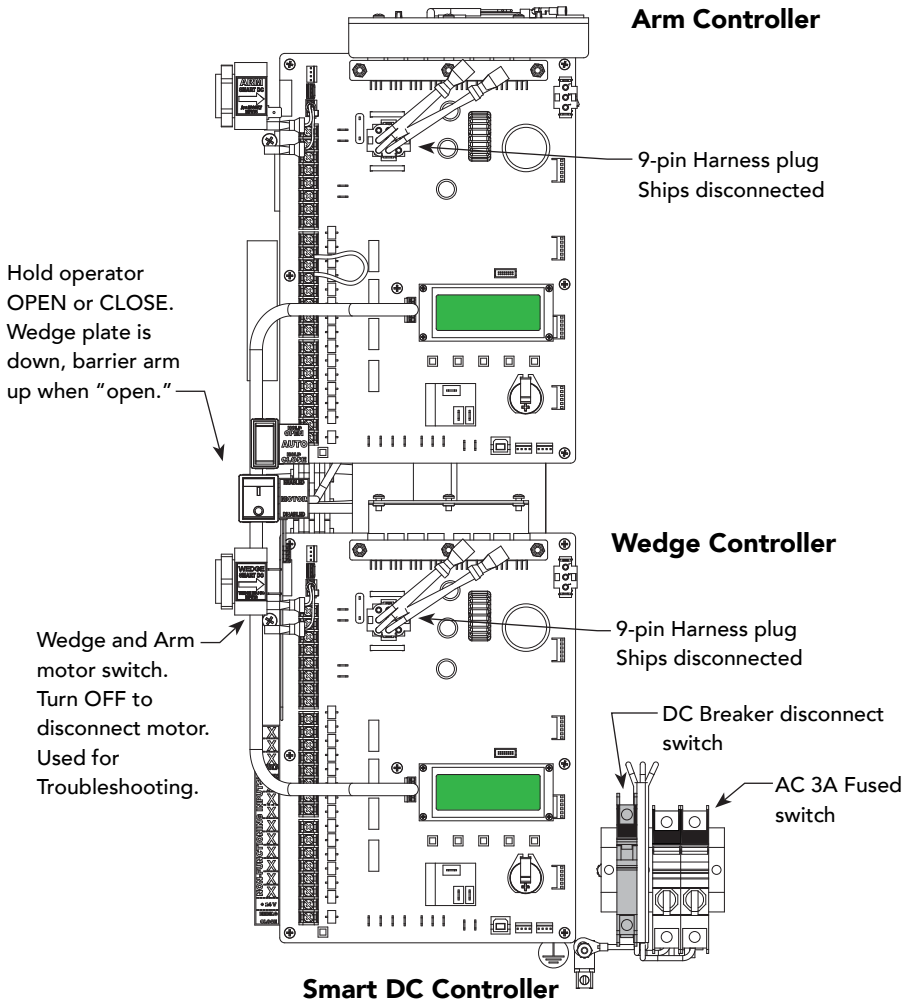
WedgeSmart DC: Left Handing



Chassis

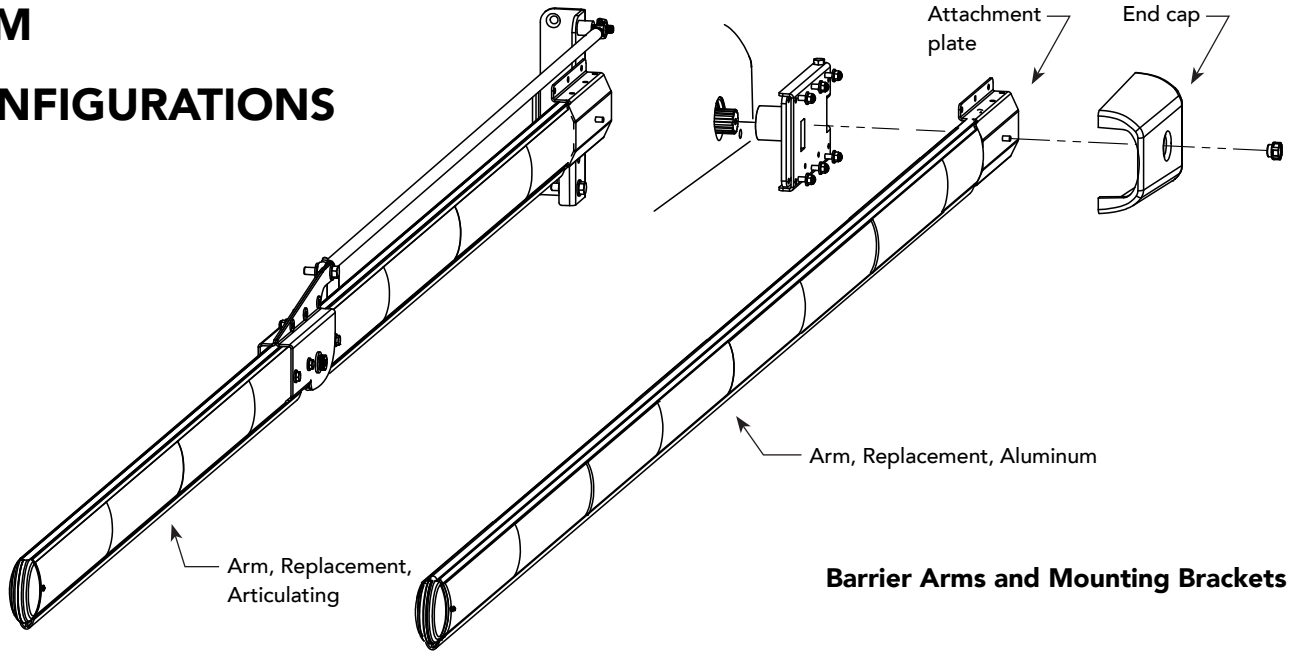


WedgeSmart DC Components: Control Box



Smart DC Controller

Arm Configurations



Barrier Arms and Mounting Brackets

WedgeSmart Loop Layout: Example

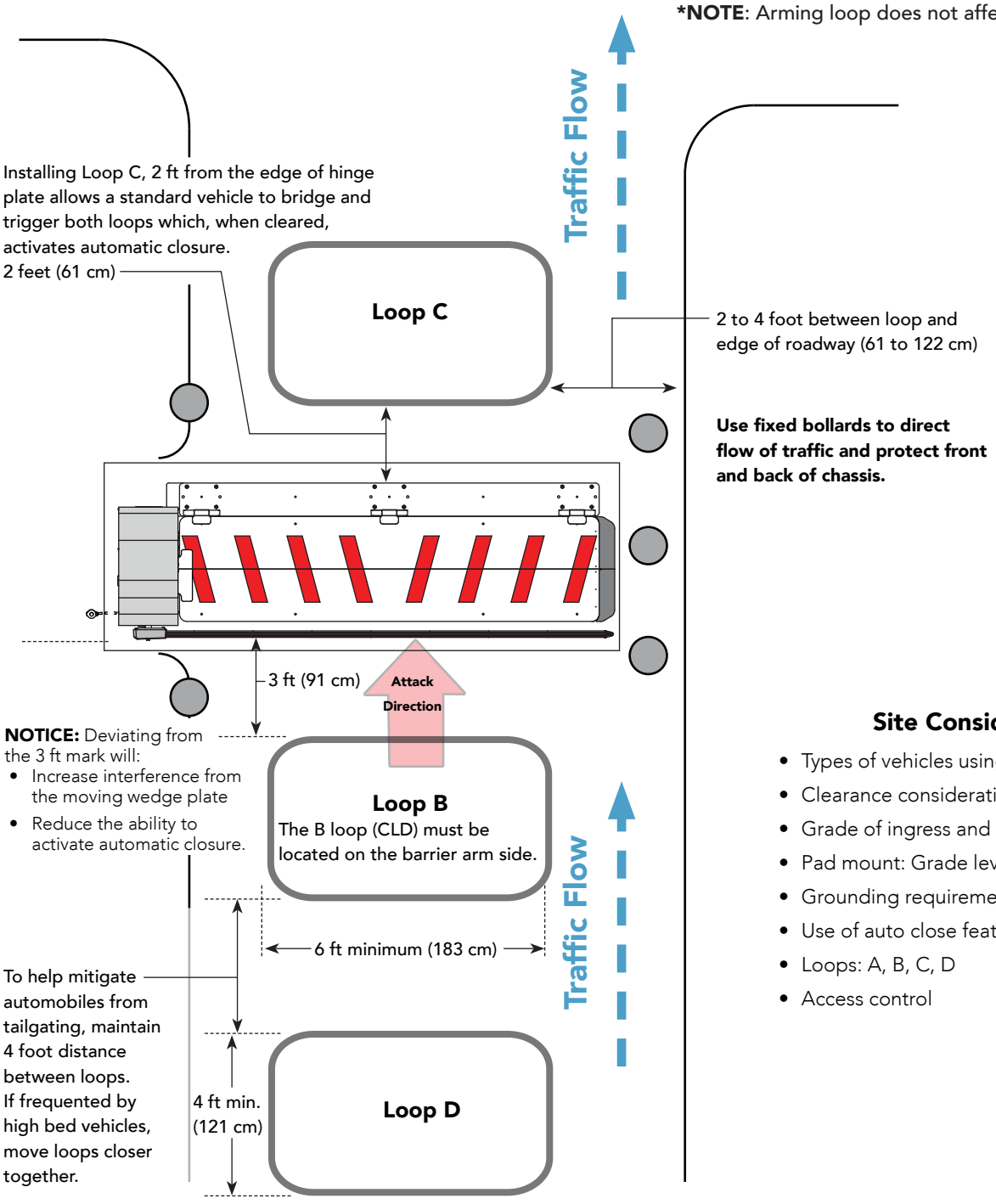
Loop applications for threat protection and theft prevention appear in the *Installation Instructions*. The following depicts **Theft Prevention** similar to what might be used at a Car Park.

Traffic Flow:
Secure ---> Public

To configure loops, refer to chart on this page and to "Loop Design" on page 67.

Loop ID	HY-5A Connection	SDC Input Connection	Installer Menu Items
A*	OUTSIDE (Arming) OBSTRUCTION	OUT OBS LOOP	OALD, OOLD, OR
B	CENTER LOOP	CENTER	CLD, CR, CP
C	INSIDE (Arming) OBSTRUCTION	IN OBS LOOP	IALD, OALD, IR
D	EXIT LOOP (optional)	EXIT LOOP	ELD, DT, EB, CB

***NOTE**: Arming loop does not affect operation.



Site Considerations

- Types of vehicles using the facility
- Clearance considerations
- Grade of ingress and egress
- Pad mount: Grade level or Recessed
- Grounding requirements
- Use of auto close feature
- Loops: A, B, C, D
- Access control

WedgeSmart DC Installer Checklist

The following list provides a high level overview of the tasks involved in installing the WedgeSmart DC gate operator. Take a moment to review the list and check off the items as you complete the install.

- ❑ Site Prep - concrete pad location/dimensions, rebar mat, Earth ground, and loop layouts.
- ❑ Use template for conduit placement and proper positioning of the chassis and wedge plate.
- ❑ Make sure gate installation complies with ASTM F2200 Standard Specification for Automated Vehicular Gate Construction. And, install the supplied WARNING signs on both sides of the barrier arm and on its chassis. Signs must be viewable by incoming and outgoing vehicular traffic.
- ❑ Check for compliance with local codes, site conditions, UL 508A and NEC standards.
- ❑ Read *Installation Instructions*.
- ❑ When concrete is sufficiently hardened, move wedge plate to clear opening. Align wedge plate with plastic chassis template.
- ❑ Drill mounting holes. Allow 12 hours to cure wedge plate anchor bolts epoxy.
- ❑ Attach anchor strap.
- ❑ Attach wedge plate chain.
- ❑ Install Barrier Arm.
- ❑ Make sure AC and DC power disconnect switches are in the OFF position.
- ❑ Connect arm lights to the wedge Smart DC Controller.
- ❑ Connect 9-pin harness plugs (one each in arm and wedge Smart DC Controllers).
- ❑ Connect AC Power.
- ❑ Turn AC and DC power disconnect switches ON.
- ❑ Set gate operator's home target (Learn Limits). Confirms target through both the Arm and the Wedge Smart DC Controller. Connect all accessory devices and loops.
- ❑ Check the Smart DC Controller software version to be sure it is up-to-date. If necessary, upload the latest version from www.hysecurity.com. See "Smart Touch Analyze and Retrieve Tool (S.T.A.R.T.)" on page 61.
- ❑ Access the User Menu to set the Arm lights to flash constantly or only when opening or closing. AL User Menu item.
- ❑ Set the Close Timer, if necessary. CT User Menu item.
- ❑ Set the Dynamic Reversing sensitivity (DR), if needed (through Installer Menu).
- ❑ Connect all accessory devices and loops.
- ❑ Configure changes through the Installer Menu depending on the accessory devices that you have installed.
- ❑ Give a copy of the *Important Safety Information* and pertinent operator instructions to the end user. Show the end user how to:
  - Remove the barrier arm from the arm bracket.
  - Turn the power OFF and ON to demonstrate learn limits after DC/AC cycles.
  - Adjust physical limit stops for barrier arm open and close positioning.
  - Turn the DC power switch off, which disengages the motor, and manually lift the barrier arm open.
  - Show user how to manually lift or lower the wedge plate using the hand crank.
- ❑ Take photographs of the completed installation site and save it in your business files.

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Welcome to HySecurity

Thank you for purchasing our premium WedgeSmart DC™ barrier gate operator. At HySecurity Gate, Inc., we pride ourselves on quality.

All operator designs are tested for hundreds of thousands of cycles before being released to the market. Traffic barrier, slide, swing, fortified crash barrier gate and vertical lift operators have all received rigorous testing and certification. Security, low maintenance, flexible configuration, and overall toughness are the foremost criteria for all HySecurity products.

Our commitment to quality and innovation will become evident as the features and performance of the expertly engineered and manufactured WedgeSmart DC become familiar to you. Thank you again for the confidence you've shown in becoming part of the HySecurity family and in choosing a premium industry-leading product.

HySecurity Gate, Inc. Headquarters in Kent, WA

Contact Information

Qualified HySecurity distributors are experienced and trained to assist in resolving any problems. For the name of a qualified distributor near you, call HySecurity at 800-321-9947.

Before contacting your distributor or HySecurity Technical Support, obtain the serial number of your operator.

For information about HySecurity training for installers, maintenance personnel, and end users, refer to the company website at www.hysecurity.com.

Notices and Bulletins

Installers should visit HySecurity's online Technical Support page at www.hysecurity.com or contact HySecurity prior to installing product to make sure they have received the most up-to-date information.

Supplemental Documents

The product literature is comprehensive and contains information needed to plan, install, operate and maintain your gate operator. Additional general information concerning HySecurity gate operators can be obtained from the following:

- HySecurity web site www.hysecurity.com - Contains links to the product catalog, product order form, operator manuals, operator software downloads, technical support bulletins and other useful information.
- S.T.A.R.T. - Smart Touch Analyze and Retrieve Tool - User's Guide (D0049) detailing the extensive software, diagnostic and troubleshooting capabilities of the Smart DC Controller board.
- Technical Bulletins (as applicable).

NOTE: Technical Bulletins are automatically issued to registered users of HySecurity products. The product warranty registration card can be filled out online at www.hysecurity.com.

Hazardous Materials and Proper Disposal

Be aware of the international, federal, and local codes in your area and how best to handle hazardous waste materials.

The pump pack fluid, found in all hydraulic HySecurity operators, can be recycled. Gear oil, found in HySecurity electromechanical gate operators, can also be recycled. If the fluids are mixed or contaminated with any solvents or other chemicals, they become hazardous waste. Hazardous waste requirements for storage and disposal must be followed.

CAUTION

If the gate operator has a battery backup system, the batteries contain materials that are considered hazardous to the environment. Proper disposal of the battery is required by federal law. In the U.S.A., refer to federal EPA guidelines for proper hazardous waste disposal.

IMPORTANT SAFETY INFORMATION

Hazards, associated with hardened vehicle barriers, 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 the HySecurity product documentation.

It is important that only qualified installers handle the installation of HySecurity equipment and gate operator. A "qualified" installer has one of the following:

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

HySecurity vehicular barriers are marked to UL508A for electrical safety. More importantly for high security installations, HySecurity barriers are either engineered to meet and/or tested to ASTM F2656.

WARNING

A vehicular barrier, by its very nature, can potentially damage vehicles or equipment and injure people. Vehicle barriers prevent unauthorized vehicular traffic from passing through a particular site. If inadvertent contact with a hardened vehicular barrier transpires, the possibility of damage to property, and injury, or even death, to persons may occur. It is therefore incumbent on the site designer, installer, and property owner to ensure that these hazards are mitigated and the public is warned of the existence of a potential hazard. Read all the product safety information prior to installation. Verify the gate operator is installed to comply with all safety standards and local and federal regulations.

1. READ AND FOLLOW ALL INSTRUCTIONS. Read the gate operator's product manual and review all the product labels and literature prior to installing, operating, or maintaining the automatic gate operator.
2. Install the barrier only in accordance with the instructional materials supplied with it.
3. Never use vehicular barriers for pedestrian traffic. Allow for pedestrian traffic separate from vehicular traffic. NO ONE SHOULD CROSS THE PATH OF A MOVING BARRIER.
4. Never let children operate or play with barrier controls. Keep all remote controls, especially radio transmitters, away from children. Do not allow children to play on or around the barrier.
5. Employ traffic calming features to limit speed, such as 90 degree turns just prior to the access point, chicanes set up with bollards or jersey barriers, or other means of slowing vehicular traffic.
6. Provide clear indication that there is an active vehicular barrier in use and that there are consequences of inadvertently or purposely running into it.
7. Keep the barrier properly maintained per the maintenance instructions provided with the equipment.
8. For detecting vehicles in the active zone and preventing closing on a vehicle in transit, it is highly recommended to install vehicle detectors in accordance with the product documentation. KEEP GATES PROPERLY MAINTAINED. Read the product manuals. Have a qualified service person make repairs to gate hardware and replace batteries in accessory or entrapment sensory devices on a regular basis.
9. In the case where Emergency Fast Operation (EFO) is enabled, it is highly recommended that a covered switch be used, or some other means of mitigating the risk of accidental actuation (dual action switch, dual palm switches, etc.).
10. Ensure the vehicular barrier is properly grounded and the incoming power matches the voltage label.

SAVE THESE INSTRUCTIONS

Safety - Installer Responsibilities

NOTICE: In the following safety information, the term "gate" refers to the hardware that the automatic gate operator is moving: gate, barrier arm, bollard or wedge.

- Verify the gate operator usage class for the site. For all gate operators other than Crash-rated, refer to Identifying Gate Operator Category and Usage Class in the product manual. Install the operator only when the gate operator class is correct for the site, size, and type of gate.
- Install the supplied WARNING signs so they are clearly visible from both the secure and public sides.
- Make sure all exposed pinch points are guarded.
- Reduce the risk of entrapment throughout the entire travel path by making sure the gate is installed in a location which ensures the required clearance between the gate and adjacent structures when opening or closing.
- Install external entrapment protection sensors so pedestrians are protected from entrapment in both directions of gate travel and all hazard areas are fully protected. Note that no IES exists in the StrongArm operator or Crash products. A dynamic reversing sensor exists on WedgeSmart DC.
- Never disable the Warn Before Operate buzzer. This buzzer provides an alert that the gate is about to move.
- Mount access control devices beyond reach of the gate operator. The control devices that operate the gate must:
  - Be located in a clear line of sight to the gate. Locate controls (Open, Close, Stop/Reset) where a user will have a clear view of the gate.
  - Be mounted beyond 6 feet (183 cm) of the gate, to prevent users from touching or accessing the gate while operating the controls. People attempting to access the controls by reaching through or around the gate can be seriously injured or killed by the moving gate.
  - Incorporate a security feature to prevent unauthorized use.
  - Connect radio and other remote access (non-resetting controls) to the RADIO OPTIONS terminal of the Arm Controller only.
- Open and close the gate to confirm that it was properly installed and to ensure reduced risk of entrapment. Verify the clearance between the gate and adjacent structures to avoid entrapment Have a qualified technician test the gate monthly.
- When you complete the installation, demonstrate the safety features and operation of the gate operator to the end user:
  - Clearly explain and demonstrate the consequences of removing or defeating any of the safety features.
  - Remove the operator cover(s), and then turn the power on and off.
  - Show how to use the manual override hand wheel.
  - Use the Emergency Stop Button. (If an emergency stop button is not available, show the user where the Stop button is located on the gate operator.)
  - Take photographs of the completed installation site and save it in your business files.

NOTICE: Gate operator instructions must be given to the owner.

SAVE THESE INSTRUCTIONS

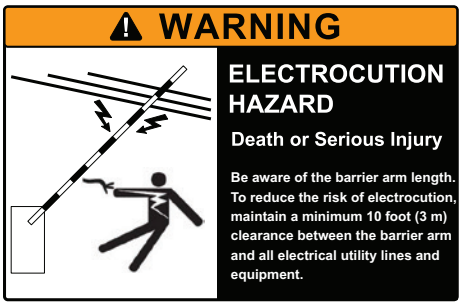
Safety - Owner/User Responsibilities

As the owner/user, you are responsible for the correct and safe installation, operation and maintenance of the WedgeSmart DC barrier gate operator. It is of the utmost importance that you read and follow the specific instructions and precautions found in the *Important Safety Information* addressed in this manual. In addition, you must adhere to the safety standards of applicable federal, state, and local safety regulations, industry standards, and/or procedures.

NOTICE

For installations outside the United States, make sure that you follow the applicable international, regional, and local safety standards.

- READ AND FOLLOW IMPORTANT SAFETY INFORMATION.
- Learn how to turn the power on and off. Learn how to manually operate the barrier arm.
- WARNING signs supplied with the barrier gate operator must remain installed and clearly visible on both secure and public sides of the barrier gate.
- Do not physically disable the warning buzzer and NEVER disconnect or cut its wires. The buzzer provides compliance with the Manual on Uniform Traffic Control Devices (MUTCD) standards. Disabling the warning buzzer may increase the risk of death or serious injury.
- Be aware of the length of the barrier arm. Safeguard against any possible contact between the barrier arm and overhead power or utility cables and wires.
- Do not remove entrapment devices or any other safety features.



- Have a professional gate installer routinely inspect the gate hardware and test overall gate operation and any entrapment protection sensors and.
- Have a qualified service person make repairs to gate hardware and equipment to keep the equipment running smoothly.

SAVE THESE INSTRUCTIONS

Manual Override

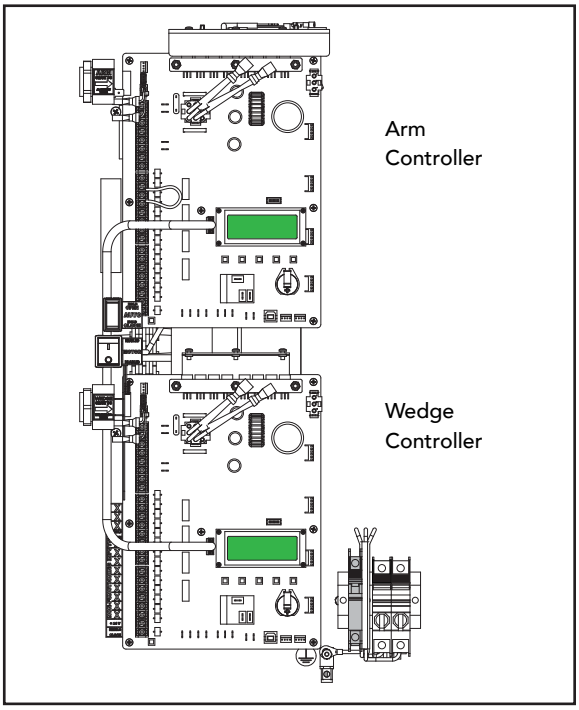
CAUTION

Before attempting a manual release, make sure that the barrier arm and wedge plate are not in motion.

Make sure and instruct all users how to move the wedge plate and barrier arm manually.

Barrier Arm

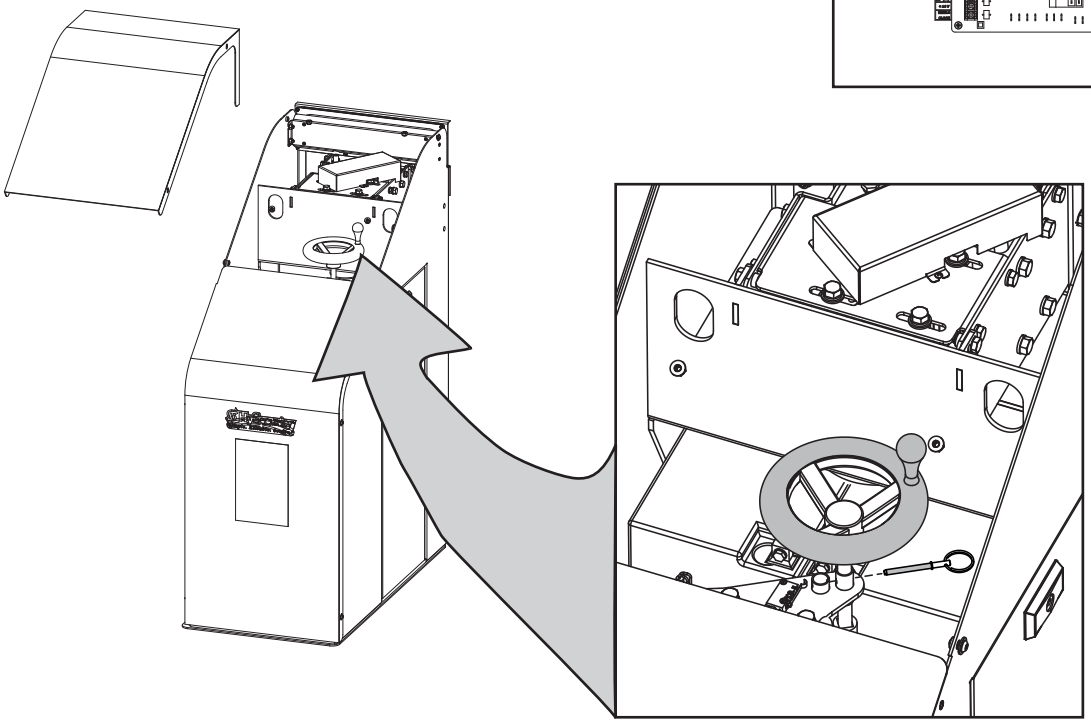
- When AC or DC power is available, use the Hold to Open toggle switch to raise the barrier arm.
- When AC & DC power is unavailable, place both AC and DC switches in the off position and lift the barrier arm to open it.



Wedge Plate

The wedge plate can be opened or closed using the hand wheel by taking the following steps:

1. Remove the locking pin. It trips the limit switch and forces a Stop command.
2. Turn the handle, to raise the plate.



Hand crank wheel in chassis

Dynamic Reversing Sensor

The WedgeSmart DC provides an integral feature to help prevent entrapment. While closing, if the dynamic reversing sensor is tripped twice within a specific period of time, it enters safe mode. The operator stops barrier arm or wedge plate travel. For more information, see *"Adjusting the Dynamic Reversing Sensor" on page 70.*

Safety Notices

The following four levels of safety notices are used where applicable within this manual; each notice contains information specific to the situation.

DANGER

Indicates death or serious injury will occur if the hazardous situation is not avoided.

WARNING

Indicates death or serious injury could occur if the hazardous situation is not avoided.

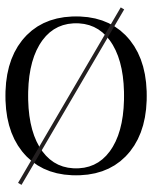
CAUTION

Indicates mild or moderate injury could occur if the hazardous situation is not avoided.

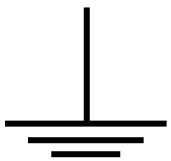
NOTICE: Indicates damage to equipment is probable if the hazardous situation in not avoided.

Common Industrial Symbols

The following international safety symbols may appear on the product or in its literature. The symbols are used to alert you to potential personal injury hazards. Obey all safety messages that follow these symbols to avoid possible injury or death.



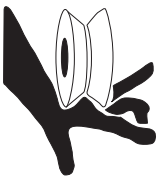
Electrical Phase Symbol



Ground Symbol

- Danger - Keep Away

Entrapment Zone



Possible Pinch Point

Attention - Take Note -

The following bullet points highlight how your automated gate system sites monitor external entrapment sensors using HySecurity gate operators:

- Normally Closed (NC) sensors – The operator will cycle power to the device at least once per cycle and verify the input changes from not-tripped to tripped, and back again.
- Build Year (BY) – An added menu item distinguishes between pre-2016 manufacturing dates and UL 325 - 2016 manufacturing dates. Build Year (BY) is a factory-setting. Build Year 2 (BY 2) is the default for all HySecurity gate operators indicating a manufacturing date of January 1st, 2016 to July 31, 2018 in the serial number. Replacement controller boards for existing sites allow for a Build Year setting of 1 (BY 1) (pre-2016). Build Year (BY 3) is the default for all HySecurity gate operators indicating a manufacturing date of after July 31, 2018 in the serial number.
- Independent Sensor Inputs – The edge, photo eye and photo eye COM inputs on the Smart Touch and Smart DC Controllers (STC and SDC) have been re-labeled. The same wiring connections become three independent methods for easy entrapment protection sensor configuration and normally closed outputs.

External Entrapment Protection Sensors monitored by HySecurity Gate Operators

Any external entrapment protection sensor may be monitored by HySecurity gate operators, provided the following requirements are met:

- Sensor is marked as certified to UL 325 Standard of Safety by a Nationally Recognized Test laboratory, such as UL or ETL.
- If the sensor only has a normally open (NO) output with a 8.2KΩ or 10KΩ resistor, such as an edge sensor, then a conversion device must be used to convert the NO resistor output to an NC output. Example of two different installation methods:
  * Method A - Wired

    Connect the edge sensor to a NC conversion module (GEM-104 or HY2NC) and connect the module to the operator controls according to the manufacturer's instructions.
  * Method B - Wireless

    Connect the edge sensor to a UL 325 certified wireless edge transmitter and connect a matching receiver to the operator controls according to the manufacturer's instructions.

A resource list is available from the drop down Gate Safety menu on the HySecurity website. The HySecurity recommended list shows examples of external entrapment protection sensors available for NC monitoring of automatic gate operators. All HySecurity gate operators manufactured after January 1, 2016 using software versions h4.50 or h5.50 (or later) comply with UL 325 Standard of Safety for monitoring entrapment protection sensors using normally closed contacts.

The site designer or installer must determine which external entrapment protection sensors will be installed with the gate operator to create a UL 325 compliant automatic gate operator site.Every UL325 compliant operator has provisions for connecting up to 3 different external entrapment sensors. If more than 3 potential entrapment zones exist, then a Miller Edge MIM-62 can be used for additional sensors.

The UL 325 Standard of Safety and ASTM F2200 define the MINIMUM gate site requirements. Gate site, gate hardware, gate usage and other conditions may dictate the use of additional entrapment protection sensors. It is up to the gate system designer and installer to assess appropriate gate safety design and install the components required to protect all potential entrapment zones. Always check your local area codes and comply with all standards and regulations.

CAUTION

Temperatures and environmental conditions affect proper operation of external entrapment protection sensors. Always check the manufacturer's specifications shipped with the sensors. Consult the manufacturer's instructions for correct wiring connections, hardware installation and proper operation.

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How to wire the operator is presented in the *Installation Instructions*, but detailed information about the earth and equipment ground, wiring to AC power, and DC power considerations are described in this section.

Installing the Earth Ground

An earth ground refers to the grounding rod and accompanying equipment ground which need to be installed to safeguard against potential electrical shock and damage to personnel and equipment.

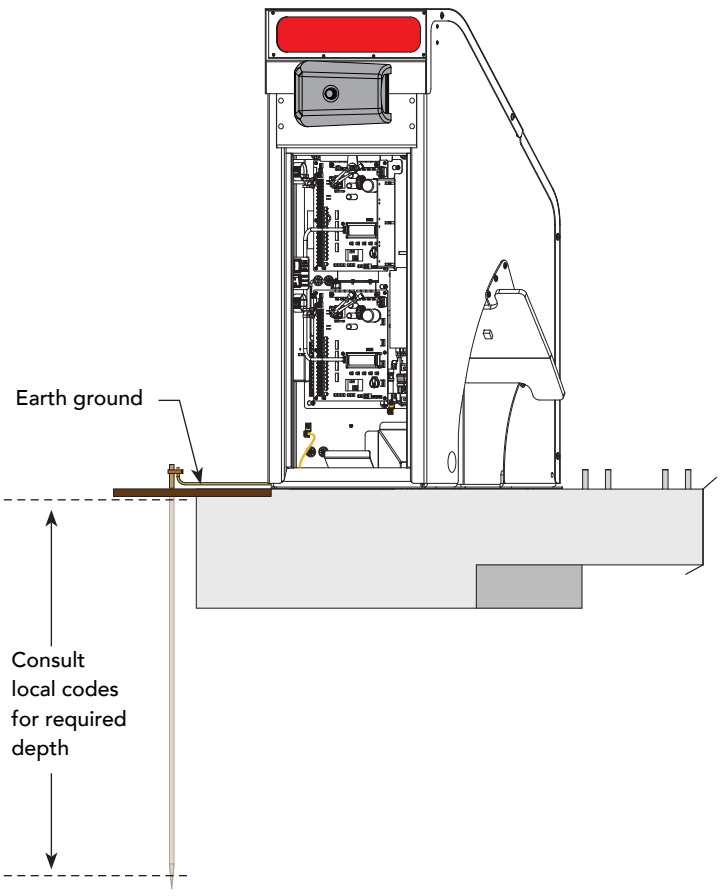
DANGER

The potential for lightning discharge exists with all gates, fences and gate operators. National Electric Code (NEC) - Article 250 requires a separate earth ground in addition to the required equipment ground.

HySecurity recommends grounding the operator with a separate earth ground rod (or a similar device) to shield the operator against electromagnetism and other electrical signals that may cause, erratic operation with, or damage to, the Smart DC Controller and other electrical parts.

For earth grounding requirements in the U.S.A., refer to the National Fire Protection Association (NFPA) 780 - Standard for the Installation of Lightning Protection Systems. Highlights of the standard include:

- The ground rod must be UL listed copper-clad steel, solid copper, hot-dipped galvanized steel, or stainless steel. Minimum requirements: ½ inch (13 mm) diameter and 8 feet (244 cm) in length.
- The ground rod is driven into the earth (refer to local codes for proper depth requirements).
- The ground rod is electrically bonded to the chassis with a single length of un-spliced 6AWG copper wire less than 3 feet (91cm) long. Due to the large concrete foundation on crash products, make the necessary adjustments to accommodate for earth ground requirements.
- Local jurisdictions may impose other requirements above the NEC, Article 250 and NFPA 780. Consult the local codes and regulations regarding requirements in your area.



NOTICE: Properly grounding the gate operator is critical to gate operator performance and the life of its electrical components. Use sufficient wire size during installation. If you do not ground the operator with a separate earth ground, you risk voiding the HySecurity Limited Warranty.

AC Power Wiring: Site Considerations

CAUTION

Both chassis and wedge plate must be plumb and level, and on grade with the roadway surface. Slope drainage ¼-inch per foot within 2 feet of the operator (2 cm per meter).

Verify AC power supply wires and low voltage (12V & 24V accessory power wires) run through two separate conduits. The higher voltage from the AC power supply may cause interference and anomalies in WedgeSmart DC operation if the high and low voltage wires are routed through the same conduit.

- Maximum gate operator current draw is 3 Amps on a dedicated 115VAC circuit. Make sure a 20-amp circuit (minimum) protected with a 20-amp Inverse Time Breaker is provided.
- Maximum gate operator current draw is 1.5 Amps on a dedicated 208/230VAC circuit. Make sure a 20-amp circuit (minimum) protected with a 20-amp Inverse Time Breaker is provided.
- Make sure proper wiring is being used.
- All electrical wiring is properly routed via conduits.
- Check the distance of the wiring run from the main panel to the gate operator. Refer to Wiring Charts below.
- Verify that the operator is electrically grounded per NFPA 780 and NEC Article 250, and local codes.
- The available power source matches the electrical requirements specified on the voltage nameplate.

CAUTION

Each gate operator is built to run on a specific line power voltage and phase. Failure to ensure the source voltage, phase and frequency match what is specified may result is severe damage to the equipment.

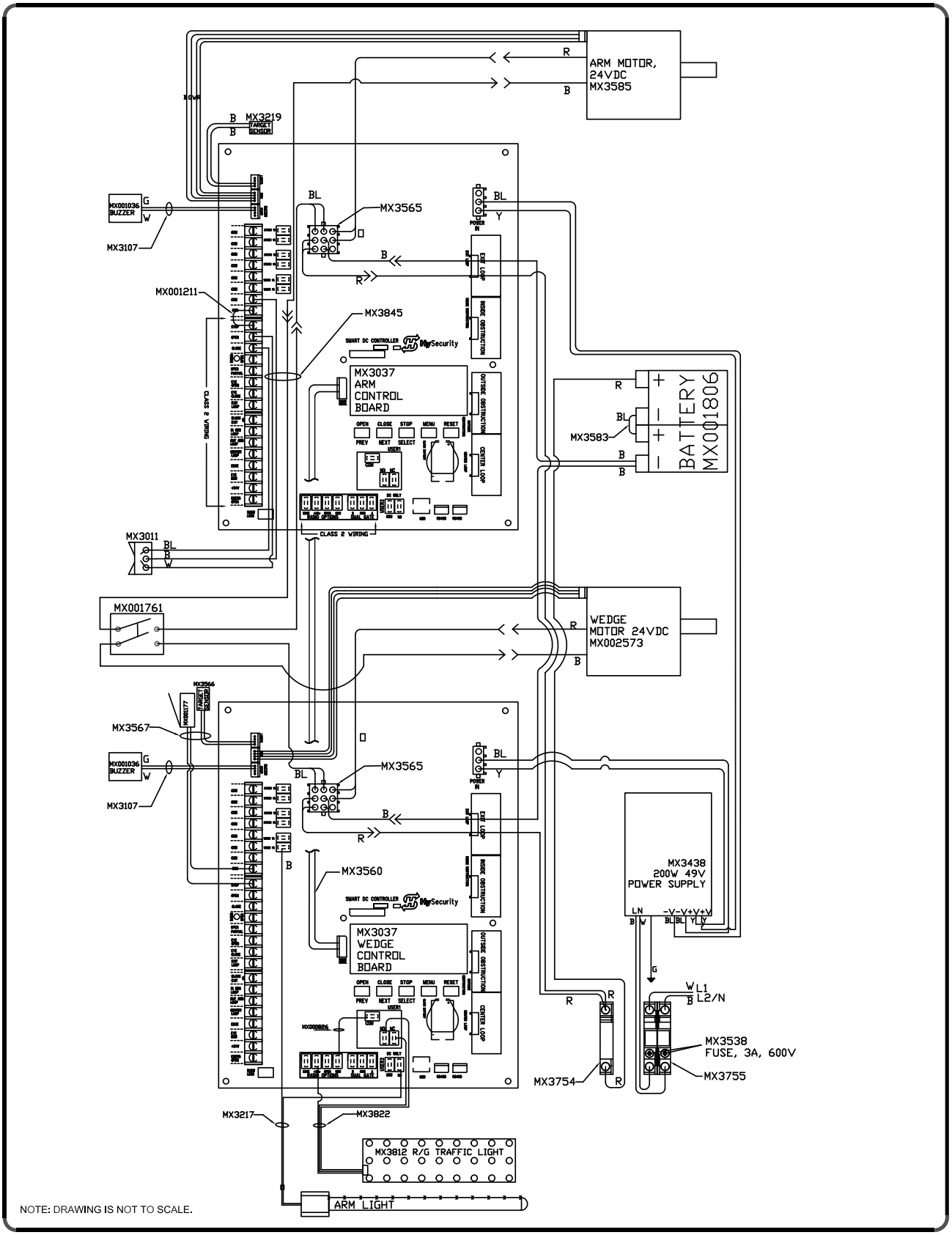
The following table shows the maximum allowable wire run from the power source to the operator for various wire sizes.

WedgeSmart DC 115VAC: Wire Gauge versus Run			
AC Power	**14 Gauge Wire**	**12 Gauge Wire**	**10 Gauge Wire**
One operator 115V	730 ft (223 m)	1200 ft (366 m)	1900 ft (579 m)
Two operators 115V	460 ft (140 m)	750 ft (228 m)	1160 ft (354 m)

NOTE: Table 115VAC assumes a dedicated circuit with an accessory power load up to 2A.
Additional loads require that the wire size be increased or the distance of the run be decreased.

WedgeSmart DC 208/230VAC: Wire Gauge versus Run			
AC Power	**14 Gauge Wire**	**12 Gauge Wire**	**10 Gauge Wire**
One operator 208/230V	2095 ft (639 m)	3350 ft (1021 m)	5300 ft (1615 m)
Two operators 208/230V	1465 ft (446 m)	2350 ft (716 m)	3750 ft (1143 m)

Wiring Diagram: WedgeSmart DC



HySecurity Kent, Washington	DOCUMENT TITLE: SCHEMATIC, ELECTRICAL WEDGESMART DC	DRAWN JEF / DATE 9/18/15	DOCUMENT NUMBER: D0636	REV A	
		CHECKED BK / DATE 9/1/15			
		APPROVED JEF / DATE 9/18/15	THIRD ANGLE PROJECTION	SHT 1 OF 1	

Wiring AC Power

The WedgeSmart DC has separate *Installation Instructions* that explain how to connect to AC power. For reference purposes, the same information is provided below.

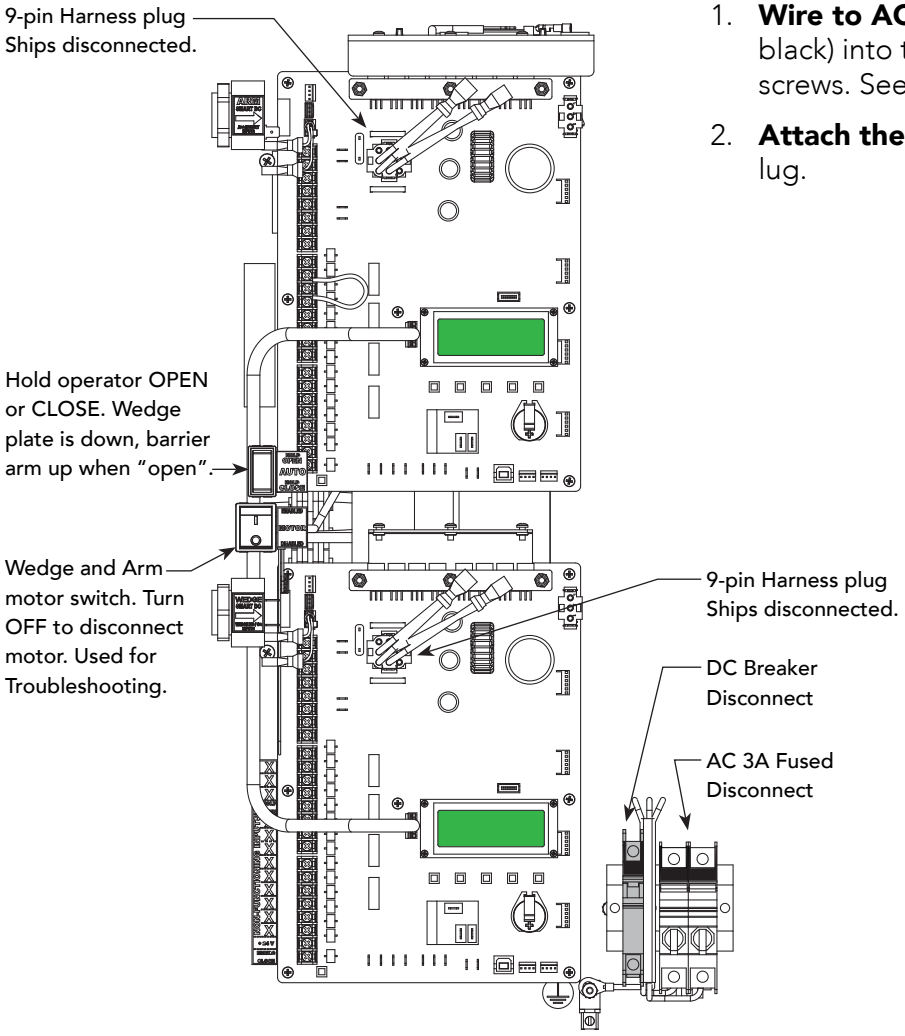
Size the primary wires. Consider the voltage and length of the wire run from the main power panel. See "AC Power Wiring: Site Considerations" on page 23.

DANGER

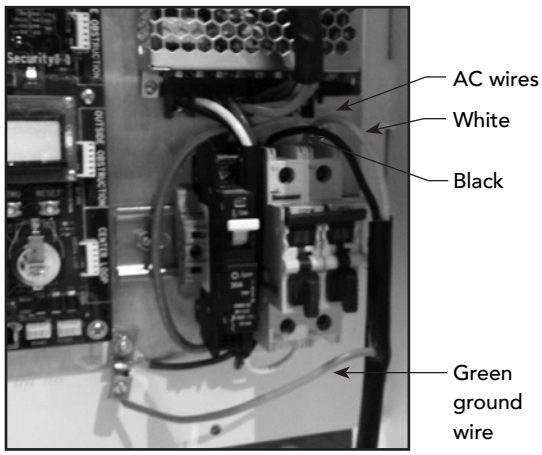
Turn OFF AC power at the source (circuit breaker panel) before accessing the wires in the WedgeSmart DC. Follow facility Lock Out/Tag Out procedures. Make sure all power disconnect switches are in the OFF position. Follow all electrical code standards and regulations.

CAUTION

Wiring of gate operators must conform to NFPA and NEC standards and comply with all local codes. When the installation is compliant and complete, turn on AC power at the source and power module.



1. **Wire to AC Power:** Place incoming power (white and black) into their appropriate slots and re-tighten the screws. See photo.
2. **Attach the green ground wire** to the chassis' ground lug.



CAUTION

To avoid arcing and damage to the Controllers, be sure to connect the 9-pin harness plugs to both Controllers before turning ON AC power.

Connecting DC Wire Harnesses on Both Controllers

To connect the DC batteries:

1. With the motor switch toggled to "Disabled" and AC and DC disconnect switches in the OFF position, connect the 9 pin harness plugs at the center of each Controller.
2. Turn ON the DC switch and toggle the motor switch to "Enabled."

The Arm's Smart DC display notifies the installer that the operator needs to learn its limits (find its home target).

CAUTION

Stay clear of the barrier arm! Be aware the barrier arm will move when power is initially supplied.

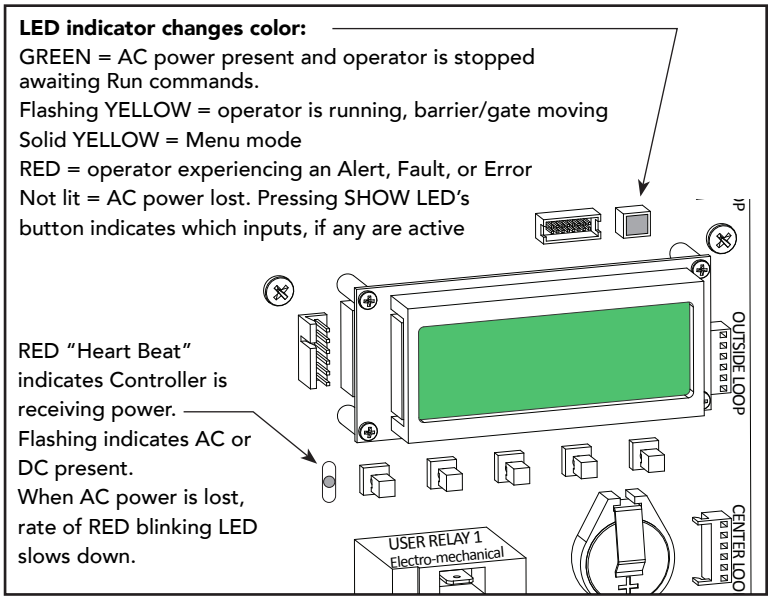
Turning the Power Disconnect Switches ON:

NOTE: The equipment can be powered when either the AC or DC switch is turned on. However, since WedgeSmart DC is "DC-powered", it accesses power through its batteries. If the DC power switch is off, the operator will not function (even though the AC power switch is on). When connected to AC power (or solar panels) and both AC and DC power switches are turned on, power is being supplied to the operator and the charge level of the battery is being monitored and maintained.

When the wiring is complete per local codes and NEC standards, turn the AC 3A fused disconnect switch ON.

With both DC and AC power disconnect switches turned ON:

- A green status LED appears on the Smart DC Controller and indicates that the processor is receiving power. The multi-colored status LED corresponds to the action that the operator is performing. See illustration.
- The flashing red indicator light next to the OPEN button on the Smart DC Controller is considered the heart beat of the system. It indicates that the Controller is receiving power. When AC power is lost, the rate of flashing slows down.
- The Arm controller prompt indicates that it needs to "learn its limits." When OPEN is pressed, the arm cycles and establishes its open and close limits. No physical limit switches for the barrier arm exist. After the limits are established, the Wedge Controller display indicates what the installer needs to do to set the targets for the wedge plate.



NOTE: Home targets (Learn Limits) remain intact even if AC power is lost and the batteries are fully drained. The only exception occurs when factory defaults are reinstated, or the Smart DC Controller is replaced. For more information about Learn Limits and Menu modes, refer to "Resetting Open and Close Limits" on page 42.

Important Considerations for DC-Powered Operators

- Control of the load is important since the gate operator may need to run on backup batteries. Gates that move easily and do not bind will drain less energy from the battery, preserving capacity for more cycles during a power failure.
- Be certain to observe polarity when connecting the batteries or adding accessories. Reversed polarity may result in a non-functional operator or damage to a component. Red (+) is positive and black (-) is negative. If shorted, the batteries will generate a very high current. The batteries are connected in series: Join the positive (+) terminal from one battery to the negative (-) terminal of the next battery.
- Variations in temperature affect battery performance. An example of amp hour (Ah) performance is shown in the chart below. To provide residual heat inside the enclosure, HySecurity mounts a heater beneath the electrical shelf and turns on when temperatures dip below 28°F (-2°C), +/- 5°.

Example of Battery Performance: Ah	
Temperature	**Capacity**
77°F (25°C)	100
32°F (0°C)	80
-22°F (-30°C)	50

- Batteries have a finite life and age more quickly when exposed to temperatures above 80°F (27°C). Battery temperatures above 104°F (40°C) are damaging and significantly shorten battery life. A fan automatically turns on when internal cabinet temperature exceeds 110°F (43°C), +/- 5°.
- As the batteries age, they will progressively lose their capacity to store energy. If the total amount of back up capacity is critical, plan to replace the batteries after two years of use, especially in hot climates. Properly discard used batteries. See "Hazardous Materials and Proper Disposal" on page 14.
- Batteries contain sulfuric acid. Acid in your eyes, on your skin, or on your clothing can cause injury and severe burns. If batteries are dropped or damaged dispose of them properly.
- HySecurity uses permanently sealed AGM-type batteries which last much longer than wet cell batteries and need no maintenance over their life span. Batteries are protected from over discharge by the smart system charger.
- The gate operator software stores all User and Installer Menu settings in non-volatile memory (EEPROM). Configurations are saved if a power loss occurs and reinstated once power is restored.

Display & Menu Options

Highly sophisticated software provides three different modes of operation: *run*, *program*, and *fault*. How to navigate using the Smart DC Controller (SDC) keypad, interpret status display codes and program the operator is found in this section.

Initial Setup

Once you have completed the installation, attached accessories and turned power ON, you're ready to program the operator. Two different approaches exist:

- Connect a laptop computer to the serial (RS-232 or USB) port, check for the most current software version and then set the operator menu configurations via the S.T.A.R.T. software. See "Smart Touch Analyze and Retrieve Tool (S.T.A.R.T.)" on page 61.

NOTE: Use a laptop computer at your place of business to conveniently download the free S.T.A.R.T. software and most current software version from www.hysecurity.com before heading out into the field. This makes it easy to adjust settings using a laptop.

- Manually navigate through the User and Installer Menus using the SDC keypad. The instructions for performing this second option are provided in this section.

Understanding the Display and Keypad

The SDC display and keypad provide access to the operator's sophisticated software and functionality.

Three different operational modes exist:

- Run Mode - gate is operational, awaiting commands.
- Menu Mode - motor disengages and operator commands are ignored. Data entry, menu navigation, and menu selection can be accomplished via the keypad or through a S.T.A.R.T. software connection using the RS-232 or USB port.
- Fault Mode - alerts, faults, or errors appear on the display. Some errors or faults can be reset with the Reset button while more serious faults require additional troubleshooting. Faults indicate a need for diagnosis and resolution. Refer to "Troubleshooting".

Display in Run Mode: Stop, Open, or Close

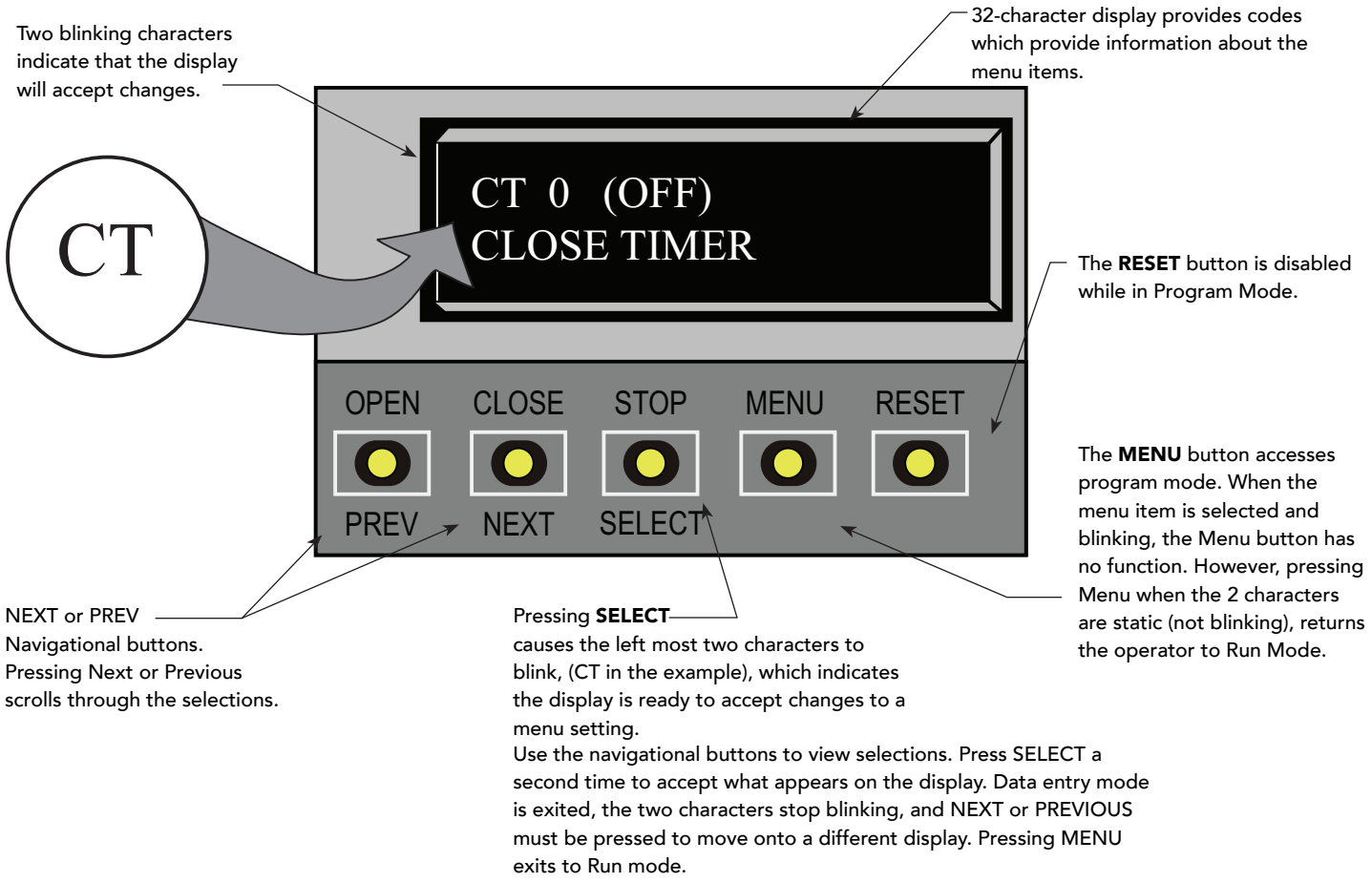
The keypad lets you navigate, change, or clear the information in the display menus. The singular use of these keys is dependent on the operator mode.

The buttons with text above and below have two functions. Use these buttons to enter operating commands or navigate through the User and Installer Menus.

Menu Mode

In Menu Mode, the motor disengages and operator commands are ignored. Data entry, menu navigation, and menu selection can be accomplished using the buttons on the Smart DC Controller keypad.

NOTE: Menu Mode automatically returns to Run Mode if no activity (i.e. key presses) occurs for two minutes.



NOTE: More extensive descriptions, setting options, and wiring connections are found in the User Menu and Installer Menu sections.

Menu Mode Navigation

Navigating within the program menus is easy once you learn how the keypad buttons function. Refer to the following chart.

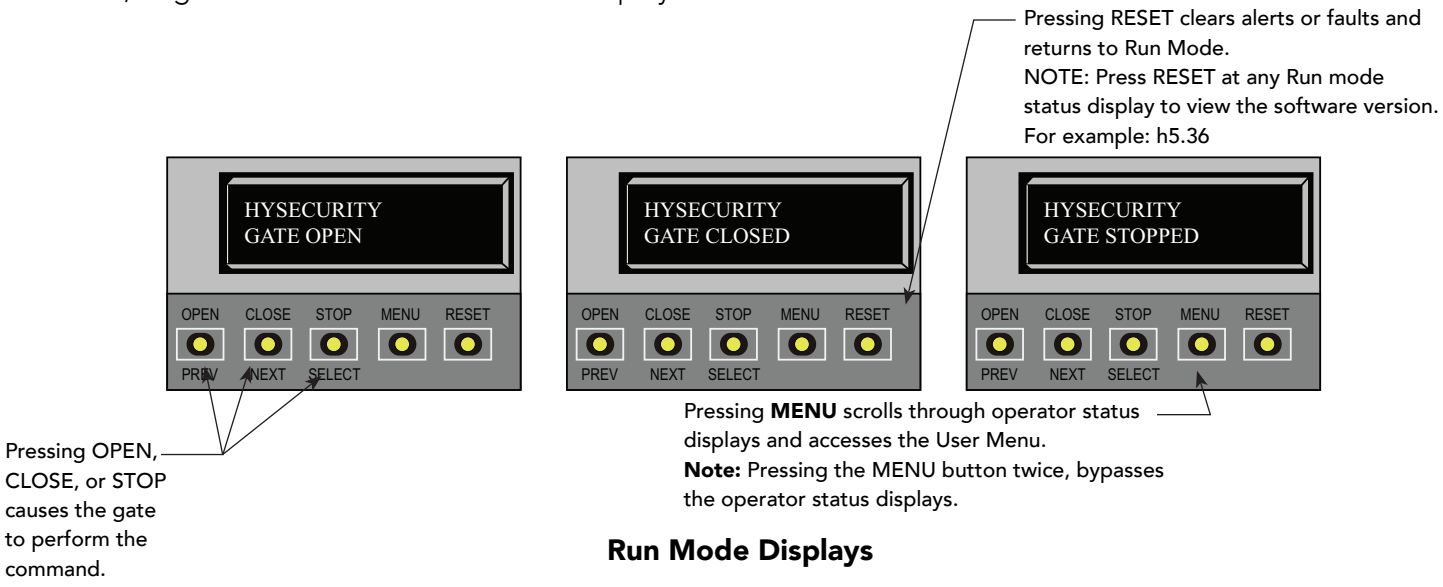
Smart DC Controller: Menu Mode Navigation Buttons

To change that data appearing in the display	To navigate through the Selections	To choose what appears on the display	To navigate between menu items
Press SELECT. Two left characters blink.	Press NEXT or PREVIOUS. Continue pressing NEXT to view all selections.	Press SELECT. Blinking characters become static.	Press NEXT or PREVIOUS. Advance - press NEXT Previous - press PREVIOUS

Run Mode

The Run Mode displays appear static when the operator is ready and waiting for a run command. When the display is flashing "GATE OPENING" or "GATE CLOSING", a command has been received and the barrier or wedge are in motion. The command may come from a variety of sources: a card reader, push-button remote, or recognition of a vehicle passing over a loop detector. In all cases, the operator "runs" the motor when it receives an operational command.

Three displays indicate the position or status of the operator. The keypad entry used to access the User or Installer menus, begins at one of these Run Mode displays.



Run Mode Displays

NOTE: To access the User or Installer menus, the motor cannot be engaged and the barrier arm or wedge cannot be moving.

Viewing Operator Status Displays

Press the MENU button once and the operator status displays scroll past in two second intervals. Pertinent information appears to provide a quick overview of the operator's status or configurations.

The type of information that may scroll across the display includes: software version, operator type (OT), gate handing (LEFT HANDING), buss voltage, and life cycle counter.

Example of Operator Status Displays

Smart DC Controller Communication

Two Smart DC Controllers exist in the WedgeSmart DC and are connected via the RS-232 communications port

User Menu

The User Menu consists of several items which can be modified using the Smart DC Controller keypad.

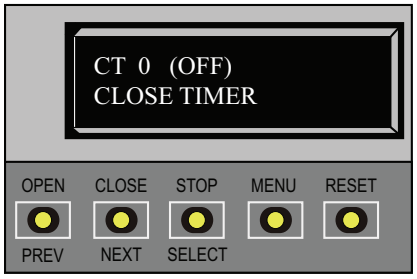
Access:

Pressing the MENU button, at one of the static Run Mode displays, causes the operator status displays to scroll past, stop and display the first user menu item.

When the Close Timer (or Hold to Close "HC") display appears, it means you have accessed the User Menu. The Close Timer display is the first in a cyclical series of User Menu displays.

> **NOTE:** To access the User Menu, the operator must be in Run Mode. To bypass the operator status displays, press the Menu button a second time.

Use the navigational buttons, Select, Next, and Previous to change or view the menu functions. Table 1 describes the User Menu items and supplies the factory defaults. (Factory default settings shown in bold.)



User Menu: Table 1.

User Menu	Setting Options	Appears on Controller	Menu Tasks & Explanations	SDC Wire Connections
CT 0 (OFF) CLOSE TIMER	**0 = Timer disabled (OFF)** 1 second to 99 seconds	ARM and WEDGE	Assign how many seconds before open gate initiates automatic closure. Keep setting at 0 if a hardwired, push-button control device is being used. **NOTE**: CLOSE TIMER display does not appear when HOLD TO CLOSE is set to 1.	Loop connections required HY-5B preferred
HC 0 (OFF) HOLD TO CLOSE *	**0 = OFF** 1 = ON	ARM (Primary)	Set to 0 produces a gate closure when a momentary signal is transmitted. Set to 1 if a constant hold to close signal, such as a push button control, is being used. A setting of 1 also deactivates automatic close timer and causes its menu to disappear. You must set HC to 1 to comply with UL 325 Type D protection. **NOTE:** A change to the Arm setting will affect the wedge performance in the same manner.	COM Close

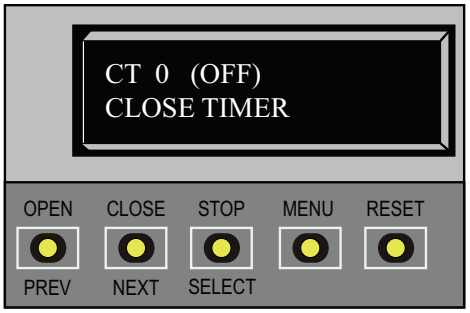
***** Menu item does not appear in the display associated with the wedge plate.

User Menu	Setting Options	Appears on Controller	Menu Tasks & Explanations	SDC Wire Connections
HO 0 (OFF) HOLD TO OPEN *	**0 = OFF** 1 = ON	ARM (Primary)	Similar to HOLD TO CLOSE, but configures OPEN push button for a constant-hold unction. 0 = Momentary open signal 1 = Constant hold open push button required. You must set HO to 1 to comply with UL 325 Type D protection. **NOTE:** A change to the Arm setting will affect the wedge performance in the same manner.	COM Open
AP 0 AC LOSS UPS FAIL OPEN *	**0 = UPS FAIL OPEN** 1 = UPS FAIL CLOSE 2 = AUTO OPEN 3 = NO CLOSE TIMER	ARM (Primary)	Setting designates what action gate performs during an AC power loss.	COM
RO 0 (OFF) RADIO OPEN/CLOSE	**0 = off** 1 = on	ARM (Primary)	Configures radio input for open only (0). If changed to setting 1 then adds capability for radio input to close gate, but only when gate is fully open.	COM RADIO Open
BF 0 (OFF) WARN BEFORE OPER	0 = off **1 = warning buzzer on throughout Gate travel** 2 = warning buzzer on for 2 seconds of Gate travel **3 = warning buzzer on during gate travel**	ARM and WEDGE	Controls the warn-before-operate buzzer and can be configured three ways: Set to 0: Buzzer is disabled. The buzzer will still beep if alerts, faults, errors, or entrapment occur. Set to 1: Buzzer beeps for 3 seconds before gate moves and continues through entire length of travel. Set to 2: Buzzer beeps for 3s before gate moves and continues for 2s of travel. Set to 3: Buzzer beeps when gate starts to move and continues throughout gate travel.	Not applicable (N/A) Do NOT cut wires to buzzer or unplug it as operator will not be in compliance with UL 325. Failure to comply may result in serious injury or death.
PE 0 (OFF) PHOTO EYE ALIGN *	**0 = off** 1 = on	ARM (Primary)	When set to 1, operator serves as an aide in photo-eye emitter/receiver alignment. Buzzer chirps once when emitter and receiver are not aligned. When emitter and receiver are aligned, buzzer chirps twice. If they go out of alignment again, buzzer will chirp once. Alignment Mode is reset with a limit input or reset input.	EYE Open EYE Close EYE COM
CL 0 SET CLOCK	**0 = off** 1 = on	ARM and WEDGE	To set or adjust minute, hour, day, month or year, select 1. Once clock is set, display automatically returns to 0 setting. Significant gate events are logged and stamped with time and date. This feature is useful to read historical operation data, which can be accessed with a computer via USB or RS232 port or the LG setting in User Menu.	N/A
LD 5 LCD CONTRAST	**5** 0 through 9	ARM and WEDGE	Under some extreme high or low temperature conditions, it may be necessary to adjust LCD contrast. Display is adjustable from 0-9 with a factory default setting of 5.	N/A

***** Menu item does not appear in the display associated with the wedge plate.

User Menu	Setting Options	Appears on Controller	Menu Tasks & Explanations	SDC Wire Connections
US 0 CLEAR COUNT *	**0 = off** 1 = Clear Transient count 2 = Clear Tenant count 3 = Clear Special count 4 = Unknown User 5 = All User	ARM (Primary)	Clears the logs (counts) of "user types" entering or exiting through the WedgeSmart DC gate. This menu is used most often in Parking lot and revenue control scenarios. Selecting a number and pressing SELECT again, clears the count.	COM TRANSIENT USER TENANT USER SPECIAL USER
AL 0 ARM LIGHTS *	**0 = Steady-ON** 1 = Flashing	ARM (Primary)	With the default setting of 0, the arm lights are continuously lit when the arm is closed. One row flashes while opening or closing, but the lights remain lit and do not blink when the arm is in closed position. A setting of 1 causes one row of the arm lights to blink constantly while opening or closing and remain blinking when closed.	
DS 0 (OFF) DIAGNOSTIC LOGS	**0 = off** 1 = detailed	ARM and WEDGE	Set this item to 1 to record all gate operator open and close events, in addition to normal alert, fault and error logs. This parameterautomatically resets to the default 0 (off) after 24 hours, which is useful when experiencing intermittent problems. Set to 0, DC Controller logs pertinent gate operator events such as faults, errors, or menu manipulation.	USB or RS-232 cable and laptop computer loaded with HySecurity free S.T.A.R.T. software is required to read the log file.
PD 0 SET PASSWORD	**0 = Off** 1 = On, Set Password	ARM and WEDGE	To enter a password (up to 80 characters) for network connectivity, select 1. You can use the menu navigation buttons to enter the password (SELECT, NEXT, SELECT). When the password is set, the display returns to the 0 setting. **NOTE:** The System Address (SA) value in the Installer Menu must be set to 1 before the Set Password display will appear in the User Menu.	Network: Ethernet or RS-485

Installer Menu



The Installer Menu options provide more advanced configurations for the gate operators. Access to the Installer Menu is through the User Menu. The navigational buttons are the same in both menu modes.

Access:

While a static Run Mode code is being displayed, press the MENU button twice. (Bypasses the operator status displays.)

When the Close Timer display appears:

1. Access the Installer Menu by simultaneously pressing and holding the RESET and OPEN buttons.
2. Release both buttons and the Learn Limit display appears. The LL display is the first item in the Installer Menu.

NOTE: Installer Menu options can also be configured through the use of a laptop computer and the S.T.A.R.T. software.

Table 2 describes the Installer Menu items and supplies the factory defaults. (Factory settings shown in bold.)

Installer Menu: Table 2.

Installer Menu	Setting Options	Appears on Controller	Menu Tasks & Explanations	SDC Wire Connections
OT 0 SET OPERATOR TYPE	**0 = operator type** 12 = SwingSmart DC 20 & DCS 20 Solar 13 = WedgeSmart DC 10 & DC14 DCS 10 Solar & DCS 14 Solar 14 = WedgeSmart DC & DCS 15 = SlideSmart DC 15 & DCS 15 Solar 16 = SlideSmart DC 10F & DCS 10F Solar	ARM and WEDGE	Select the appropriate number for the operator. **NOTE**: This menu item only appears if the Smart DC Controller is being replaced. **CAUTION: If you are replacing a Smart DC be sure to transfer the operator's menu settings from the existing board to the replacement board. Refer to the installation instructions supplied with the replacement board.**	Not applicable (N/A)
MN 0 MODEL NUMBER	0 = model type unknown 1 = Arm 2 = Wedge	ARM and WEDGE	Indicate which Smart DC Controller is associated with which gate operator used at the site. Both Smart DC controllers are located in the chassis. The upper board, and its control box, is associated with the Arm. The lower control box houses the Smart DC board that controls the wedge. **NOTE**: This menu item only appears if you need to set the OT (operator type).	N/A

Installer Menu	Setting Options	Appears on Controller	Menu Tasks & Explanations	SDC Wire Connections
LL 0 (OFF) LEARN LIMIT RESET	**0 = Normal setting** 1 = Erases learned limit positions	ARM and WEDGE	A setting of 1 places operator into its learn limits mode which allows you to reset gate's open and close positions.	N/A
UC 0 USAGE CLASS	**0 = gate disabled** 1 = Family dwelling (1 to 4 units) 2 = Multi-family & commercial 3 = Light industrial* 4 = Industrial/guarded secure* *Not serving the general public	N/A	**NOTE:** The usage class setting does not appear on WedgeSmart DC display. It is set at the factory.	N/A
SH 0 SET HANDING	**0 = gate disabled** R = viewed from the secure side, the arm lifts right to open L = viewed from the secure side, the arm lifts left to open	ARM (Primary)	The handing determines which way the barrier arm opens as you view it from the secure side. **NOTE:** WedgeSmart DC is factory configured for left handing. SH does not appear in the display associated with the wedge plate.	N/A
OS 1 OPEN SPEED	**1 = 2.5 seconds** 2 = 2.0 seconds 3 = 1.5 seconds	ARM (Primary)	Adjust how quickly the barrier arm and wedge plate opens. **NOTE:** OS does not appear in the display associated with the wedge plate.	
CS 1 CLOSE SPEED	**1 = 2.5 seconds** 2 = 2.0 seconds 3 = 1.5 seconds	ARM (Primary)	Adjust how quickly the barrier arm and wedge arm closes. **NOTE:** CS does not appear in the display associated with the wedge plate.	
FD 0 (OFF) FACTORY DEFAULTS	**0 = user settings** 1 = reload factory settings	ARM and WEDGE	Globally restores all menu settings back to new operator status. Select setting 1 to return operator to factory defaults. **NOTICE:** If factory defaults are restored, any customized menu settings will need to be reprogrammed. Before loading factory defaults, you can save your customized menu settings using a PC laptop & S.T.A.R.T.	N/A
DG 0 (OFF) DUAL GATE	**0 = solo operator** 1 = Secondary unit 2 = Primary unit 3 = Sally Port A* 4 = Sally Port B* *NOTE: Items not available on Wedge controller.	ARM (Primary)	Configures gate operator as a Primary or as a Secondary in a dual-gate installation. When you assign one unit as Primary, you must configure other as Secondarythrough Installer Menu. This menu is also used to configure a Sally Port system by setting one operator to Sally Port A and the other to Sally Port B. ***NOTE:** Requires wired connection between two Arm (MN 1) Smart DC Controller boards. This menu item appears if the sequenced gate menu item SG is set at 0 (off). It does not appear in the display associated with the wedge plate.	Dual Gate COM (Gate 1) to Dual Gate COM (Gate 2)* A to A B to B

***** Menu item does not appear in the display associated with the wedge plate.

Installer Menu	Setting Options	Appears on Controller	Menu Tasks & Explanations	SDC Wire Connections
SG 0 (OFF) SEQUENCED GATE *	**0 = off** 1 = Loop Layout/Site #1 2 = Loop Layout/Site #2 3 = Loop Layout/Site #3 4 = Loop Layout/Site #4	ARM (Primary)	Establishes communication after wiring two or more gate operators as sequential gates. This SG menu item only appears if the Dual Gate menu item (DG) is set to 0 (solo operator). For Loop configuration, see Loop Layout on page X. ***NOTE:** Access the User Menu in both Arm operator controllers and set a Close Timer.	Connect Dual Gate COM (Traffic Gate) to Dual Gate COM (Security Gate)* A to A B to B
CH 0 (AC) CHARGER TYPE *	**0 = AC powered charger** 1 = Solar powered charger	ARM (Primary)	Assigns charger type usually set at factory. If set to solar at factory then this menu item is hidden. **NOTE:** Menu item does not appear on an AC-powered operator.	
BT 0 (STANDARD) BATTERY TYPE *	0 = standard 8Ah* **1 = extended (50 Ah)** 2 = maximum (110 Ah)*	ARM (Primary)	Assign the battery type used by the operator. Smaller batteries are charged with less current to avoid overheating and larger batteries are charged with more current to supply a more rapid charge.	*Standard 8Ah and 110Ah batteries not used in WedgeSmart DC.
FO 0 (OFF) FIRE DEPT OPEN *	**0 = disabled** 1 = enabled	ARM (Primary)	Enables Fire Department Open input. When set to 1, signal received through this input overrides all photoelectric eyes and edge sensors and opens gate. Pressing RESET button (or the OPEN push button) is required before gate can be closed. **NOTE:** A change to the Arm setting will affect the wedge performance in the same manner. However, the inputs are disabled on the Smart DC board associated with the wedge plate.	+24V Fire Dept Open
OC 0 EMER CLOSE	**0 = Disabled** 1 = Enabled	WEDGE (Secondary)	The Emergency Open input on the Wedge Controller serves as the Emergency Close input. If the emergency close is triggered, both the arm and wedge will close simultaneously (barrier arm down, wedge plate up). All inputs (open, safety, and loop) are ignored.	+24V * EMERG OPEN * * Wedge Controller
SE 0 IES SENSITIVITY	**0 = Maximum (highest) sensitivity** 1 = Moderate sensitivity 2 = default settings 9 = Least sensitivity	WEDGE (Secondary)	Adjusts sensitivity of internal inherent entrapment sensor (IES). Available settings are 0 to 9 with 9 being least sensitive. HySecurity strongly recommends that you avoid setting IES sensitivity higher than 6.	See NOTE.
DR 0 (HIGH) REVERSING SENSOR*	**0 = Maximum (highest) sensitivity** 1 = Moderate sensitivity 2 = Least sensitivity	ARM (Primary)	Adjusts the sensitivity of the dynamic reversing sensor in the Arm only. Available settings are 0 to 2. Zero is the default and reacts quickly (high sensitivity) to impediments. **NOTE:** On the arm, adjust the spring to prevent false trips prior to changing the sensitivity.	See NOTE.

***** Menu item does not appear in the display associated with the wedge plate.

Installer Menu	Setting Options	Appears on Controller	Menu Tasks & Explanations	SDC Wire Connections
EC 0 STOP ONLY EYE CLOSE LOGIC *	**0 = Close eye stops only** 1 = 2s reverse to open 2 = Full Open	ARM (Primary)	Default setting is non-reversal if close photo eye is triggered while closing. A setting of 1 causes gate to reverse toward open for two seconds if triggered while closing. A setting of 2 reverses the gate to full open. **NOTE:** A change to the Arm setting will affect the wedge performance in the same manner.	EYE Close EYE COM (Inputs #14 or #15)
SR 0 (FULL OPEN) REVERSAL LOGIC *	0 = Reverses full open **1 = ½ second reversal (.5)**	ARM (Primary)	The default setting is a ½-second duration reversal if the dynamic reversing sensor is triggered. The optional setting of 0 will cause the gate to reopen fully if triggered while closing.	N/A
PC 1 NO CONTACT PHOTO EYE OUTPUT*	0 = Normal Open PE output **1 = Normal Closed (supervised)**	ARM (Primary)	The default setting is photo eyes with Normally Open outputs. Setting 1 requires a Normally Closed (NC) output which requires both a photo EYE OPEN and a photo EYE CLOSE are connected. If set for NC, the connection is supervised and any open or short circuit fault will generate a FAULT 2 which requires a STOP button reset to re-enable any functions triggered. **NOTE:** For WedgeSmart DC, adjust the spring to prevent false trips prior to changing the sensitivity.	EYE OPEN EYE CLOSE 4 wires total: COM/+24 COM/ PHOTO EYE CLOSE
GC 1 NO CONTACT GATE EDGE OUTPUT *	0 = Normally Open Edge **1 = Normally Closed**	ARM (Primary)	The default setting is edge sensor with Normally Open (NO) output. The optional setting of 1 requires an (NC) output. **NOTE:** For WedgeSmart DC, adjust the spring to prevent false trips prior to changing the sensitivity.	COM EDGE
S1 0 SENSOR #1 TYPE	0 - disabled **1 - (NOT USED)** 2 - (EYE CLOSE) 3 - (EDGE CLOSE 4 - (EYE OPEN) 5 - (EDGE OPEN) 6 - (EDGE BOTH) 7 - (EYE BOTH)	Arm Installer Menu Only	UL 325 - 2018 sensor input setting for external entrapment protection sensor monitoring. All three sensor types must be configured to a non-zero number before the gate operator will move the gate. Edge Both is only available in Swing Gate operator types. Eye Both is only available in Slide Gate operator types.	
S2 0 SENSOR #2 TYPE	Same as Sensor #1	Arm Installer Menu Only	Same as Sensor #1	
S3 0 SENSOR #3 TYPE	Same as Sensor #1	Arm Installer Menu Only	Same as Sensor #1	
DT 0 FREE EXIT DISABLE FUNCTION*	**0 = Disable Free Exit** 1 = Disable Close Timer	ARM (Primary)	Configures BLOCK EXIT input to disable either Free Exit Detector function or, alternately, Close Timer function. Default setting disables free exit detector. **NOTE:** For WedgeSmart DC, adjust the spring to prevent false trips prior to changing the sensitivity.	COM BLOCK EXIT

***** Menu item does not appear in the display associated with the wedge plate.

Installer Menu	Setting Options	Appears on Controller	Menu Tasks & Explanations	SDC Wire Connections
OR 1 REVERSE OUTSIDE OBS LOOP	**0 = Pause closing only** **1 = Enable reversing to open**	WEDGE (Secondary)	A setting of 0 causes gate to only pause when triggered. Gate closure continues as soon as loop is clear again. A setting of 1 is for full reversal when Outside Obstruction Loop is triggered while closing. **NOTE:** Refer to loop drawings in the Loop Layout section on page X.	OUTSIDE OBS LOOP (#11) COM or connection to HY-5B detector
IR 1 REVERSE INNER ARM LOOP	**0 = Pause closing only** **1 = Enable reversing to open** 2 = Ignore and continue closing	ARM and WEDGE	The default 0 causes the barrier arm to pause when triggered. Continued closure begins as soon as the loop is clear again. A setting of 1 is for full reversal when the loop is triggered. A setting of 2 allows the arm to close if the IALD is tripped. **NOTE:** Setting 2 is not available in the Smart DC installer menu associated with the wedge plate.	IN OBS LOOP (INNER ARMING) COM or connection to HY-5B detector
CR 0 REVERSE CENTER LOOP *	**0 = Reopen if center loop triggers** 1 = Pause only 2 = Continue closing (Arm only)	ARM (Primary)	The default allows the barrier arm to reopen if the Center Loop detector is triggered during closure of the barrier arm. A setting of 1 causes the barrier arm to only pause when triggered. Closure begins as soon as the loop is clear again. A 2 setting is available for the arm in WedgeSmart DC only. It causes the arm to continue closing after one vehicle has crossed the center loop and another attempts to follow. The operator detects that the second vehicle has not triggered the access control (open command) and, therefore, continues closing the arm. Setting 2 helps prevent tailgating.	Center Loop COM or connection to HY-5B detector
CB 0 (OFF) CLD DISABLE ELD *	**0 = Normal operation of Free Exit** 1 = Disable Free Exit	ARM (Primary)	Setting 1 allows an CLD input to disable the Free Exit Detector (ELD) until the barrier arm is fully closed. Used in bidirectional traffic situations.	Center Loop COM or connection to HY-5B detector
CP 0 (OFF) CLD COUNTS PBO *	**0 = Immediate closure** 1 = Provides addt'l open time	ARM (Primary)	The default allows the Center Loop Detector when triggered and released, to close the barrier arm immediately. The optional setting of 1 designates that the Smart DC Controller remember additional open commands. For example, if a vehicle on center loop, the software recognizes up to two additional open commands and will match that to the number of center loop crossings before closing the gate.	Center Loop COM or connection to HY-5A detector
EB 0 (OFF) ELD BACKOFF *	**0 = Normal operation of Free Exit** 1 = Back off close function	ARM (Primary)	The default allows normal latch open operation of the Free Exit detector. The optional setting of 1, creates an automatic close function if a vehicle triggers and then backs off the Free Exit Loop detector.	Free Exit Loop COM or connection to HY-5B detector

***** Menu item does not appear in the display associated with the wedge plate.

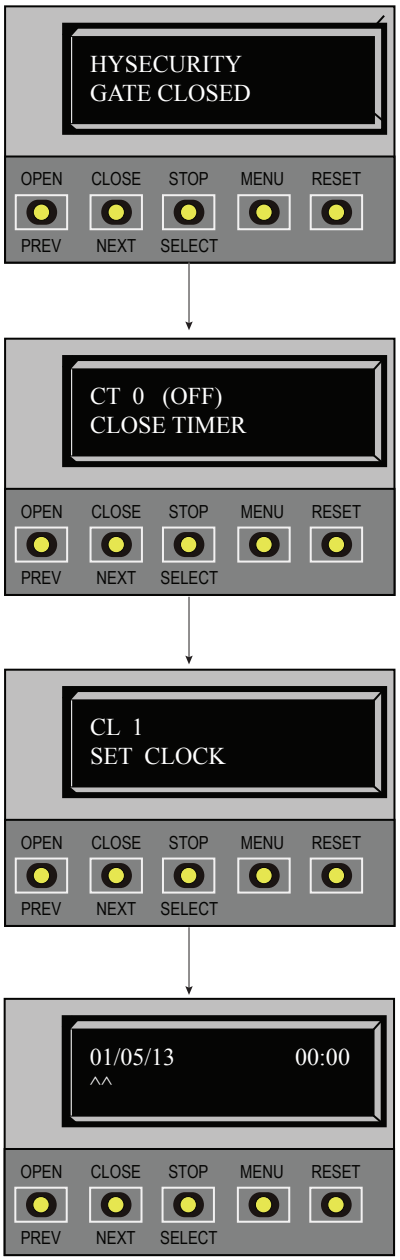
Installer Menu	Setting Options	Appears on Controller	Menu Tasks & Explanations	SDC Wire Connections
RL 1 0 DISABLED RELAY 1 LOGIC	**0 = Disabled** 1 to 45 available	ARM and WEDGE	Configures function of the user 1 output relay, which is an electromechanical relay. It has capacity to switch, both AC and DC and can be used for high voltage and/or high current loads. Connect devices directly to the top of relay: COM plus NO and NC contacts. Up to 45 optional relay functions exist.See *"User Relays - Programming Procedure" on page 50.*	COM User 1 Relay
RL 2 0 CLOSE LIMI RELAY 2 LOGIC	**0 = Disabled** 1 to 45 available	ARM and WEDGE	Configures function of user output relay, which is an electronic relay with capacity for switching a DC load only. The User 2 Relay is limited to 48 Volts DC and 4A maximum load. Up to 45 optional relay functions exist. **NOTE:** In the WedgeSmart DC, it is recommended to use the User 2 Relay for connection to the LED arm lighting.	COM User 2 Relay
RL 3 0 DISABLED thru RL 10 0 DISABLED RELAY LOGIC *	**0 = Disabled** 1 to 45 available	ARM and WEDGE	Similar to Relay 1 Logic. All menu configurations for user relay 3 through 10 must be set in the Arm's (MN 1) Smart DC Controller. **NOTE:** The Hy8Relay™ module option can be purchased for eight additional NO relay outputs. Relay #39 set aside for Factory Use.	COM User 3 through 10 Relay
TL 2 (45 SECS) OPEN TIME ALERT *	0 = 0s delay 1 = 15s **2 = 45 second delay** 3 = 75s 4 = 105s 5 = 135s	ARM and WEDGE	This menu item affects the #8 User Relay function. It adjusts the time delay before activation of the User Relay function.	User Relay
LT 3 (75 SECS) LOITERING ALERT *	0 = 0s delay 1 = 15s 2 = 45s **3 = 75 second delay** 4 = 105s 5 = 135s	ARM and WEDGE	This function monitors activation of Outside Obstruction Loop when the gate is closed and not running. When adjustable period of time is exceeded, User Relay No. 13 triggers and reports loitering in diagnostics log. Adjust time delay before activating user relay. Maximum time setting is 135 seconds. On WedgeSmart DC, a loitering alert triggers if the following is true: • CLD or IALD is active for the programmed period of time • The gate is closed • No open command occurs	User Relay
BA (OFF) BREAK-AWAY USED	**0 = OFF** 1 = ON	Wedge Board with h.5.58 software or later	Allows software to monitor the breakaway arm, and reports if the arm break away after imacts from cars hitting and knocking it off.	BY 1 = COM and Sensor 2 (PHOTO EYE OPEN) BY 2 = COM and Sensor 3 (PHOTO EYE CLOSURE)

***** Menu item does not appear in the display associated with the wedge plate.

Installer Menu	Setting Options	Appears on Controller	Menu Tasks & Explanations	SDC Wire Connections
SA 0 (OFF) SYSTEM ADDRESS	**0 = No network** 1 to 99 = Network "drop" address	ARM and WEDGE	Sets the system address for network communication: 0 = no network communication 1-99 sets individual poling addresses. See PD SET PASSWORD in "User Menu: Table 1." on page 31.	RS-485. Involves additional hard-ware & software.
ELD0 RUN MODE * EXIT LOOP SET	**0 = Run mode** 1 = Show frequency 2 = Show call level 0-7 3 = Set Frequency	ARM (Primary)	Controls the HY-5B Free Exit loop detector.	HY-5B
ILD0 RUN MODE * IN ARM LOOP SET	**0 = Run mode** 1 = Show frequency 2 = Show call level 0-7 3 = Set Frequency	ARM (Primary)	Controls the HY-5B Inside Obstruction Loop (Inner Arming Loop) detector.	HY-5B
OLD0 RUN MODE * OUT ARM LOOP SET	**0 = Run mode** 1 = Show frequency 2 = Show call level 0-7 3 = Set Frequency	ARM (Primary)	Controls the HY-5B Outside Obstruction Loop (Outer Arming Loop) detector.	HY-5B
CLD0 RUN MODE * CENTER LOOP SET	**0 = Run mode** 1 = Show frequency 2 = Show call level 0-7 3 = Set Frequency	ARM (Primary)	Controls the HY-5B Center Loop detector.	HY-5B

Setting the Time and Date

A feature of the Smart DC Controller is its 24-hour, 365 day clock. Make sure it is set to the appropriate time zone. An accurate time and date allows the diagnostic log to date stamp operational data which indicates when Alerts, Faults and Errors occur. The log helps in troubleshooting and can be viewed using the S.T.A.R.T. software application via a laptop connected to the USB or RS-232 port. For more information, refer to "Smart Touch Analyze and Retrieve Tool (S.T.A.R.T.)" on page 61.



To set or adjust the time or date, take the following steps:

1. At a gate status display, press the MENU button twice. This accesses the User Menu and the CLOSE TIMER display appears.
2. Press NEXT or PREV until the SET CLOCK display appears.
3. Press SELECT.
4. CL blinks.
5. Press NEXT or PREV to change the number to 1.
6. Press SELECT to accept the display.
7. The date and time display appears. Use the SELECT and NEXT buttons in the same manner as before to adjust the date and time.

NOTE: A date or time field must be blinking before it can be changed.

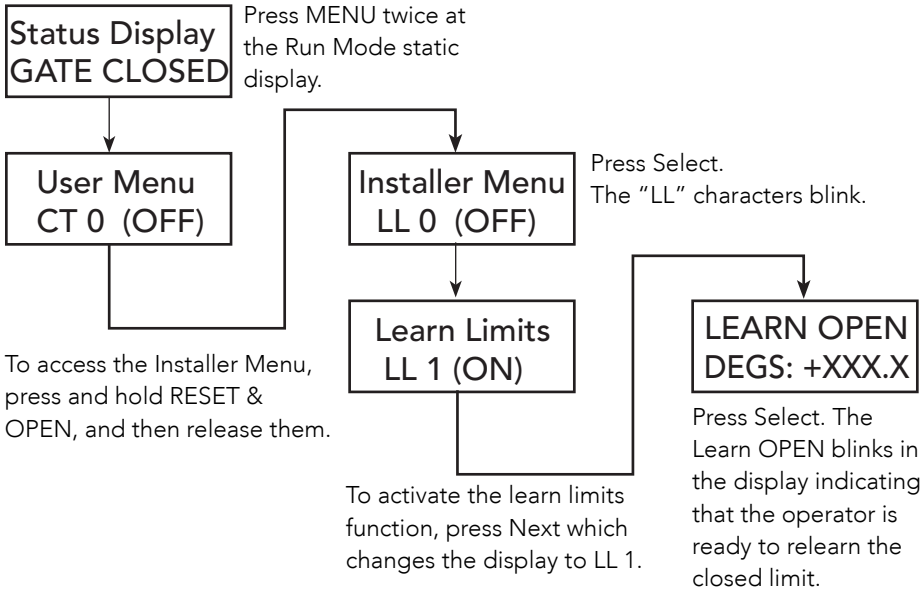
8. To accept what appears on the date and time display, press SELECT.
9. To exit the User Menu, press the MENU button. A gate status appears in the display indicating you have returned to Run Mode.

NOTE: A lithium coin battery supports the clock so the date and time is retained even when the main power is turned off. Replace the battery about every five years with a DL 2025, DL 2032 or CR 2025 or CR 2032 battery. Refer to Clock Battery Replacement.

Resetting Open and Close Limits

Resetting the open and close limits is easily accomplished by accessing the Installer Menu.

Access to the Installer Menu is through the User Menu. See the flowchart below.



Learn Open Limits

1. Press and hold the OPEN button while the degrees increase toward 90 and the barrier arm reaches the desired full open position.
2. Release the OPEN button as the arm nears full open. The motor slows as do the numbered increments on the display. Note that if you go too far, you can press CLOSE to reverse direction.
3. Press STOP twice to preserve the open stop location. The buzzer chirps twice and the full open stop is retained in memory.

Learn Close Limits

1. Press and hold the CLOSE button while the degrees increase toward - 90 and the barrier arm reaches the desired full open position.
2. Release the CLOSE button as the arm nears full open. The motor slows as do the numbered increments on the display. Note that if you go too far, you can press OPEN to reverse direction.
3. Press STOP twice to preserve the open stop location. The buzzer chirps twice and the full open stop is retained in memory.

Test the Operator

Complete the installation by testing the operation of the gate.

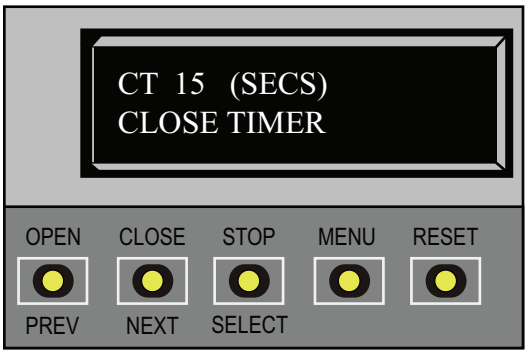
NOTE: The operator must be turned on and in Run mode. A Run mode display appears on the SDC. If a Run mode status does not appear on the display, press Reset. If an error, alert, or fault appears on the display, refer to the "Troubleshooting" section to learn how to clear the display and return to Run mode.

1. Press Open to open the barrier arm.
2. Test the operator.

   Cycle the barrier arm a few times by pressing the Close and Open buttons.

NOTE: If additional accessories are to be added, read about "SDC Inputs & Wiring".

Setting the Close Timer



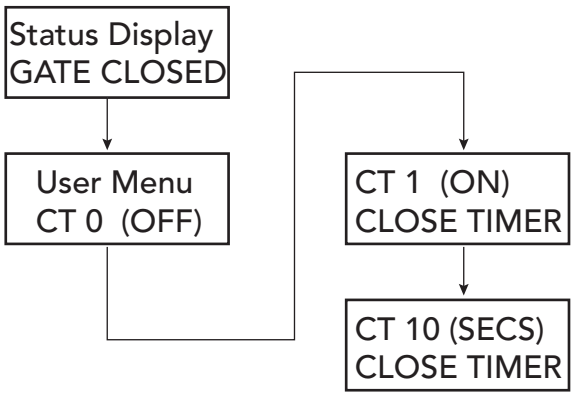
As an added security measure and to make sure the barrier arm closes automatically within a reasonable time frame after all loops are cleared, you must set the Close Timer.

The Close Timer assigns how many seconds will pass before the operator initiates closure of a fully opened barrier arm after all open commands and reversing sensor inputs have ceased and loops cleared. Every gate operator needs to have the close timer set to a specific number of seconds (for example, 5 seconds) unless a hard-wired closing device is connected to the unit, such as a "hold to close" push button station.

To adjust the time (1 to 99 seconds) it takes before the operator initiates gate closure, take the following steps:

1. At a gate status display, press the MENU button twice. This accesses the User Menu and the Close Timer display appears.

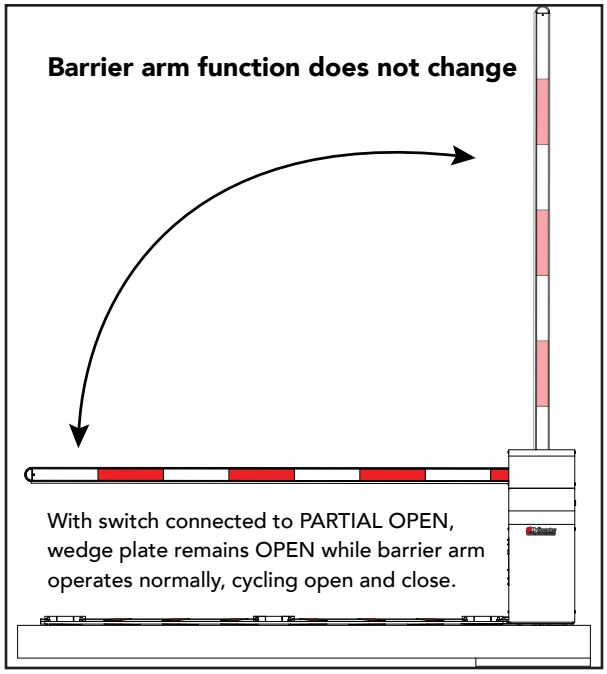
NOTE: If you want gate personnel to operate the gate with the Hold to Close feature found in some push button stations, then set the Hold to Close menu item to 1. When the Hold to Close menu item is active (set to 1), the Close Timer menu item is unavailable.

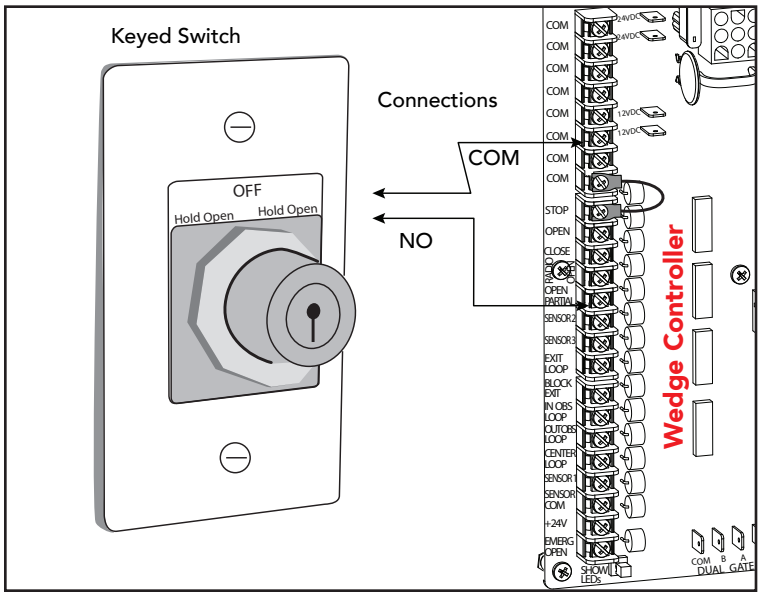


2. Use the Select, and then Next or Previous buttons to change the number of seconds appearing on the display.
3. To exit the User Menu, press the MENU button. The gate status appears in the display indicating you have returned to Run Mode.

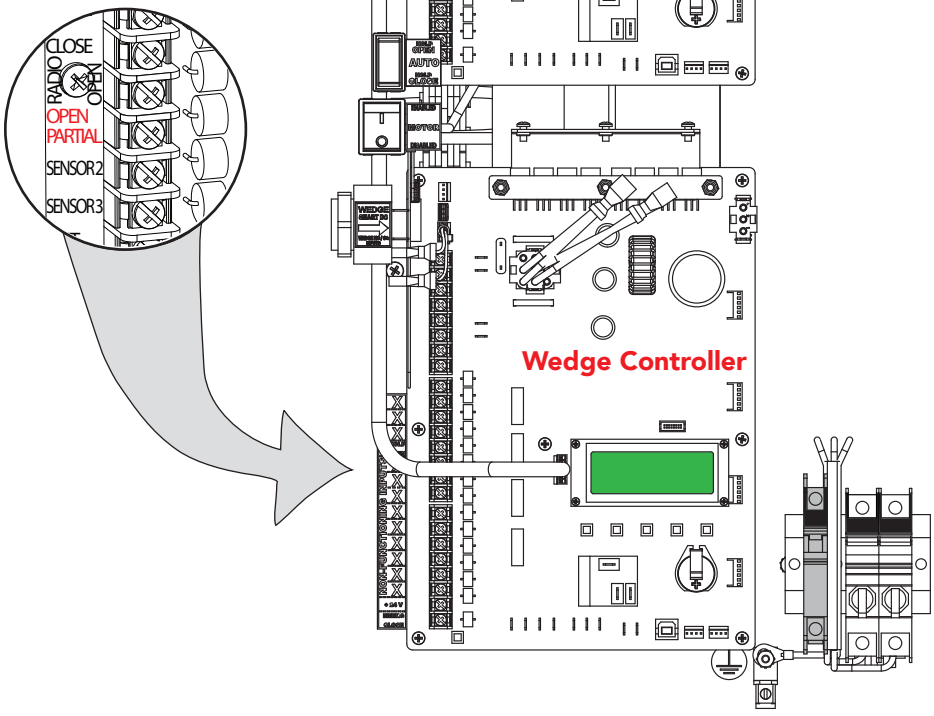
Wedge Hold Open

Connect a standard ON/OFF switch (such as a toggle or keyed switch) to the OPEN PARTIAL input on the Wedge Controller to keep the wedge plate in the open position while utilizing the open and close function of the barrier arm.





Example of a Wiring Diagram for Wedge Hold Open

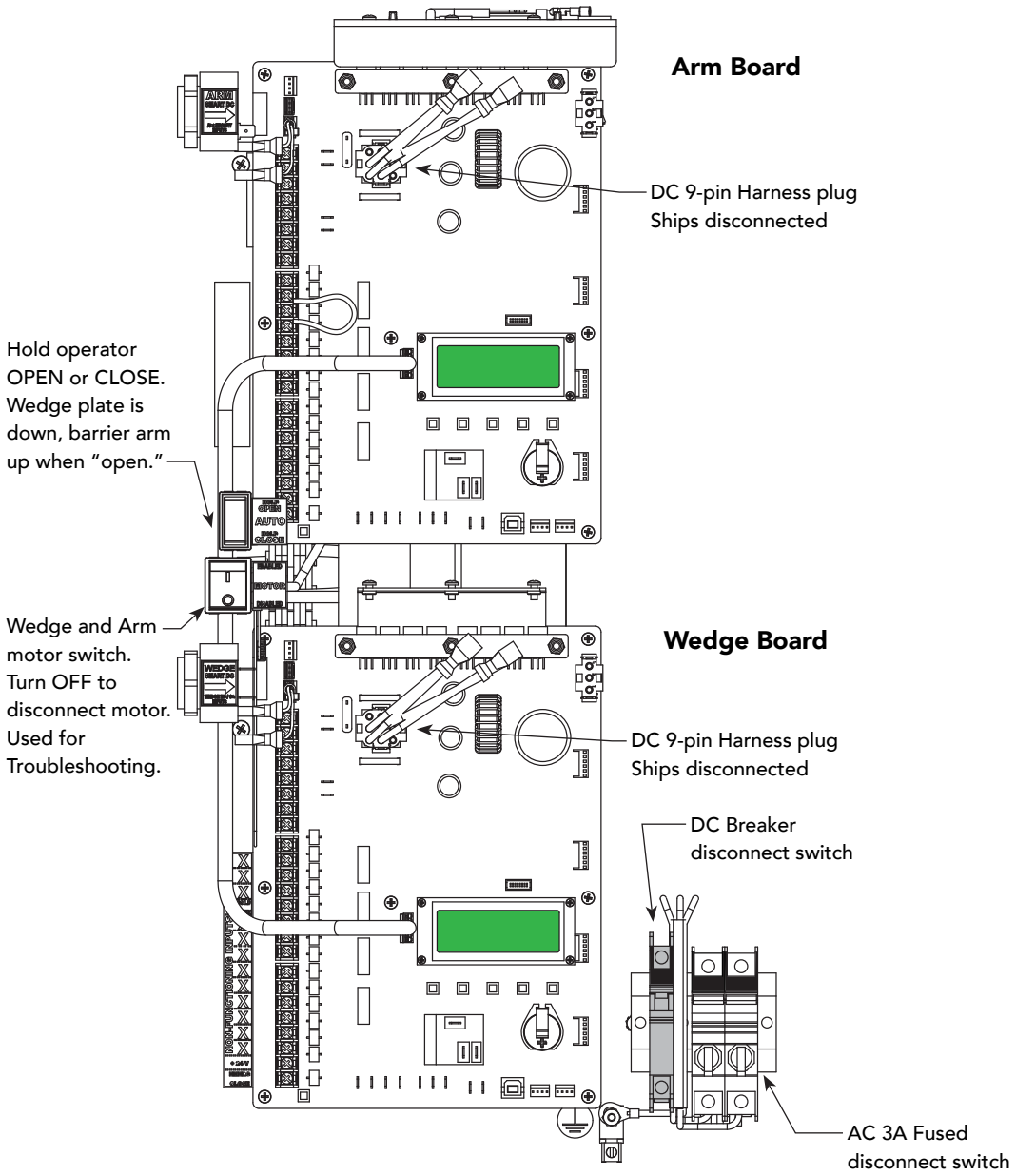


Arm and Wedge Controller's inside Chassis

SDC Inputs & Wiring

This section provides information about the Smart DC Controller, its inputs for peripheral connections, and its monitoring capabilities. This section explains how to:

- Make Connections on the Smart DC Controller
- Connect HY-5B Vehicle Detectors
- Connect Accessory Devices
  - Entrapment Sensor Connections
  - Access Controls
  - User Relays

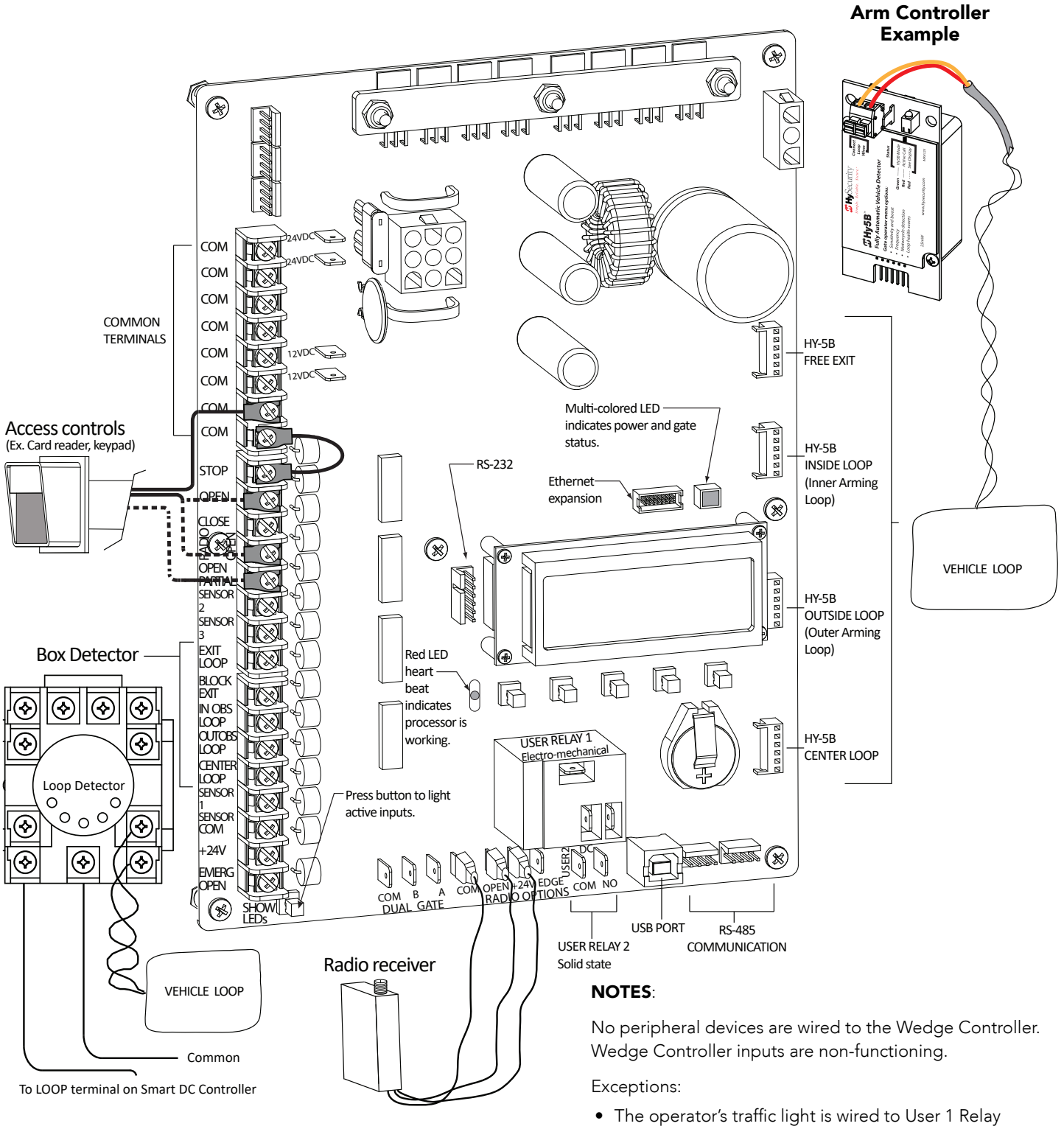


Smart DC Controller

Overview of the Smart DC Controller

The Smart DC Controller uses LED's to indicate active inputs when AC power is present. For operators that use only DC power, you can push a button to show the active inputs. This SHOW LEDS button is at the bottom left corner near the EMERG OPEN input.

On a new operator no active inputs should appear until external accessories and wiring are attached. If any inputs are active before connecting external wiring, refer to "Troubleshooting"."



NOTES:

No peripheral devices are wired to the Wedge Controller. Wedge Controller inputs are non-functioning.

Exceptions:

- The operator's traffic light is wired to User 1 Relay
- Arm Lights are wired to User 2 Relay.

Smart DC Controller Inputs

When using AC power, an LED lights next to active inputs. On a new operator, no active input should appear until external accessories and wiring are attached. If any inputs are active before connecting external wiring, refer to "SDC Inputs & Wiring" on page 45.

1. Test the open and close function of the barrier arm before wiring to accessory devices (external control inputs).

   NOTE: If you are using the operator strictly in a DC capacity, the Smart DC Controller has a tact button you can push which lights an LED next to the active inputs. This button is in the bottom left corner of the SDC board. Press the SHOW LEDs push button to verify the status of the terminal inputs.

2. All control device inputs listed below are shown as a single input. In most cases, the second wire is connected to one of the eight Common Terminal Bus (COM) on the Smart DC Controller board.

   NOTE: The Emergency Close and Fire Dept. Open inputs are an exception and require a +24V input, as well as activation in the Installer Menu. For convenience, a +24V is located next to the EMERG OPEN terminal.

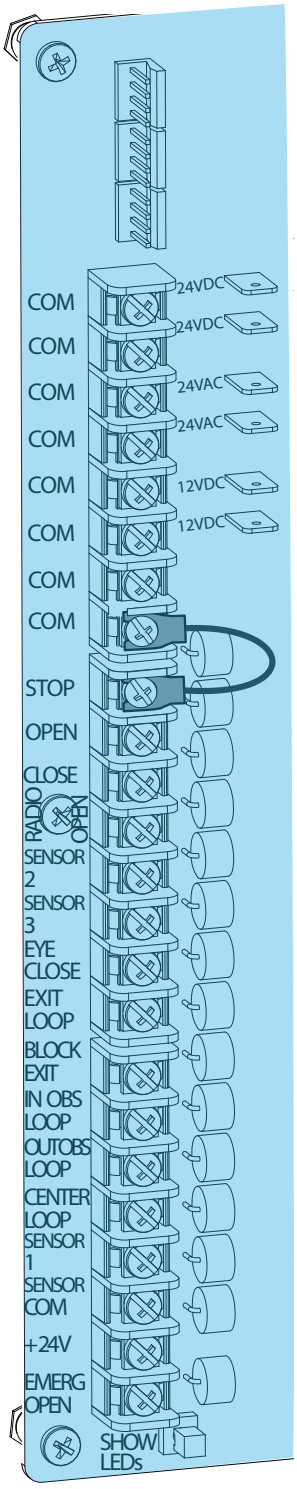
SDC Terminal Inputs

NOTICE: A label on the Control Box indicates the change in inputs for revenue control sites.

SDC Inputs Chart

Label	SDC Terminal	Wire Connections	Commonly used for...
COM	COM	Common terminal. All user inputs are energized when connected to common except Emergency Open.	All inputs except Emergency Open.
STOP	Stop* Button	Normally Closed input. Jumper to Common if input is not being used.	Line of sight, external stop button or 3-button station.
OPEN	Open* Button	Normally Open (N.O.) input. Do not use for radio or remote access controls.	Line of sight, external open button or 3-button station.
CLOSE	Close Button	N.O. input. Do not use for radio or remote access controls.	Line of sight, external close button or 3-button station.
RADIO OPEN	Remote Open & Radio Control	N.O. input. For radio/remote open device: Access the RO from the User Menu and set to 1 for close function too.	Remote access control or radio controls
OPEN PARTIAL	Open Partial	Normally Open (N.O.) input.	Supervised access controls

Label	SDC Terminal	Wire Connections	Commonly used for...
Sensor 2	Eye Open	Spare input for WedgeSmart DC only. N.O. input for SlideSmart DC & Swing-Smart DC. Connection for Photo Eye Open direction. Can be changed to a monitored Normally Closed (N.C.) contact through the Installer Menu	Non-contact entrapment sensors.
Sensor	Photo Eye Close direction	N.O. input. Connection for Photo Eye Close direction. Can be changed to a monitored Normally Closed (N.C.) contact through the Installer Menu.	Non-contact entrapment sensors.
EXIT LOOP	Free Exit Vehicle Detector	N.O. input. Connection for free exit vehicle detector.	Vehicle detector, box type connections for free exit loop.
BLOCK EXIT	Block Free Exit vehicle detector or Close Timer	N.O. input. Free Exit is only disabled if Close Limit Switch is tripped.	Installer menu enabled. See DT 0 If the gate is partially opened, the Free Exit detector will trigger the gate to open fully. The input can be converted in the Installer Menu to alternately disable the Close Timer.
IN OBS LOOP	Inside Obstruction/ Arming Vehicle Detector	N.O. input. Inside reversing loop.	Vehicle detector, box type connections inside reversing loop
OUT OBS LOOP	Outside Obstruc-tion/Arming Vehicle Detector	N.O. input. Outside reversing loop.	Vehicle detector, box type con-nections outside reversing loop
CENTER LOOP	Center Loop (Shadow) Vehicle Detector	N.O. input. Center Loop for WedgeSmart DC. Shadow function used for Swing gates only.	Vehicle detector, box type con-nections. Shadow function for swing gates, reset function for barrier arm gates.
Sensor 1	Edge Sensor	N.O. input. One input works for both directions of travel. It can be changed to N.C. contact through the Installer Menu.	Gate edge, entrapment device sensor connections. One input works for both travel directions.
EYE COM	Photo Eye Common	When the Photo Eye Open and Photo Eye Closed common wires are connected to this terminal, the photo eyes energize only when the motor runs.	Photo eye connections. Use these terminals to preserve battery power.
+ 24	+24V DC	24VDC power.	Convenient 24VDC power for photo eyes or the Emergency Open input.
EMERG OPEN	Emergency Open (Fire Dept.Open) **	N.O. input.	The Emergency Open must be enabled via the Installer Menu. It is energized by connecting to the +24V terminal above it. The EMERG OPEN overrides photo eye & edge sensor commands.
EMERG CLOSE †	Emergency Open (Wedge Controller)	N.O. input.	Wedge controller: Emergency Open becomes Emergency Close enabled via the Wedge controller's Installer Menu.



SDC Inputs

* Do not connect an external control to the STOP or OPEN inputs unless the controls are located in clear view of the entire gate area. Use the RADIO OPEN input or RADIO OPTIONS spade connections for all out-of-sight controls, such as a telephone entry or radio operated controls.

**The Fire Department Open control must be keyed or guarded so that it can only be used by authorized personnel.

† Emergency Close on the Wedge controller, is energized by connecting to the +24V terminal and the EMERG OPEN.

Connecting Accessory Devices

Object detection devices may be connected and wired to the Arm Controller Board. The Wedge Board has no functioning inputs for accessory devices. The WedgeSmart DC gate operator is regulated by UL 508A Power & Safety Standards. Always check your local area codes and comply with all regulations.

Standard accessory connections require a minimum of two connections:

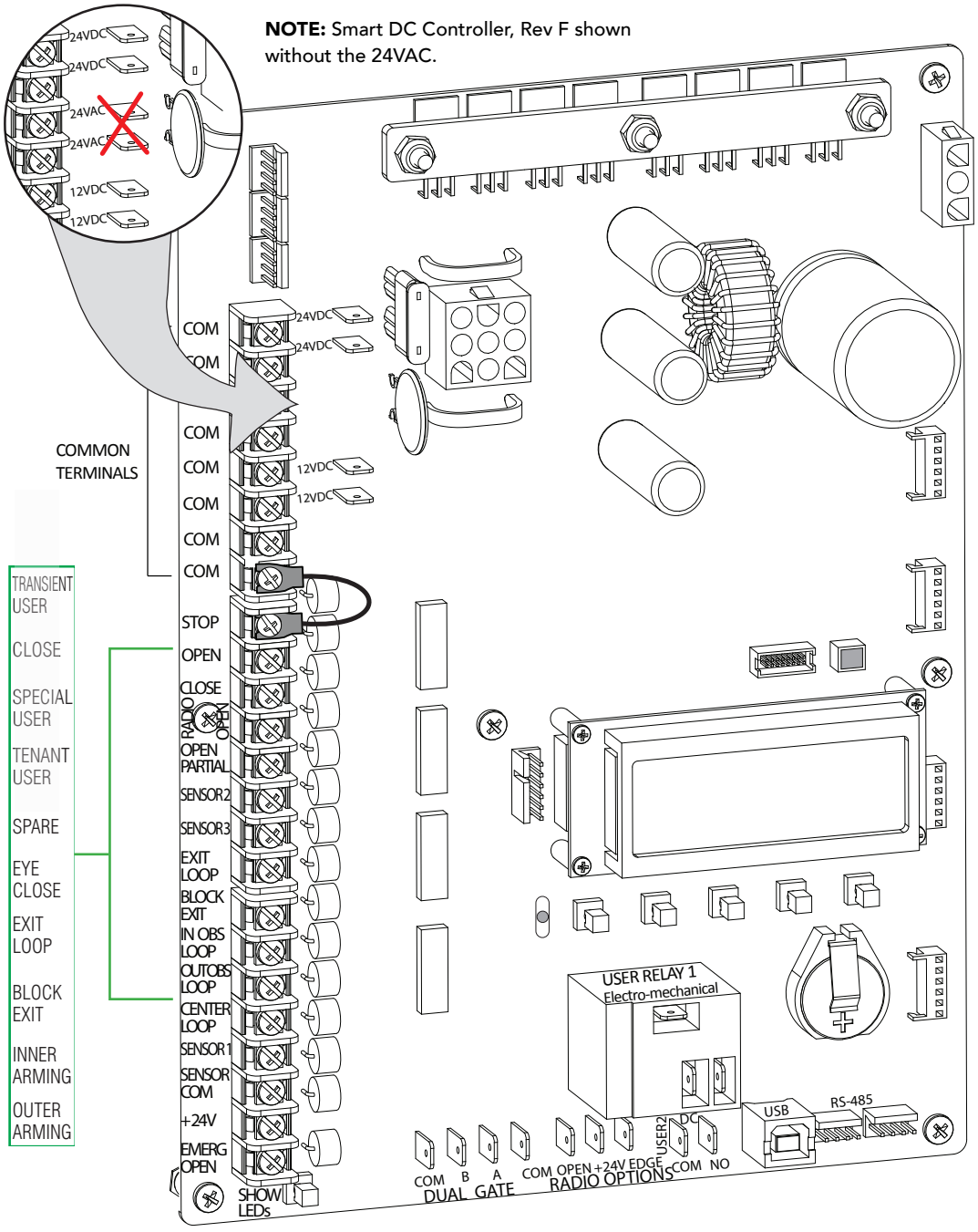
- a device input
- a Common Bus Terminal (COM)

Other devices may require more connections or configurations. For example, the Fire Department (EMERG OPEN) input requires a +24 volt input. The connection must be activated by changing the setting through the Installer Menu.

Two power supplies (2 terminals each) are available for peripheral connections: 24VDC & 12VDC

NOTE: Each power supply (and its corresponding terminals) can be used in any combination to draw the available 1A maximum.

NOTE: Smart DC Controller, Rev F shown without the 24VAC.



Parking Site Use

The label for the Smart DC Controller accommodates arming loops and establishes which open commands need to be wired for vehicle counts (transient, special, and tenant "user types").

The software identifies the access control inputs and uses the arming loops to control relay and network outputs.

NOTE: The most current software must be loaded on your Smart DC Controller.

User Relays - Programming Procedure

The Smart DC Controller is able to interface with many types of external devices through the use of programmable output relays: one mechanical relay (User 1) and one solid state relay (User 2) which is used most often for connection to flashing devices.

NOTE: For WedgeSmart DC, an extended relay module option provides 8 additional mechanical relay connections. In the chart below, you use Relay 3 Logic through Relay 10 Logic for wire connections.

All of the user relay functions identified and described in the table below are accessible in the Installer Menu selections.

NOTE: A setting of zero disables a user relay. The user relays will operate normally to 18VDC. Below 18VDC, alert notification occurs. On WedgeSmart DC the R2 RELAY 2 LOGIC is recommended for LED arm lights.

Use the SDC buttons to program the user relays according to the following steps:

1. Select the relay you wish to use through the "Installer Menu: Table 2." on page 34. For example: R1, RELAY 1 LOGIC.
2. Select the appropriate function (1 through 39) by changing the display to the associated number listed in the table. Use the Select, Next and Previous buttons to make your selection. See "Menu Mode Navigation" on page 29.

Programmable User Relays: Table 4

Relay No.	Name	Description	Wire Connection
1	Close limit output	Creates an interlock signal to another operator's interlock input, or simply to indicate that gate is secure or not. Relay is released when fully-closed limit switch is tripped. Relay is energized when fully-closed limit is released. (Any open command energizes relay.)	Relay 1
2	Close limit pulse output	Used in a sequenced system to command a second operator to close. Generates a brief pulsed output that occurs when the close limit is triggered.	Relay 1
3	Open limit output	Indicates a full-open position. This output becomes active when an open-limit is triggered and deactivates when the open-limit is released or a close command is received.	Relay 1
4	Open limit pulse output	Triggers a sequenced barrier arm gate operator to open. Generates a brief pulsed-output when open-limit is triggered. An additional pulse is also generated with any new open command even when gate is already fully-opened.	Relay 1
5	Warn before/during operate output	Controls an external warning device. This output is active whenever internal warn before operate buzzer is sounding but the relay output is constant on. Activation timing of this relay is controlled by setting User Menu for Warn Before Operate [bF].	Relay 1

Relay No.	Name	Description	Wire Connection
6	Gate Lock output	Controls external solenoid locks or magnetic locks. In both directions of travel, this output is activated about 7/10ths of a second before operator starts moving the gate.	Relay 1
7	Gate forced open output	Activated if gate is forced off closed limit switch and operator is not able to restore gate to full closed position within four seconds. The buzzer resets itself in 30 seconds but relay stays active until gate receives a run command.	Relay 1
8	Gate open too long output	Activates when gate is open longer than the user-selected period of time. Adjustable from a 0 second to 135 seconds delay in 15-second increments. **NOTE:** TL - Open TIME ALERT adjustments can be made in the Installer Menu.	Relay 1
9	Safety Mode Alert output	Activated when system is in Safety Mode or Entrapment Mode. Safety Mode occurs upon an impact with an obstruction. Entrapment Mode means gate is stopped and occurs if inherent entrapment sensor triggers while system is in Safety Mode.	Relay 1
10	Entrapment Mode Alert output	Controls an external warning device. Activated only when in the Entrapment Mode.	Relay 1
11	Unauthorized Vehicle Entry output (Tail gate alert)	Activated when a second vehicle enters from outside without a valid input from an access control device. The OOLD and IOLD loops must be capable of being triggered at the same time for this relay to ever activate. This output releases when an access control input signals open or gate reaches the close limit position.	Relay 1
12	Outside Obstruction Vehicle Detector output	This output is active whenever Outside Obstruction Loop Detector is tripped. Interlocks an entry device to prevent pedestrian use.	Relay 1
13	Loitering Alert	Indicates vehicle is loitering on Outside Obstruction Loop with the gate closed. Adjustable from a 0 second to 135 second delay in 15-second intervals. **NOTE:** LT LOITERING ALERT adjustments can be made in the Installer Menu.	Relay 1 or 2
14	Gate nearing full travel output	Activated when gate is approaching full open or full closed. Relay activates three feet from where software expects limit switch to be triggered whether moving toward full open, full close, or in a reverse travel mode. **NOTE:** If the operator has not yet learned limits, it will energize Relay 14 when the motor begins moving the barrier arm.	Relay 1
15	Gate failure output	Activated to report occurence of problem. Indicates the system is in an Error, Fault, Alert, or Entrapment Mode. If active, gate is disabled.	Relay 1
16	Motor Running output	Active when the motor is running and gate is in motion.	Relay 1
17	AC Power Failure output	This relay is normally energized and drops with loss of AC power.	Relay 1
18	DC Power Failure output	**DC operators only.** Activated when battery power is very low, but output ceases when battery is dead (18 volts). Relay is triggered when battery is less than 21 volts.	Relay 1
19	Flasher Relay	Controls flashing lights to pulse once per second. Relay is constantly pulsing except when open limit switch is triggered. Recommended to use User Relay 2 since it is an electronic switch * Preferred connection is Relay 2, a solid state relay.	Relay 1 or 2*

Relay No.	Name	Description	Wire Connection
20	Free Exit Loop Vehicle Detector output	Active when the Free Exit Loop is tripped.	Relay 1
21	Inside Obstruction Vehicle Detector output	Active when the Inside Obstruction loops is tripped.	Relay 1
22	Reset Loop Detector output	Active when the Reset loop detector is tripped.	Relay 1
23	External Latching Gate Lock Output	Not used in the Smart DC Controller.	Relay 1
24	Gate at Partial Open Position	Active when the partial open position is reached or exceeded.	Relay 1
25	DC Power Alert	Deactivates when the software detects a low battery voltage (below 21VDC, but greater than 18VDC) for a duration of 2 seconds or more. To slow battery drain, accessory power loads are shed.	Relay 1
26	Free Vehicle Detector Pulse	Activates when the Exit Loop Detector is tripped and causes a 250mS pulse output to occur.	Relay 1
27	Not Open (requires AC power)	When AC power is detected, this relay activates when the gate in NOT on the open limit. If AC power fails, or the gate is on the open limit, the relay is deactivated.	Relay 1
28	Flasher (requires AC power)	Controls flashing lights that pulse 500ms per second. The relay is constantly activating except when the open limit switch is triggered or AC power fails.	Relay 1
29	Arm Entry Ticket Dispenser	Not available (N/A)	
30	Arm Exit Ticket Dispenser	Not available (N/A)	
31	Resert Ticket Dispenser Pulse	Not available (N/A)	
32	Backoff Pulse	Not available (N/A)	
33	Transient In Pulse	Not available (N/A)	
34	Transient Out Pulse	Not available (N/A)	
35	Tenant In Pulse	Not available (N/A)	
36	Tenant Out Pulse	Not available (N/A)	
37	Special In Pulse	Not available (N/A)	
38	Special Out Pulse	Not available (N/A)	
39	Unknown In Pulse	Not available (N/A)	
40	Unknown Out Pulse	Not available (N/A)	
41	Test Open Pulse	Not available (N/A)	
42	Break-Away Switch Output	Not available (N/A)	
43	Warn Before	Combination of relays #5 and #16.	
44	Partial Open Limit Pulse	Pulses for 250ms when gate, commanded with Partial Open input, reaches Partial Open Limit, or, gate is past Partial Open Limit and Partial Open input is activated.	
45	Outside Obstruction/Arming Loop Detector	Activated when OOLD/OALD detector input tripped and gate closed. Used for testing purposes.	

Revenue Control Parking Applications

Additional mechanical relay options are shown in Table 5. Any of the options can be configured through the relays on the Smart DC Controller. If you need additional mechanical relay terminals, an optional extended relay module with 8 terminals is available from HySecurity.

NOTE: System baud rate: 38,400

Programmable User Relays: Table 5

WedgeSmart DC Revenue Control Parking Application

Relay No.	Name	Description	Wire Connection
29	Outer Arming Loop Active Output OALD	Input. Interlocks an entry device to prevent pedestrian use. This output is active whenever the Outer Arming Loop Detector is tripped. **NOTE:** If the Center Loop is tripped before the Outer Arming Loop (indicating a vehicle is exiting the facility), this relay will not energize.	R1, R3 through R10
30	Inner Arming Loop Active Output IALD	If the Center Loop is tripped before the Inner Arming Loop (indicating a vehicle is entering the facility), this relay will not energize.	R1, R3 through R10
31	Device Reset Pulse Output	N.O. Input. A 250ms pulse occurs when the Center Loop is triggered. If a back out occurs, this relay sends a reset pulse to the access control device or computer system to invalidate the ticket.	R1, R3 through R10
32	Back Out Pulse Output	N.O. Input. The relay outputs a 250ms pulse when a back out has occurred based on the criteria given in the "Revenue Control Parking Functions."	R1, R3 through R10
33	Inbound Transient/Lot Output	N.O. Input. The relay outputs a 250ms pulse used to increment the transient and total vehicle counts.	R1, R3 through R10 TRANSIENT USER
34	Outbound Transient/Lot Output	N.O. Input. The relay outputs a 250ms pulse used to decrement the transient and total vehicle counts.	R1, R3 through R10 TRANSIENT USER
35	Inbound Tenant Output	N.O. Input. The relay outputs a 250ms pulse and increments the tenant counter when the Tenant User input is activated and OALD, then CLD, are tripped and released. This activity signals a prepaid customer has entered the facility.	R1, R3 through R10 TENANT USER
36	Outbound Tenant Output	N.O. Input. The relay outputs a 250ms pulse and decrements the tenant counter when the Tenant User input is activated and IALD, then CLD, are tripped and released. This activity signals a prepaid customer has exited the facility.	R1, R3 through R10 TENANT USER
37	Inbound Special Output	N.O. Input. The relay outputs a 250ms pulse and increments the special counter when the SPECIAL USER input is activated and OALD, then CLD, are tripped and released. This activity signals a customer has entered the facility.	R1, R3 through R10 SPECIAL USER

Relay No.	Name	Description	Wire Connection
38	Outbound Special Output	N.O. Input. The relay outputs a 250ms pulse and decrements the tenant counter when the SPECIAL USER input is activated and IALD, then CLD, are tripped and released. This activity signals a customer has exited the facility.	R1, R3 through R10 SPECIAL USER
39	Unknown In	Operates the same as inbound "special user" but appears with the counter titled UNKNOWN USER which counts vehicles of unknown type.	R1, R3 through R10 UNKNOWN USER
40	Unknown Out	Operates the same as outbound "special user" but appears with the counter titled UNKNOWN USER which counts vehicles of unknown type.	R1, R3 through R10 UNKNOWN USER
41	Test open pulse	This output pulses briefly about 5 secs after the close limit is activated. This can be used with the close timer to continuously cycle the gate open and close (for testing purposes)	R1, R3 through R10
42	Break away arm switch activated	When the arm break-away switch is tripped, this relay is activated. The relay can also be used to turn on a light or buzzer, etc.	R1, R3 through R10
43	Active while warn before operate and while motor running	Output is active when the warn-before/during operate buzzer is active (see relay #5) and when the motor is running (see relay #16). This setting combines relay #5 and #16.	R1, R3 through R10
44	Pulse when partial open limit is reached and a partial open input was received	Output pulses active when gate receives open command through the Partial Open input, and then reaches the Partial Open Limit. The output also pulses if the gate is already at or past the Partial Open Limit and the Partial Open input is activated. Example, where used: Two barrier arms control ingress and egress while a sliding gate travels across both entrance and exit lanes	R1, R3 through R10

Extended Relay Module Option

The extended relay module provides 8 numbered mechanical relays. R3, RELAY 3 LOGIC through R10, RELAY 10 LOGIC can be accessed through the Installer Menu. Set the number for the relay based on the information found in Tables 4 or 5. Table 5 is oriented toward revenue control parking lot applications.

Wire communication cable connections between the DUAL GATE ports, at the base of the SDC, and the extended-mechanical relay module. See illustration "Overview of the Smart DC Controller" on page 46.

Vehicle Detector Logic

In parking or barrier arm applications, where detectors may be used to close the gate, the Smart DC Controller needs to told what to do with the wired connections. Vehicle detector functions for the Center Loop (reset loop) are configurable through the "Installer Menu: Table 2." on page 34. They include, CR CB, CP, EB and DL.

Vehicle Detector Logic Mode Selection

The Detector Logic (DL) menu item, found in the Installer Menu, lets you set the anti-tailgate mode. This menu item works in conjunction with the Close Timer (CT) when the vehicle detector is triggered. If you plan to use the anti-tailgate feature, re-check the Close Timer (CT) setting to make sure it's compatible.

The two selectable modes for DL are as follows:

Mode 1 (Default): The default setting 1 causes the Close Timer to start when the Center Loop is clear. The Close Timer begins to count down only after all vehicle detectors are clear and no other open command is present.

Mode 2: A setting of 2 causes the Close Timer to start when the open limit switch trips. The close timer does not wait for vehicle detectors to clear, but instead it starts running as soon as the open limit is reached.

> **NOTICE:** Using any vehicle detector logic mode other than Mode 1 (default) requires that all the loops be placed with the geometry and spacing as shown in the layout drawings.

TailGate Alert

User Relay 11 is available for notification devices. For example, it is used to activate an alarm, or camera. If a tailgating vehicle is detected, the relay will be activated.

HY-5B Vehicle Detector Installation

The Smart DC Controller provides an interface for up to four different vehicle detector functions.

NOTE: Standard box type 11 pin (24 VDC or 24 VAC) vehicle detectors may be connected in the traditional manner, but HySecurity's custom HY-5B mini-detector module plugs directly into the Smart DC Controller, making field installation much faster and enhancing performance.

The HY-5B detector communicates with the Smart DC Controller microprocessor to achieve the following benefits over common box type detectors:

- Loop frequency is automatically set and monitored by the Smart DC Controller.
- Best operating frequency for each loop is automatically selected.
- Cross-talk between multiple loops is impossible.
- Very low power draw, which is important for maximum UPS capability during a power failure or for solar applications.
- Loop frequency and call strength can be reported on the Smart DC Controller display.
- Loop malfunctions are stored by the Smart DC Controller and appear in code on the display.

NOTE: It is not mandatory to use two separate detectors for inner and outer obstruction detection; however, the benefits of using the additional HY-5B detector are great. Several new features are possible, such as second vehicle tailgating detection, loitering alert, and selectable non-reversing options.

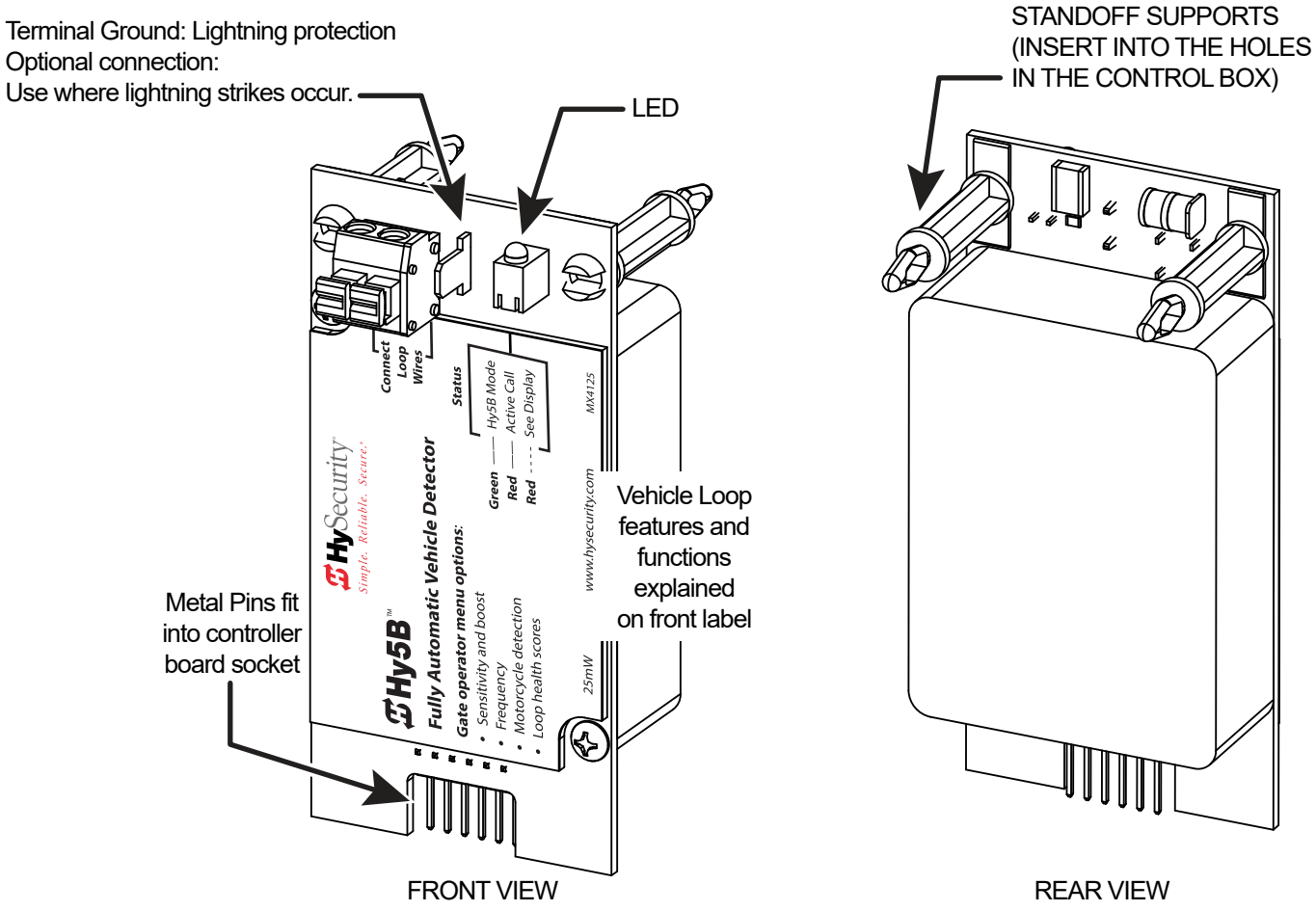
Four vehicle detector inputs exist on the Smart DC Controller, as well as the four direct plug ins (EXIT LOOP, INSIDE OBSTRUCTION, OUTSIDE OBSTRUCTION, CENTER LOOP) for the HY-5A modules.

The vehicle detector input functions are as follows:

- Free Exit Loop Detector - Opens a fully closed gate.
- Inside Obstruction Loop Detector (IOLD) - Triggered by the inside (secure side) vehicle detector loop
- Outside Obstruction Loop Detector (OOLD) - Triggered by the outside (public side) vehicle detector loop
- Center/Reset/Shadow Loop Detector (CLD) - On barrier arm gates, prevents closure when active. On swing gates, prevents gate from opening or closing when the vehicle detector is active.

NOTE: Use of any combination of HY-5A detectors and box detectors is acceptable. On occasion, multiple obstruction detectors may be mandatory. For example, an area greater than 200 square feet (61 square meters) of vehicle loop cannot be connected to any one detector because the sensitivity becomes inadequate.

For more information on loop layout scenarios, refer to the *WedgeSmart DC Installation Instructions*.



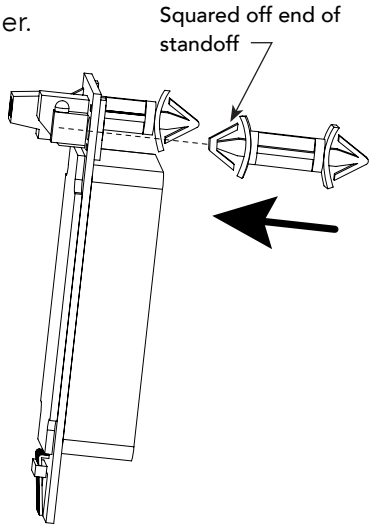
HY-5B Vehicle Detector Module

Connecting HY-5B Vehicle Detectors and Making Adjustments

NOTE: For additional information, review the installation instructions provided with the HY-5B vehicle detectors. An online copy of the instructions is available at www.hysecurity.com.

A quick overview on how to install the HY-5B Vehicle Detector modules, one at a time, follows:

1. Turn off the AC and DC disconnect switches next to the Wedge Controller.
2. Insert the locking end of the two white plastic standoffs into the mounting holes on the detector.
3. Plug the detector into the appropriate socket along the right edge of the **ARM's Smart DC Controller**. Be careful to align the six detector pins into the socket correctly (the screws for tightening the terminals should face toward the board), and then snap the standoffs into the holes in the metal bracket.
4. Route the loop wires through the holes provided in the control box and connect the loop leads to the two terminals on the HY-5B detector. Tighten the terminal screws securely.
5. To enable the detector, turn on AC and DC power. The detector will immediately tune if it is connected to a vehicle loop. Make sure no cars or other metal objects are over the loop.



6. Repeat Steps 1 through 5 for each HY-5B detector.
7. If the detector module is unplugged after it is enabled, a communications alert (ALERT 10) will be triggered. If the fault is not resolved, an error message, ERROR 3 "Detector Failed" is displayed.

   NOTE: If there is any detector fault, the gate operator functions as if the detector is triggered.

   Pressing the RESET button:
   - Clears any errors
   - Tunes the detectors on connected loops
   - Un-installs any detectors that have been removed
8. The Smart DC Controller automatically governs frequency selection for all HY-5B detector modules. This simplifies installation and guarantees that there is no cross-talk between multiple loops. The frequency and call level can also be manually selected; if this is required, refer to the appropriate loop set in the "Installer Menu: Table 2." on page 34.

   For example, CLD0 RUN MODE
   CENTER LOOP SET controls the HY-5B center loop detector.
9. Sensitivity is the only adjustment available on the detector itself. Generally, sensitivity does not need to be increased unless the loop is large or there are multiple loops connected to one detector.

   NOTE: Do not exceed more than 200 square feet (61 square meters) of loop area to one detector. The detection height is roughly 2/3's the size of the shortest side of the loop.

If required, adjust the sensitivity using the rotary dial.
The factory default setting is 1.

0 = Low with boost*	4 = Low without boost	A = Automatic
1 = Normal with boost*	5 = Normal without boost	M = Motorcycle
2 = Medium with boost*	6 = High without boost	
3 = High with boost*	7 = X-High without boost	

NOTE: *A boost feature is applied for settings 0 through 3. Boost increases the sensitivity during a call and is useful for maintaining continuous detection if the signal becomes weak (such as with tractor-trailer trucks). Sensitivity settings 4 through 7 are the same as 0 through 3, but without the boost feature.

10. Set the loop configuration in the Installer Menu. Display settings include, DT, CR, CB, CP, EB, OR, and IR.
11. Set the vehicle detector logic (DL).

NOTE: The outside and inside Obstruction Loop Detectors are factory configured to fully re-open the gate as a default setting. In the Installer Menu, each detector can individually be set so that when the gate is closing there is only a pause if triggered. To change the setting, go to the menu OR or IR item and set to 0.

View Call Level in Real Time

1. Enter the Installer Menu and access the loop menu item associated with the HY-5A detector:

   Exit=ELD, Inside=ILD, Outside=OLD, or Reset/Shadow/Center=SLD/CLD).
2. Press SELECT and change the menu item to 2, Call Level. For example:
   ILD2
   CALL LEVEL

Knowing the strength of a vehicle detector (call level) is valuable because it provides information about how well the vehicle loop is actually "seeing" a passing vehicle. The HY-5A detector has the ability to read call levels in real time on a scale of 1 to 7. A call level of 7 indicates the loop is detecting the passing vehicle extremely well and is highly sensitive. If you receive a call level reading of 0 to 2, when a vehicle passes over the loop, you'll want to test the loop (see page 1). If the test outcome is good and all the loops are operating properly, you may need to adjust the HY-5B sensitivity dial, so the call level reads in the 5 to 6 range.

Installing Standard 11-Pin Box Type Vehicle Detectors

If standard 11-pin box type vehicle detectors are to be used, perform the following procedure.

If there is sufficient space, install the sockets in the control box; if not, then install them in a separate external housing. Carefully consider your peripheral connections. Any peripheral device required for safe gate operation should be attached 24VDC in case of an AC power outage.

NOTE: Box detectors with relays require five times more power than HY-5A detectors. One HY-5A detector draws about 0.005A. Consider HY-5B vehicle detectors for DC and Solar powered sites.

1. Connect 24 Volt power to the detector. Connect Pin No. 1 to a 24VAC or 24VDC terminal and Pin No. 2 to common.
2. Connect output Pin No. 6 to the Common Bus and output Pin No. 5 to one of the four detector terminal inputs (depending upon the detector function required) on the Smart DC Controller.

If multiple detectors are used, route the power wires and common wire from socket to socket (daisy-chaining) rather than individually running each wire to the same location. The only wires that are separate are the output wire to the Smart DC Controller and the detector loop input wires.

Always keep the detector loop wires well twisted beyond the area of the loop. The lead in portion sealed in a saw cut does not need to be twisted so long as the wires are encapsulated in loop sealant and cannot move.

Photo Eyes (Non-Contact) Installation

Photo eyes are wired to the SDC and require low voltage conduit. If your site conditions require a battery-powered transmitter, it can be ordered through your distributor.

The Smart DC Controller has two photoelectric sensor inputs (Photo eye open and Photo eye close).

The two common photoelectric sensor types are thru-beam and retro-reflective; each has its advantages. A thru-beam sensor is generally more powerful and able to function reliably with dirty optics and in poor weather. A retro-reflective sensor has the convenience of not requiring the installation and electrical wiring of the remote emitter required in a thru beam system, but is generally less reliable in poor weather.

NOTE: Avoid using a retro-reflective device to span a distance greater than 24 feet (7.3 meters) in an outdoor environment because of reduced performance.

Compatibility

The UL 325 standard requires that a photoelectric sensor be laboratory tested and "recognized" under UL 325. In order to be compatible with HySecurity operators, a photo eye must be rated to function from 24 Volts DC source power.

Installation

Install additional photo eyes according to the following steps.

1. Locate the photo eye approximately 15 to 30 inches (38 to 76 cm) above the ground and as close to the gate as possible. See site layout below.
2. Mount the receivers on the left or right side of the gate operator.
3. Mount the emitters just beyond the travel of the arm in the fully-closed position.

NOTE: The installation locations described above are intended for pedestrian detection. If photo eyes are also to be used for vehicular detection, consider (in addition to the low elevation photo eye for cars) installing another photo eye at a height of about 55 inches (140 cm) to detect semi (tractor- trailer) trucks.

Configuration

Configure the photo eyes according to the following procedure.

1. If the photo eye has an internal switch for setting Light Operate versus Dark Operate, select Light Operate.
2. If the photo eye has a relay output and has both NO and NC terminals, some experimentation may be required to determine the proper connection because, when its in the Light Operate mode, the output relay is normally energized and releases when the beam is blocked.

Some manufacturers label an output as NO, when it is actually an NC contact.

If the photo eye has a solid-state output, you must choose a sinking-type connection.

Photo Eye Connections

Connect the three wires to the receiver and two wires to the emitter according to the following procedure.

1. Obtain the +24 Volt source power at one of the three spade-terminals on the power module.
2. Obtain the 24 Volt Common from screw-terminals on Terminal Nos. 14 or 15 (which are labeled Photo Eye Power Common) on the Smart DC Controller.

   NOTE: The -24 Volt Photo Eye Power also supplies the photo eye output Common.

3. Perform one of the following as applicable:
   - If the photo eye spans the road, connect the NO or NC output to Terminal No. 19 on the Smart DC Controller.
   - If the photo eye spans the gate's open storage area as in a slide gate scenario, connect the NO or NC output to Terminal No. 17 on the Smart DC Controller. (Not used on StrongArm M30/M50.)

Photo Eye Alignment

Most photo eyes require careful optical alignment in order to aim the emitter beam to the center of the receiver or reflector. In order to avoid false triggering, it is important to carefully align the system, especially with retro-reflective photoelectric sensors. To that end, HySecurity has provided a unique feature that turns power on to the photo eyes and causes a buzzer to chirp when the photo eye enters and exits alignment. Align the photo eyes using this feature by taking the following steps:

1. Refer to “User Menu: Table 1.” on page 31.
2. Move the barrier arm off (away from) the close limit.
3. Set the menu item [PE_0] to [PE_1] .
4. Start aligning the photo eyes; the buzzer will chirp twice when the beam is broken and once when remade. (The parameter will automatically reset the next time the Close Limit Switch is triggered.)

Monitored Connection

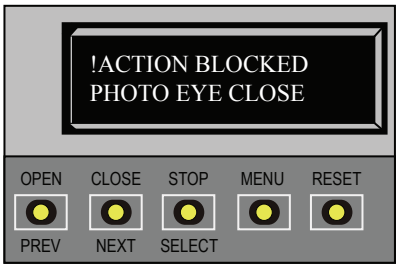
A monitored connection tests for the presence and correct operation of the photo eye prior to each gate activation and prevents gate operation if any fault is present. The Installer Menu item [PC_0] must be changed to [PC_1] to enable this feature.

Photo Eye Function

If the gate is stationary, a tripped photo eye will prevent the gate from starting in either direction. If tripped while in motion, the standard function is to pause the gate motion and then automatically restart again if the photo eye is clear within five seconds. An optional setting in the Installer Menu will cause a 2 second reversal of travel. See EC and EO in “Installer Menu: Table 2.” on page 34.

Troubleshooting

The Smart DC Controller reports system malfunctions using three simultaneously occurring methods:



- Codes presented on its display (alert, fault or error)
- Activation of a buzzer which emits a series of chirps at defined interval
- Gate travel stops

Refer to Table 3, "Troubleshooting Codes" on page 64, for details concerning identification and description of Alerts, Faults and Errors.

To help in problem-solving, the active status of each input on the controller is indicated by its associated LED.

- On AC-powered gate operators: Active-input LEDs are always illuminated.
- On solar-powered gate operators (with input power OFF): Press and hold the Tact button to illuminate the active-input LEDs.

NOTE: A qualified technician may troubleshoot the operator with the aid of the information and procedures that follow. If it is necessary to call a distributor for assistance, be sure to have the model and serial numbers available. Other helpful information is the job name, approximate installation date, and service and records of any recently-performed maintenance work.

System Diagnostic Messages

Code	Priority	How to clear
ALERT	Low	Enter a new command such as Open or Close.
FAULT	Medium	Press the Stop or Reset button
ERROR	High Serious issue that may require Technical Support.	Errors can only be cleared by pushing the Reset button or cycling power.

NOTE: The green LED near the display on the Smart DC Controller is the "fault indicator" of the processor. A steady green LED indicates the system is receiving power and operating in Run mode. When a fault, error, or alert occurs, it turns red. A yellow LED indicates Menu mode.

The Smart DC Controller maintains self-diagnostics. Specific codes appear on the display and the Audio Alert buzzer emits distinctive chirping sounds. Any Alert, Fault, or Error is logged into memory and stamped with the date and time. These diagnostic messages can be retrieved for analysis purposes via optional PC-based S.T.A.R.T. software.

NOTE: S.T.A.R.T. configuration and diagnostic software is available at no charge from www.hysecurity.com. Schedule software updates as part of routine maintenance. See "General Maintenance" section.

Troubleshooting Codes

Table 3: Troubleshooting Codes				
Alert/Fault/Error Display	**Type**	**Buzzer**	**Possible Cause**	**Suggested Corrective Action**
ENTRAPMENT MODE	ALERT	4 to 5 chirps/s for 5 minutes or until cleared	Occurs when the inherent sensor is tripped when the gate is already in Safe Mode. The operator will not function until it is reset, which can occur by: • An Open or Stop command • A Reset button command or a Fire Open command. With any one of these inputs, the operator will return to Safe Mode. Barrier arm binding or wind can cause a false alert.	1. Remove the obstruction. 2. Adjust IES sensitivity. 3. Correct the gate hardware or temporarily, remove the arm in high wind conditions.
SAFE MODE	ALERT		Occurs when either the edge sensor or inherent sensor has been tripped. In Safe Mode, the automatic close timer is disabled, but any command will reset and/or start the gate in motion. Safe Mode clears when full travel is reached or the RESET button is pressed. Note that too tight of a spring on the DC14, hardware binding, or wind can cause a false alert.	1. Remove the obstruction. 2. Adjust IES sensitivity. 3. Correct the gate hardware. 4. Correct faulty edge sensor. 5. Check for worn motor brushes and replace, if necessary. 6. Adjust spring tension on a WedgeSmart DC14
NO AC POWER	ALERT	Chirps once whenever the gate reaches the close limit	AC power is shut off at the source (breaker) or is not connected. The AC power switch on the operator (lower rocker switch) is turned off, or the circuit breaker on the operator has tripped.	1. Have a licensed electrician check the wiring. 2. Connect AC power to the operator. 3. Reset circuit breaker at electrical panel. Reset the operator circuit breaker. 4. Turn AC power switch on.
LOW 24VDC	ALERT	Flashes on display 1s every 5s	Occurs when the battery voltage has dropped to less than 22 Volts. At this level, the batteries are 80% depleted. **NOTE:** Functionality of the controller board becomes impaired when the voltage drops below 21 Volts.	1. No AC Power. See above item. 2. Check all wiring connections. Clean or repair as required. 3. Check the following and replace, if necessary: • Battery condition • Charger failure. Check charger voltage • SDC • Transformer
DEAD BATTERY	ALERT	3 chirps upon any operating command entry	Extremely low UPS batteries – no automatic operation - batteries below 21 Volts. At this level, the batteries are 90% depleted. The gate will automatically open or close depending upon the setting chosen. Gate movement is possible, but limited to push button control until batteries reach 18 V.	See corrective action above.

Table 3: Troubleshooting Codes				
Alert/Fault/Error Display	**Type**	**Buzzer**	**Possible Cause**	**Suggested Corrective Action**
HYSECURITY BAD POWER	ALERT	N/A	Critically low 24V supply power. DC Buss power is below 14V – no control functions will be allowed. This message can occur only on initial start up, if power is critically low.	See corrective action above.
No display, LED blinks	ALERT		Smart DC Controller is receiving power, but battery voltage is very low. Several possible causes: • The AC power has been shut off from the operator for too long and the batteries are drained. • Wiring problem. • Batteries no longer hold a charge. • The Smart DC Controller failed. • Bad transformer.	See corrective action above.
HYSECURITY LOADER	ALERT		Software is currently being loaded.	Wait for software to finish loading.
FORCE OPEN	ALERT 1	2 chirps/s for 30s	The gate has been forced open from a full close limit and is being prevented from re-closing.	Will self-clear after an open or close input.
DRIFT CLOSED	ALERT 2	2 chirps/s for 10 seconds	The gate has drifted closed from a full open limit and is being prevented from re-opening.	Will self-clear after an open or close input.
EXCESS DRIFT	ALERT 3		Gate drift in transit - Advisory only. The alert appears if the gate drifts three times in a five minute period.	High wind factor: Remove arm or open gate. Slide gates: Check the track to make sure it is level.
MOTOR OVERLOAD	ALERT 4	2 chirps/s every 15 seconds	Thermal overload alert. Motor drive heat sink exceeds 210°F. When the alert is triggered, the gate can only "fully open" until the alert is cleared. The alert temporarily disables the operator.	1. Check gate hardware. 2. Check for properly sized weight/length of gate/arm. Alert automatically clears when the temperature drops below threshold.
BOTH LIM ACTIVE	ALERT 5	2 chirps/s every 15 seconds	Both limit switches are on at the same time. Possible causes: • Short in wiring • Stuck limit switch • Debris in limit plate area (SwingSmart)	The SDC is seeing both limits tripped at the same time. Repair any wiring issues.
LIM NOT RELEASED	ALERT 6	2 chirps/s every 15 seconds	The limit did not release when the operator was commanded to move. Possible causes: • Broken drive belt. • Hardware holding the arm.	• Check/replace drive belt. • Release any holds on the arm. • Relearn Limits.
FREQ SHIFT FAULT	ALERT 7	2 chirps/s every 15 seconds	An HY-5B vehicle detector: Abnormal frequency change alert. Likely causes are poor integrity of loops or metallic objects within range. The display indicates which detector the alert applies to: Exit Loop (ELD), Inside Arming Loop (IALD), Outside Arming Loop (OALD), Center Loop (CLD).	Check the loop, lead in wires, and roadway for problems. Replace them, if needed.

Table 3: Troubleshooting Codes				
Alert/Fault/Error Display	**Type**	**Buzzer**	**Possible Cause**	**Suggested Corrective Action**
MISSING ARM	ALERT 7		The break away arm relay has been activated.	Repair arm and reconnect break away indicator (magnet) and wiring.
LOOP SHORTED	ALERT 8	2 chirps/s every 15s	An HY-5B vehicle detector: Loop is shorted. Inadequate insulation of loop wires.	Temporarily switch detector to be sure the loop is at fault, and then repair it.
LOOP OPEN	ALERT 9	2 chirps/s every 15s	An HY-5B vehicle detector: Disconnected loop alert. Lack of continuity in the loop wire possibly caused by broken loop wire or wire unplugged from detector.	The loop and lead in wires should be checked for problems or replaced.
I²C BUS ERROR	ALERT 10	2 chirps/s every 15s	An HY-5B vehicle detector: Communications error alert. HY-5B has been removed or there's a lack of integrity of the socket connection. The display indicates which detector the alert applies to: Exit Loop (ELD), Inside Arming Loop (IALD), Outside Arming Loop (OALD), Center Loop (CLD).	Remove and re-install the HY-5B and press RESET. Replace the HY-5B, if necessary. If communication is not re-established within 30 seconds, the controller will reset and the message changes to ERROR 3.
DETECTOR FAULT	ALERT 11	2 chirps/s every 15s	An HY-5B vehicle detector: Malfunction alert Caused by a fault within the HY-5B. The display indicates which detector the alert applies to: Exit Loop (ELD), Inside Arming Loop (IALD), Outside Arming Loop (OALD), Center Loop (CLD).	Remove and re-install the HY-5B and press RESET. Replace the HY-5B, if necessary.
ON TOO LONG	ALERT 12	2 chirps/s every 15s	The Smart DC Controller has an active loop input (HY-5B or box detector output) for more than 5 minutes. The SDC "sees" an active loop for more than 5 minutes. The "active" loop can be actual or false. The display indicates which detector the alert applies to: Exit Loop (ELD), Inside Arming Loop (IALD), Outside Arming Loop (OALD), Center Loop (CLD).	1. Check traffic patterns at the site and make sure that a vehicle is not parked on the loop. 2. Determine if the loop is stable. An unstable loop can hold the detector in a triggered state. 3. The loop and lead in wires should be checked for problems and replaced, if necessary. 4. Check sensitivity setting on the detector.
STIFF GATE	ALERT 13	2 chirps/s every 15s	The SDC detects a gate that, over time, is requiring more power to move it. Usually caused by degrading gate hardware or debris in a slide gate track, this alert appears in the history log. It does not affect opening or closing the gate.	1. Check and correct gate hardware as required. 2. Check motor brushes for excessive wear.
STUCK GATE	ALERT 14	2 chirps/s every 15s	The SDC detects that it cannot move the gate at all possibly caused by broken gate hardware or ice/snow buildup.	1. Manually move the gate. Verify that it moves easily and is unobstructed throughout gate travel. 2. Check and correct gate hardware, as required.
NO TARGET	ALERT 15	2 chirps/s every 15s	Target magnet fell off or target sensor wires are damaged. The target magnet on the chain (slide gate) is missing or has not been detected.	1. Make sure target is properly fastened. 2. Check the target sensor to make sure it is reading the magnet. 3. Change the sensor if it or its wires are damaged.

Table 3: Troubleshooting Codes				
Alert/Fault/Error Display	**Type**	**Buzzer**	**Possible Cause**	**Suggested Corrective Action**
BAD COIN BATTERY	ALERT 17	3 chirps at initial power up	The small battery on the SDC is loose or needs replacing.	1. Check for current software, install update, if necessary. 2. Verify that the battery is properly seated. 3. Replace coin battery. 4. Restore power. 5. Press RESET button.
CHANGE BATTERY	ALERT 18	1 chirp a minute	Batteries are not taking a charge properly. The SDC has detected that the 24VDC UPS batteries need to be replaced.	Replace the batteries. (The buzzer will chirp every minute until the UPS batteries are replaced.)
INTLOCK FAILURE	ALERT 22	2 chirps/s every 15 seconds	Interlock/Sequenced Gate communication lost. Appears when the RS-485 communication connection is lost for more than 15s between interlocked (dual gate) or sequenced gate operators.	1. Check cable connections and wiring. Make sure both operators are working properly and have the same current and up-to-date software versions. The alert automatically clears when communication between the two operators is restored. 2. Verify operators are configured correctly. For example, if the operator on site is a solo gate operator and the display code ALERT 22 appears, access the Installer Menu. 3. Verify the Installer Menu items: DG (Dual Gate) and SG (Sequenced Gate) are both set to zero. If gates are interlocked, make sure the DG and SG settings are correct. 4. Upload current S.T.A.R.T. software and operator code.
EXT RELAY FAULT	ALERT 24	2 chirps/s every 15 seconds	Communication issue exists. The extended relay module, Hy8Relay, is not being recognized or it is not connected and values exist in the extended relay menu items. Alert noted in diagnostic log. **NOTE**: Keep your HySecurity gate operators current by "uninstalling" outdated versions of the S.T.A.R.T. application. Be aware that the current operator software code is not compatible with older version of S.T.A.R.T. find the latest software and operator code at www.hysecurity.com	Check the wiring: 1. Make sure the slide switch on the side of the extended relay module is set at "Normal." 2. (Y) Data + is connected to "A" DUAL GATE. 3. (G) DATA - is connected to DUAL GATE. 4. Connector cable (4-Pin) attaches to RS-485. If the Hy8Relay module is not connected, access the Installer menu and check that the extended relays are set to zero. SDC relays = R3 to R10.

Table 3: Troubleshooting Codes				
Alert/Fault/Error Display	**Type**	**Buzzer**	**Possible Cause**	**Suggested Corrective Action**
MOTOR RUN TIME	FAULT 1	1 chirp every 15s	The Smart DC Controller has detected the motor is on longer than the maximum run time selected. Should not occur in WedgeSmart DC. Possible causes: • Broken drive belt • Taper clamp slipping (SwingSmart)	1. Check and replace drive belt. 2. Increase Max Run Timer in the Installer Menu.
PHOTO EYE	FAULT 2	2 chirps/s once per minute	The photo eye is missing or not working. This fault can only occur if the supervised photo eye function is enabled in the Installer Menu.	Correct malfunctioning photo eye.
GATE NO LOAD	FAULT 4	2 chirps/s once per minute	The Smart DC Controller detects there is no load on the operator. The gate is not operational while this fault is triggered. Several possible causes: • DC switch off • Motor wires disconnected	1. Turn on DC power switch. 2. Replace drive belt. 3. Check DC motor wires. 4. Press RESET to clear fault.
LIMIT FAILED	FAULT 5		Not used in WedgeSmart DC.	
STUCK GATE	FAULT 14	2 chirps/s once per minute	The Smart DC Controller has tried 3 times to overcome a stuck gate/arm. The gate/arm is non-operational while this fault is triggered. Caused by broken gate/arm hardware or ice/snow buildup.	1. Check and correct gate hardware as required. 2. Press RESET to clear fault.
DIRECTION ERROR	ERROR 1	3 chirps/s once per minute	The Smart DC Controller detects that the operator ran in the wrong direction. Possible causes: • Motor wiring • Limit switch wiring (SwingSmart)	1. Check the following and correct, as needed. • Motor wiring 2. Press RESET to clear error.
!ACTION BLOCKED PHOTO EYE CLOSE	Photo Eye Close	1 chirp indicates command cannot be initiated	Operator received command to run, but movement is prevented. Photo eye is blocked or battery is dead.	1. Check the following and correct, as needed. • Photo eye path. Realign photo eye. User Menu: PE1, PHOTO EYE ALIGN • Photo eye battery 2. Press RESET to clear error.
!ACTION BLOCKED PHOTO EYE OPEN	Photo Eye Open	1 chirp indicates command cannot be initiated	Operator received command to run, but movement is prevented. Photo eye is blocked or battery is dead.	1. Check the following and correct, as needed. • Photo eye path. Realign photo eye. User Menu: PE1, PHOTO EYE ALIGN • Photo eye battery 2. Press RESET to clear error.
!ACTION BLOCKED GATE EDGE	Gate Edge Sensor	1 chirp indicates command cannot be initiated	Operator received command to run, but movement is prevented. Gate edge blocked or disconnected. If tripped when gate is moving, causes operator to enter SAFE mode.	1. Check the following and correct, as needed. • Obstructions, remove. • Faulty edge sensor. 2. Press RESET to clear error.

Table 3: Troubleshooting Codes				
Alert/Fault/Error Display	**Type**	**Buzzer**	**Possible Cause**	**Suggested Corrective Action**
HY-5B FAILED	ERROR 3	3 chirps/s once per minute	HY-5B communication failure. Caused by removal of HY-5A or lack of integrity of the socket connection. The display indicates which detector the alert applies to: Exit Loop (ELD), Inside Obstruction Loop (IOLD/IALD), Outside Obstruction Loop (OOLD/OALD), or Center Loop (CLD).	1. Press RESET to clear error. 2. Remove and re-seat the HY-5B. 3. If needed, replace the HY-5B.
PRIMARY-SECONDARY COM	ERROR 4	3 chirps/s once per minute	The Smart DC Controller detects a communication error between primary and secondary in a dual gate installation. Several possible causes: • Primary/Secondary communication cable has not been installed correctly. • Primary/Secondary not configured properly through the Installer Menu. • Operator not properly earth grounded. • Primary/Secondary communication cable installed in same conduit as high-voltage AC power. • One operator does not have power applied to it. • One operator may have a different software version.	1. Correct communication cable. 2. Verify that each operator is configured properly through the Installer Menu. One operator must be set as Primary and the other as Secondary using the Installer Menu. 3. Install ground rod per NEC/NFPA standard. 4. Install separate conduit for communication cables. 5. Ensure AC power is present at both operators and all power switches are ON. 6. Check software version in operators by pressing RESET. Make sure both operators are running the same software version.
No display	ERROR 5	3 chirps/s once per minute	The display provides no indication of this error, but it can appear in the S.T.A.R.T. log and means that the Smart DC Controller has detected a serious internal error.	1. Report any instance of this error to HySecurity Technical Support. 2. Turn both power switches off to reset software. 3. Use S.T.A.R.T. to update the operator to the most current software version. 4. Replace Smart DC Controller.
MENU CHECKSUM	ERROR 7	2 chirps/s every 15s	Software issue exists that may require factory reset. Corrupt software or data.	Call HySecurity Technical Support for assistance.
RPM SENSOR	ERROR 8	3 chirps/s once per minute	RPM sensor disconnected. Motor Encoder or wires are damaged or unplugged.	Check wiring from the motor to the Smart DC Controller board.
BATT DISCONNECT	ERROR 9	3 chirps/s when detected	The Smart DC Controller cannot identify battery connection. The batteries are disconnected or a wiring fault exists. Automatically resets after one minute.	Smart DC operators ship with a wire disconnected to prevent battery drain. 1. Ensure the red wire's spade connector in the upper left corner of the control box is plugged in. 2. Correct any issues with battery wiring. 3. Check the 35 amp fuse on the circuit board. If blown, replace it.
ARM-WEDGE COM	ERROR 12		Communication between the arm and wedge controllers is lost.	See Primary-Secondary COM.

Adjusting the Dynamic Reversing Sensor

WedgeSmart DC uses a dynamic reversing sensor on the barrier arm and an inherent entrapment sensor for the wedge plate. A solid immovable object blocking the barrier arm and wedge plate will trip the sensor and cause the operator to stop, reverse and enter safe mode.

Installer Menu

DR = Dynamic Reversing Sensor

SE = IES Sensitivity

Available settings (0, 1, and 2), accessed through the Installer Menu, allow you to adjust the level of sensitivity. A maximum sensitivity of zero (0) is the default setting.

When changing the setting, consider the site design and vehicular gate traffic. It is recommended that you use the most sensitive setting while still allowing for reliable gate operation.

To adjust the sensitivity, take the following steps:

1. At a gate status display, press the MENU button twice. The CLOSE TIMER display appears.
2. Simultaneously, press the OPEN and RESET buttons to enter the Installer Menu.
3. Release the buttons and the LEARN LIMITS display appears.
4. Press NEXT until the DR display appears (SE for the Wedge board).
5. Use the SELECT and NEXT buttons to navigate and change the number on the display.
6. Press SELECT again to accept what appears on the display.
7. To exit the Installer Menu, press the MENU button. The gate status appears in the display indicating you have returned to Run Mode.

NOTE: On the WedgeSmartDC, you can also adjust the spring tension, in combination with the dynamic reversing sensor. A spring that is too tight can cause a false alert.

Other adjustments involved in the barrier arm reversal include:

- SR (IES Sensor Logic) provides two settings: Half second reversal or full open upon trigger. The default is ½ second reversal.

For more information, review settings in the "Installer Menu: Table 2." on page 34.

If the dynamic reversing sensor is tripped, a fault occurs and SAFE MODE will appear on the display. For more information, refer to the *"System Diagnostic Messages" on page 63*.

Conditions Affecting the Dynamic Reversing Sensor

Wind load:

In windy environments, large variations in motor current may occur. In these types of scenarios, you may want to use a higher number (less sensitive) setting.

NOTE: If you know a strong wind storm is imminent, removal of the barrier arm is recommended.

Barrier arm condition:

Gate hardware near salty sea air can rust and may impede gate travel over time.

Gate maintenance:

Barrier arms that are hit and bent should be replaced. In poorly maintained gate areas, the chance for false trips is higher.

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General Maintenance

Smart Touch Analyze and Retrieve Tool (S.T.A.R.T.)

HySecurity provides Smart Touch Analyze and Retrieve Tool (S.T.A.R.T.) software to help HySecurity gate operator users and installers conduct the following field service activities:

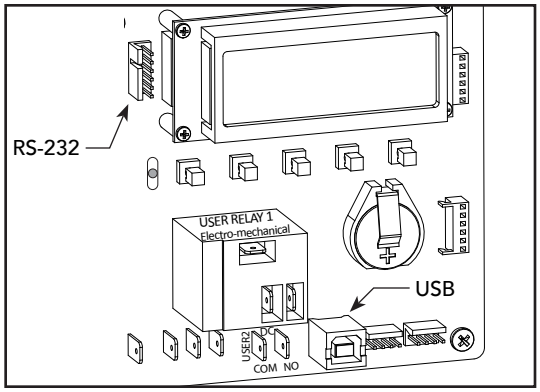
- Configure installer and user menu settings
- View the operator history (event) log
- Display monitored inputs for operator diagnostics
- Load Smart DC Controller (SDC) software

With S.T.A.R.T. software loaded on your laptop computer, you have an invaluable management tool for all HySecurity operators. The USB or RS-232 serial port (found on the Smart DC Controller), allows you to download system diagnostics and upload system configurations using the S.T.A.R.T. software. The free S.T.A.R.T. software is conveniently located at www.hysecurity.com. Instructions for downloading S.T.A.R.T. are on the website.

What You Need

Standard USB 2.0 A-B communications cable or a RS-232 to USB adapter. Be sure to install the appropriate USB driver for your laptop computer with Windows PC operating system (XP, Vista, Windows 7, or Windows 8).

- Minimum 128MB of RAM
- Minimum 5MB of hard drive disk space
- VGA graphics card (minimum resolution of 800 x 600)



Installing S.T.A.R.T. Software

Read the S.T.A.R.T. User Manual, and then take the following steps to download S.T.A.R.T. software:

CAUTION The latest version of S.T.A.R.T. is encrypted. An error message will appear stating that the file is corrupt if you try to load new operator code using outdated S.T.A.R.T. software. Be sure to "uninstall" any outdated versions of S.T.A.R.T. from your laptop and install the latest version from www.hysecurity.com.

1. Bring up your web browser and type in http://www.hysecurity.com in the command line.
2. Click Technical Support (left column) on the HySecurity home page.
3. Enter your user name and password. If you do not have a user name, register as an online member.
4. Click to Download: S.T.A.R.T. software for Smart Touch and Smart DC.
5. Read the End User License Agreement and, if you agree to the terms, click, "I accept" (bottom of page).
6. Click RUN. A setup window appears.

7. Follow the step-by-step instructions to complete the installation.*
8. When the download is complete, log out of the HySecurity website. Shortcuts for the S.T.A.R.T. and SDC History Logs appear on your laptop's desktop.

***NOTE:** Confirm you have administrative rights by clicking the following on your computer screen: Windows start ->Control Panel ->User Accounts ->User Accounts. See if your name appears as an administrator. If you are the only user of a computer, you are by default the administrator. If not, you may need to consult with your company's system administrator prior to downloading the HySecurity START program.

Software Maintenance

The software on the SDC board is periodically being enhanced with new features that create an easier install and improve the on board diagnostic tools. Be sure to check the HySecurity website for the latest version of software and operator code before heading out for field maintenance.

Electrical Controls

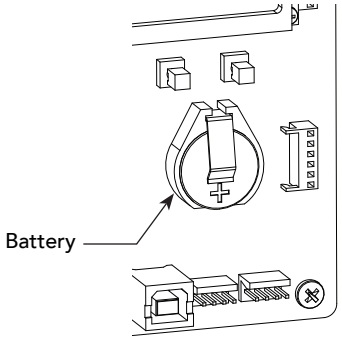
CAUTION

Before servicing, turn off all power disconnect switches.

No routine maintenance is needed for the electrical system or controls. If the environment is very sandy or dusty, or has many insects, be certain to seal all holes in the electrical enclosure. Blow the dust out of the electric panel with compressed air. Use the "Troubleshooting" to assess and fix error, alert, and fault codes. If it is necessary to call a distributor for assistance, be sure to have your model and serial number ready. Other helpful information includes the name of the job, approximate date of installation, software version, and the service record of the operator, especially if any work has been done recently.

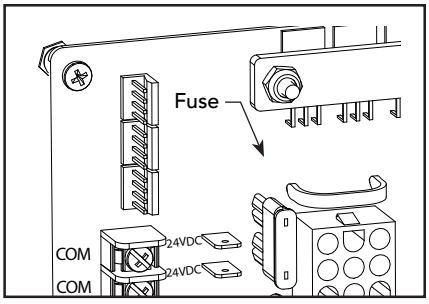
Clock Battery Replacement

A lithium coin battery supports the clock, so the date and time is retained even when the main power is turned off. Replace the battery about every two years (or as needed) with a DL 2025, DL 2032, or CR 2025, or CR 2032 battery.



Fuse Replacement

A 35A fuse is located next to the 24VDC power supply inputs on the SDC. It requires no maintenance, but if it were blown due to a power surge or other unusual circumstance, it must be swapped out with a new fuse. The symptoms of a blown fuse appear as a control system malfunction (i.e. all control systems may not work properly).



Mechanical Maintenance

CAUTION

Before working on the internal mechanisms of the operator, turn off all main power and disconnect switches.

The WedgeSmart DC mechanical maintenance is not in depth or difficult, but should be performed on a routine basis. The operator chassis is zinc plated, but some environments may speed corrosion of this plating.

Schedule regular maintenance:

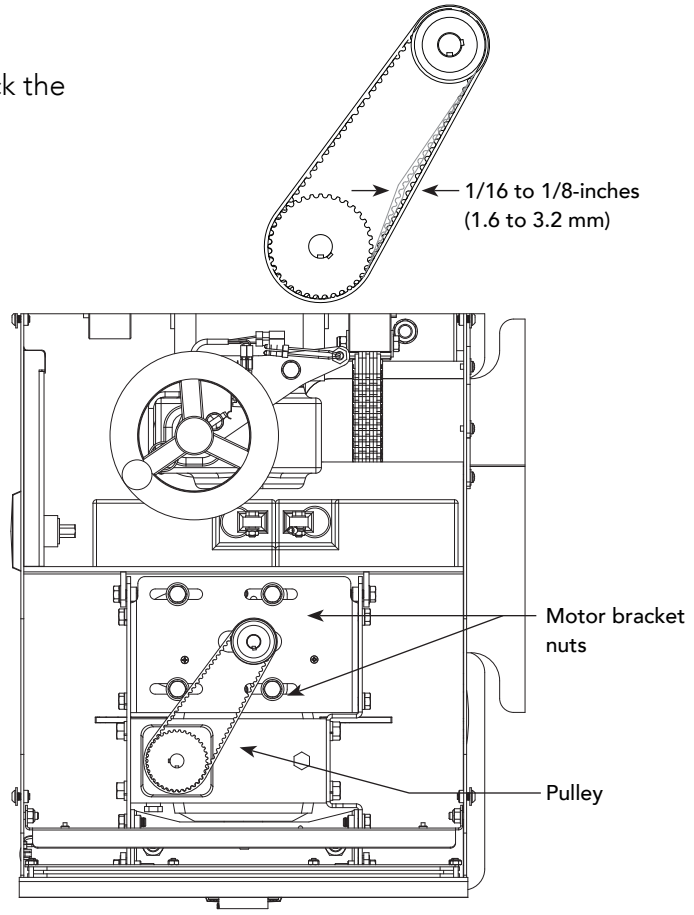
- Sweep debris out from under the wedge plate and replace the anti-slip strips as they become worn. Replace worn plate-end cover guards. See instructions on page X.
- Assess that the arm drive belt has the proper tension. Check for drive belt wear. Fraying edges or missing teeth indicate that the drive belt needs to be replaced. See steps below.
- Check the anchor strap for wear and replace if necessary. A frayed or extremely weathered anchor strap may compromise the impact resistance.
- Check for signs of rust. Reduce the spread of corrosion by treating the areas with a rust inhibitor.
- Replace worn-out batteries.
- Apply grease to zerk fittings on the chain pivot eye. Spread chain lube on both the plate and spring side chains.

Drive Belt Tension and Alignment

To prolong the life of the drive belt and maintain superior performance, proper drive belt tension is important. To check the drive belt tension, take the following steps:

1. Remove the front access panel and turn off the DC and AC disconnect switches.
2. Remove the top cover and drive belt cover.
3. Check to make sure the pulleys are aligned vertically.
4. With your finger, apply light pressure to the drive belt. If it is properly tensioned, it should move about 1/16 to 1/8-inch (16 to 32 mm).
5. To replace or re-tension the drive belt. Loosen the four motor bracket nuts and move the motor accordingly.
6. With the belt properly tensioned, retighten the motor bracket nuts.
7. Replace the drive belt cover and top cover.
8. Turn the AC and DC disconnect switches ON and replace and lock the access panel.

NOTE: Be aware that the operator will cycle open and close (close or open) as it relearns its limits. If you don't cycle the power, the operator will not "relearn" its limits and will not operate properly.



Drive belt tension and alignment

DC Battery Replacement

HySecurity provides a one year warranty from the date of shipment for all batteries supplied with the WedgeSmart DC operator.

Display indicators of a low battery include:

- LOW BATTERY or DEAD BATTERY appears on the Smart DC Controller display which may or may not be indicative of normal discharge.
- ALERT 18 CHANGE BATTERY appears on the Smart DC Controller display. The operator emits an audible chirp every minute to indicate a problem exists.
- AP (#) AC LOSS appears on the Smart DC Controller display. Gate operation is affected by AC power loss depending on customer preferences and the configuration set by the installer in the AP (#) AC LOSS User Menu.

Symptoms of a low battery may include:

- Gate remains locked in the open position
- Gate remains locked in the closed position
- Gate opens five seconds after AC power loss and locks open

CAUTION

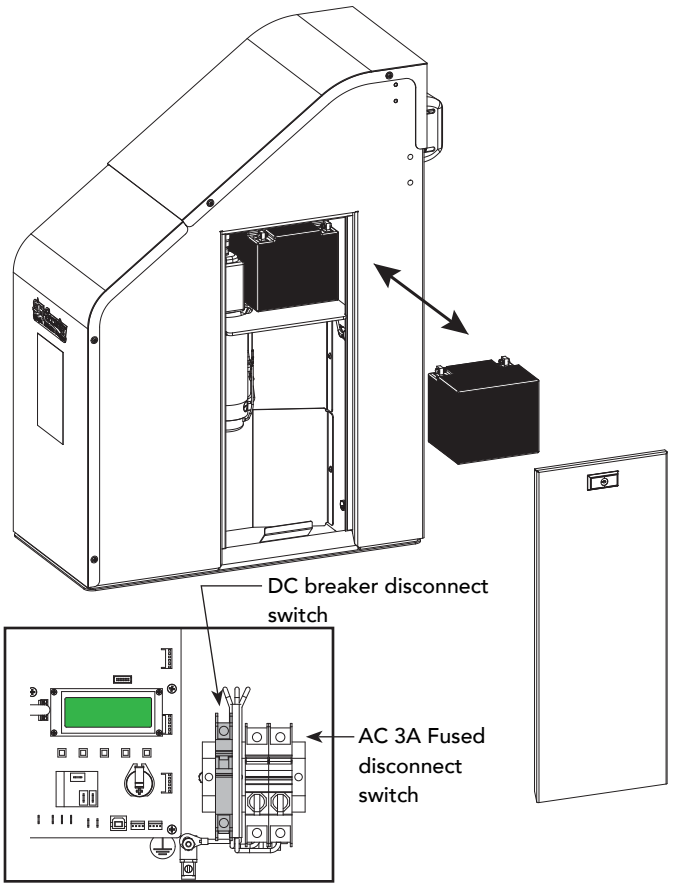
Before replacing the batteries, turn off all power switches. Use only AGM batteries as replacements. The batteries supplied in the WedgeSmart DC operator are state-of-the-art AGM batteries. Do NOT use flooded cell batteries as damage may occur to the unit. Wear protective clothing while working with batteries.

The two 50Ah batteries are accessible within the operator on a shelf next to the gear box.

To replace the batteries, take the following steps:

1. Remove the front access panel and turn off the DC and AC power switches.
2. Remove the side access panel and access the two 50Ah batteries. Cut the black wire ties holding the batteries to the shelf.
3. Disconnect the red, blue jumper, and black wires before removing the batteries.
4. To install the two new batteries, reverse the removal procedure.
   - Install the first battery and connect the black wire.
   - Connect the blue jumper wires between the two batteries.
   - Connect the red wire to the red terminal on the second battery.
5. Turn the AC and DC disconnect switches ON and replace and lock the access panels.

NOTE: Be aware that the operator will cycle open and close (close or open) as it relearns its limits. If you don't cycle the power, the operator will not "relearn" its limits and will not operate properly.



Cover Guard, Safety Striping & Bumper Replacement

CAUTION

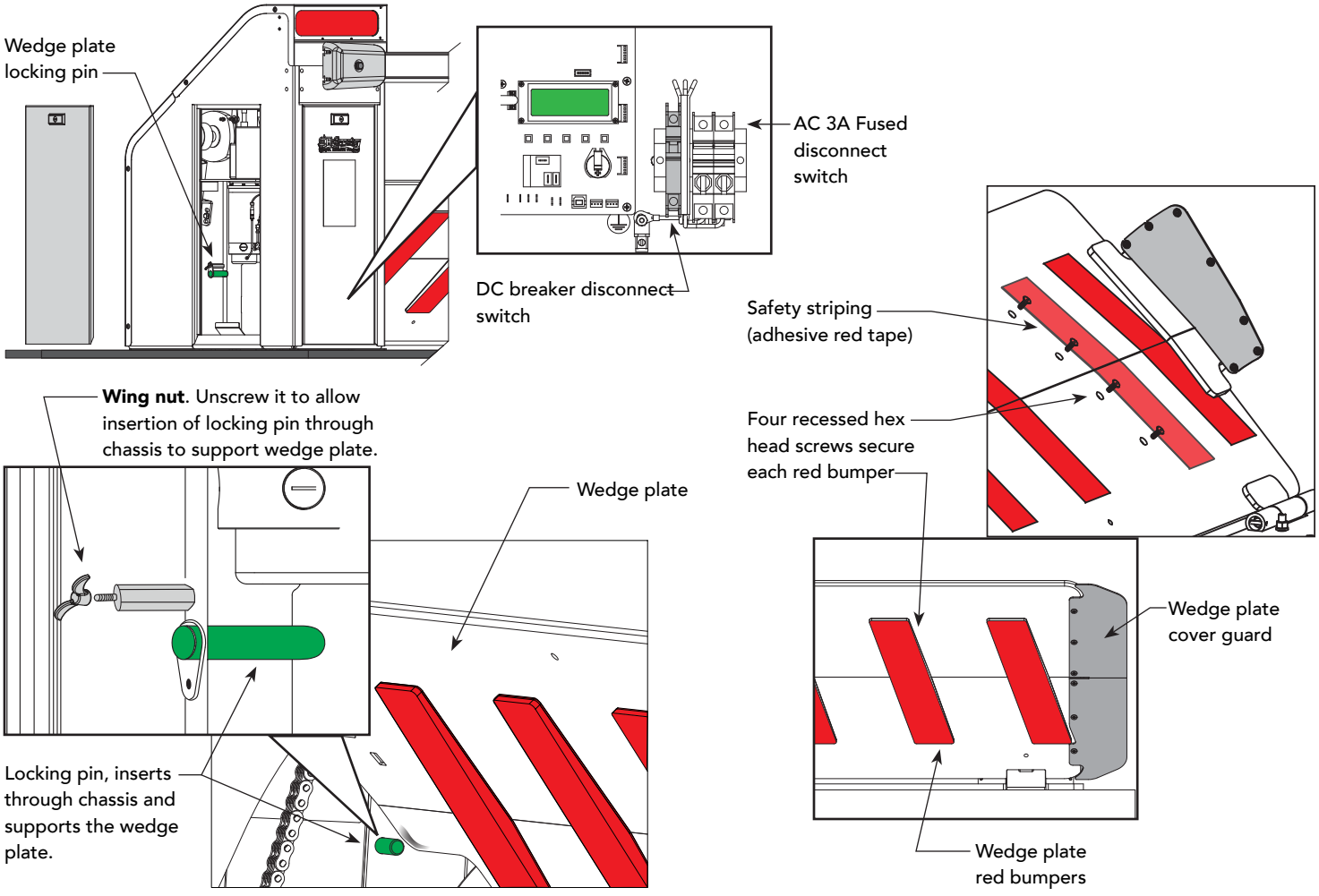
Before servicing, lock wedge plate in closed (plate up) position. Use the locking pin as shown in the illustrations. Turn off all power disconnect switches.

To secure the wedge plate in the closed (wedge plate up) position:

1. Remove the front access panel. To raise the wedge plate, press the CLOSE button.
2. When all movement stops, turn off the DC and AC disconnect switches.
3. Remove the side access panel and unscrew the wing nut securing the wedge plate locking pin.
4. To lock the wedge plate, slide the locking pin through the chassis so it engages beneath the wedge plate.

If worn or missing, replace adhesive safety tape, red bumper guards and wedge plate-end cover guard:

1. The screws that secure the red bumpers are recessed beneath the red safety tape on top of the wedge plate. Use gloves and a plastic scraper to remove the industrial strength adhesive tape.
2. Use a 3/16-inch hex wrench to remove the fasteners and replace the red bumper guards. Insert and tighten the fasteners and replace the adhesive safety tape with new tape from the kit.
3. To replace the wedge plate-end cover guard, use a flat-head screwdriver.



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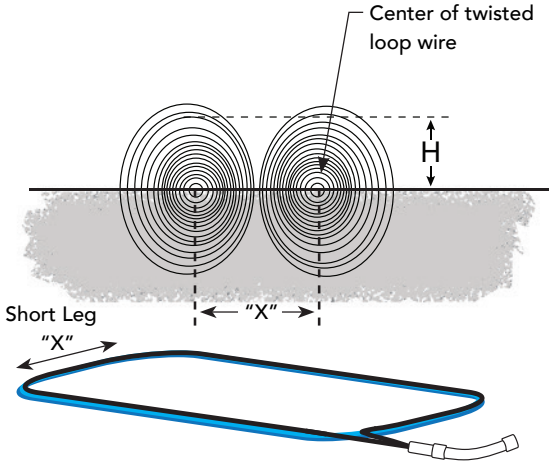
Loop Design

How a Vehicle Detector Works

An inductance field is created when the vehicle detector passes a small amount of alternating current through an in-ground, twisted wire, closed-loop system. A component of the vehicle detector measures the field's frequency. When a vehicle passes over an activated loop, the vehicle detector senses the resultant frequency drop in the inductance field and triggers the vehicle detector to output a command signal.

The effective height (H) of the loop's inductance field is two thirds (0.67) of the distance "X". To maintain a 4 foot (122 cm) inductance field height above ground level, the short side of the loop must be, at minimum, 6 feet (183 cm) in length. A minimum loop size consideration for detection of high bed vehicles is 6 x 6 feet (183 cm).



Multiply distance X by 0.67 (2/3) to determine effective height of vehicle loop. Inductance field created when loop is active. Twist in loop wire determines rotation of inductance field. Maximum loop size is 200 square feet.

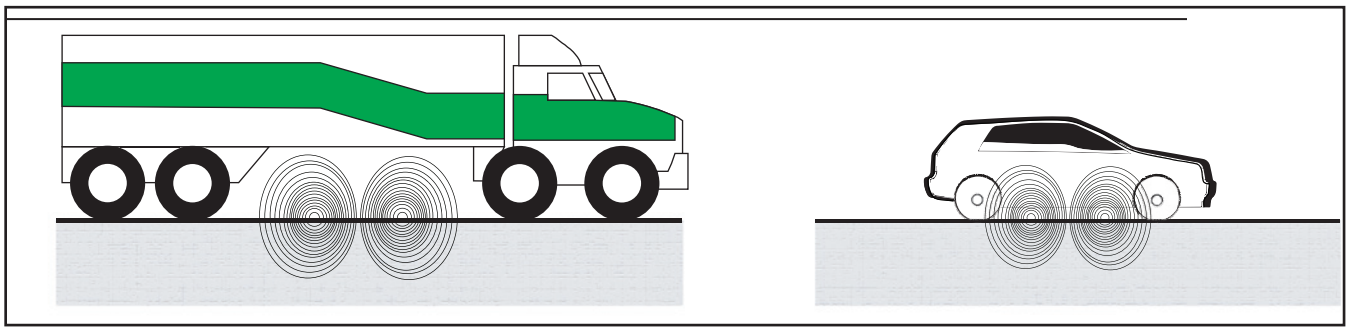
NOTICE: Any equipment (metallic object or item) that conducts electricity and is placed near the vehicle loop will change the frequency of the loop and affect the reading taken by the vehicle detector.

Site design considerations:

- Type of vehicular traffic using your site (high bed trucks, passenger vehicles, etc.).
- Proper size and number of vehicle loops (For general passenger vehicle detection, minimum loop size should be 4 x 6 foot (122 x 183 cm.) For truck traffic, minimum loop size is 6 x 6 foot (183 x 183 cm).
- Distance between threshold of gate opening and in-ground loop wire is a minimum of 4 foot (122 cm) (The exception to this rule is a Reset Loop used in barrier arm gates.
- To avoid possible frequency interference, be aware of the clearance between conduit that runs parallel to a loop. (Consider, at minimum, 1 foot (31 cm) of clearance.)
- Review loop layout scenarios provided in the product manuals or installation instructions.

CAUTION

Vehicle detector loops that are sized too small may not sense high bed trucks and, inadvertently, send an "all clear" signal to close the gate which could cause damage to vehicles or injury to personnel.



Loop dimension too small to detect high bed vehicle - Use HY-5A BOOST!

Properly size loops for the type of vehicles using your site

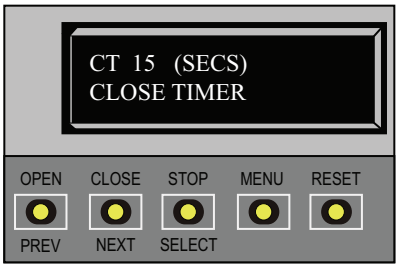
Access Controls and Vehicle Detector Loops

HySecurity automatic gate operators can be triggered to open or close through a variety of devices. An individual can affect normal open and close functions by:

- Using a key card or entry/exit access transmitter device such as a push button control
- Pressing the appropriate button on the operator's keypad
- Wiring to a separate input on the Smart DC Controller (SDC) board and connecting a push button control device (used for supervised access and for Emergency Close)
- Installing in-ground vehicle loops with the option to set the Close Timer (CT) plus a variety of other customizations through the Installer Menu.

Vehicle Detector Loop Configurations

Loop configurations differ depending on the application. All HySecurity gate operators can be designed for automatic use with one way traffic or bi-directional traffic. To assure closure, should the gate be left open, a closing timer can be set through the Installer Menu. It is provided as a back-up. The ideal means of automatic closure is created with vehicle detector loops. Gate closure begins when a vehicle passes through (first triggering then releasing), the two required loops.



In parking applications with a WedgeSmart DC operator, the center loop (B) may be as small as 4 ft x 6 ft (122 x 183 cm).

In other traffic applications, the smallest loop size must take into consideration the required height of the inductance field to detect the type of vehicles using your site.

WedgeSmart DC Vehicle Loop Recommendations

To initiate an automatic close command, the WedgeSmart DC operator requires two vehicle loops. See loop diagrams shown in this section and in the *Installation Instructions*.

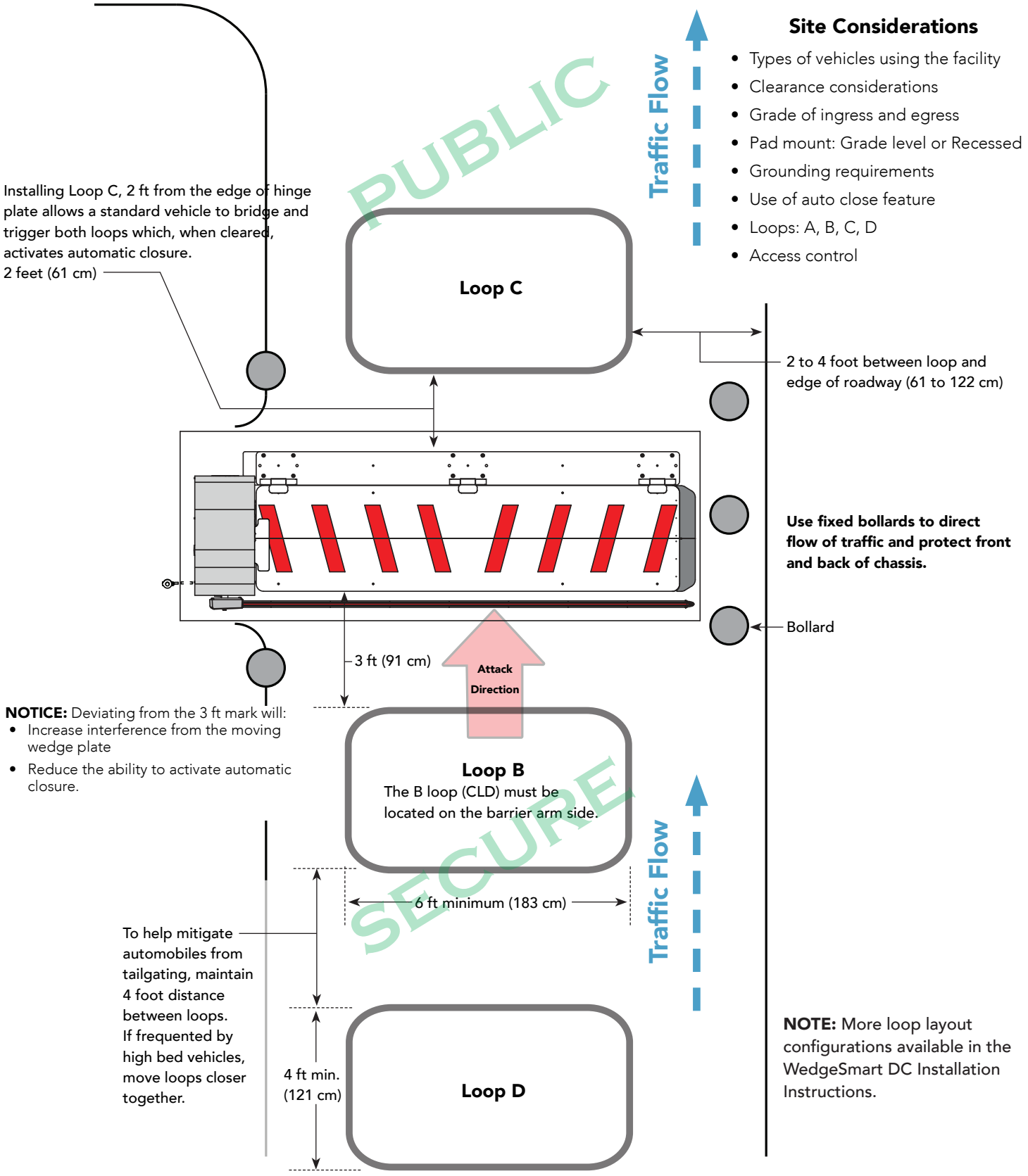
Loop Designator	HY-5A Connection	Smart DC Input Connection	Installer Menu Settings
A	OUTSIDE (Arming) OBSTRUCTION	OUT OBS LOOP	OALD, OOLD, OR
B	CENTER LOOP	CENTER	CLD, CR, CP
C	INSIDE (Arming) OBSTRUCTION	IN OBS LOOP	IALD, OALD, IR
D	EXIT LOOP (optional)	EXIT LOOP	ELD, DT, EB, CB

- To avoid interference from the wedge plate, the C loop must be centered in the road bed and, at minimum, 2 ft (61 cm) from the edge of the wedge base plate. The B loop must be placed on the barrier arm side and 3 ft (91 cm) from the moving wedge plate, so that most vehicles will be capable of tripping both the C and B loop vehicle detectors simultaneously, which will initiate an automatic close command once the loops are clear.
- If the gate is to be manually controlled with a push-button, one center loop is recommended. However, the addition of the C Loop will improve vehicle detection and reduce the risk that user inattention or excessive vehicle speed results in a vehicle hit.

WedgeSmart DC Loop Layout, Theft Prevention

Traffic Flow: Secure ---> Public

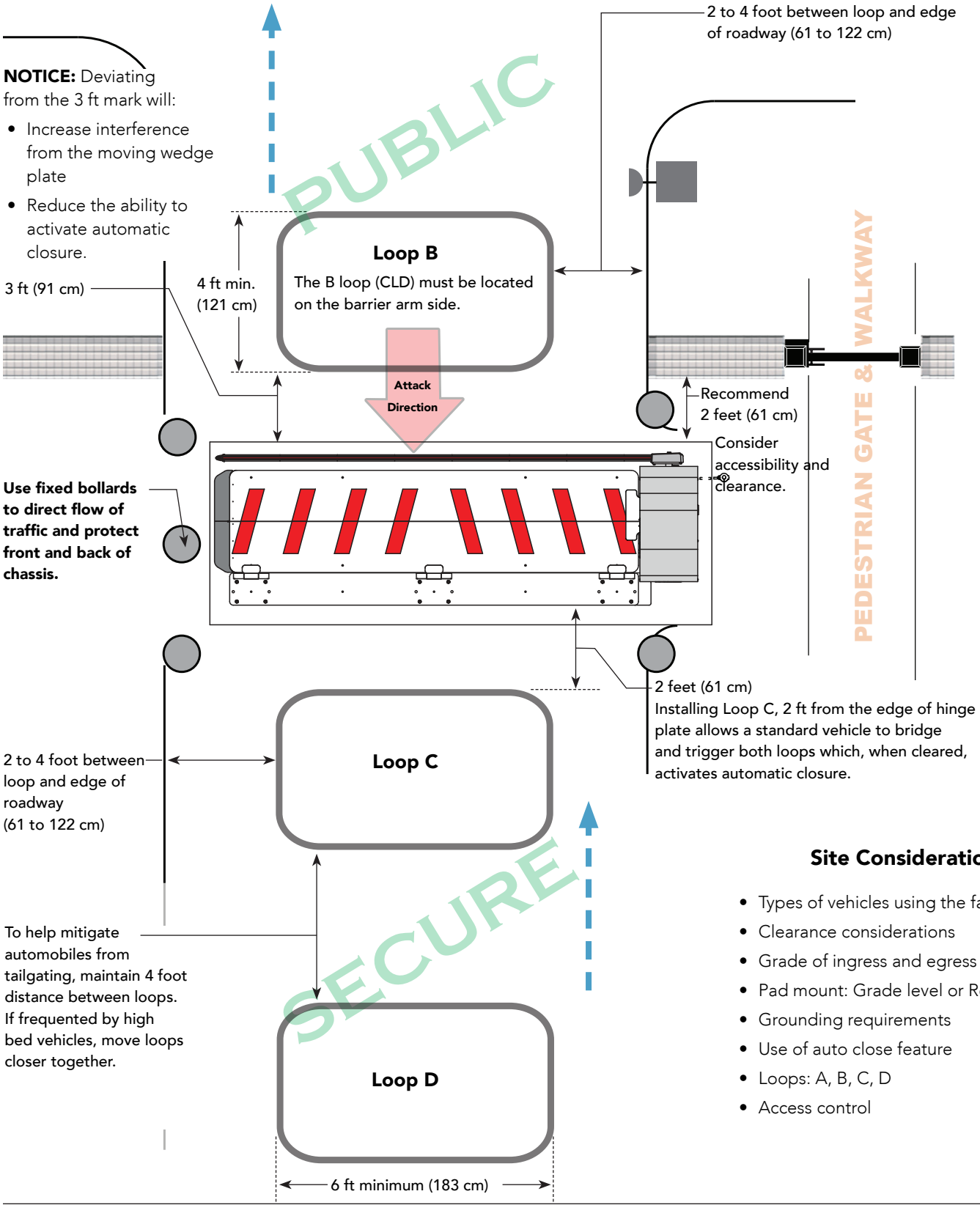
Typical Single Lane, One Direction Parking Garage Vehicle Loop Layout



WedgeSmart DC Loop Layout, Threat Protection

Traffic Flow: Secure ---> Public

Typical Single Lane, One Direction Parking Garage Vehicle Loop Layout



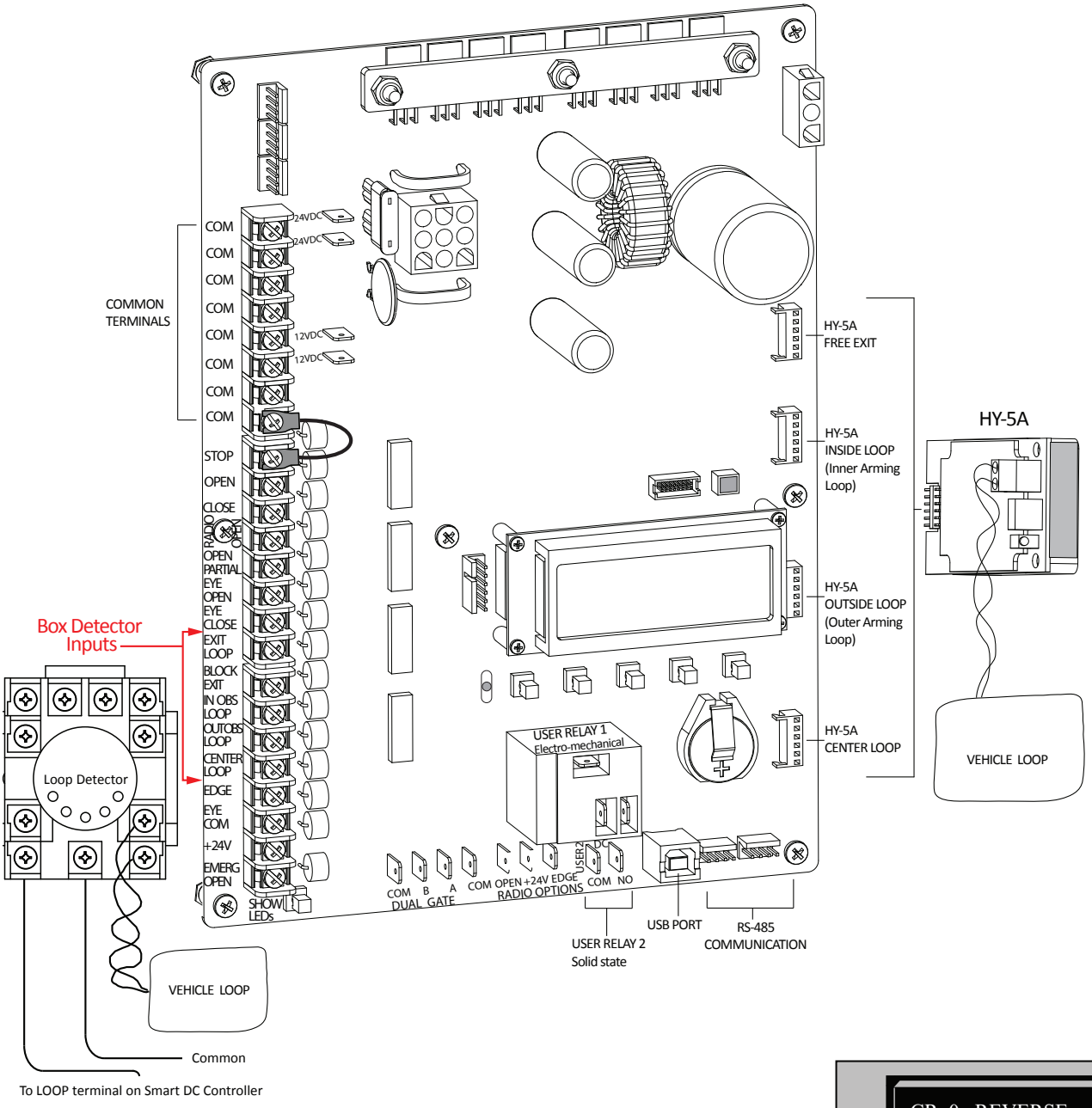
Site Considerations

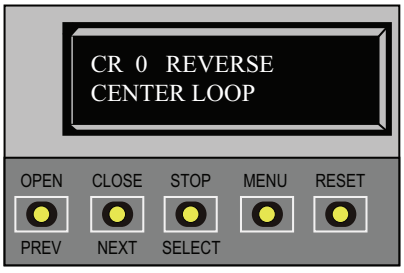
- Types of vehicles using the facility
- Clearance considerations
- Grade of ingress and egress
- Pad mount: Grade level or Recessed
- Grounding requirements
- Use of auto close feature
- Loops: A, B, C, D
- Access control

WedgeSmart DC Loop and Accessory Connections

Two different types of vehicle loop connections are shown in the illustration:

- HY-5A - HySecurity vehicle detector
- Generic box detector





NOTE: If you have a simple set up, similar to the single lane loop diagrams, the action of the gate, when the B loop (center) is triggered, can be changed.

See "CR" menu item in the "Installer Menu: Table 2." on page 34.

- Reopen fully
- Pause
- Continue closing

WedgeSmart DC Wiring Connections for Dual Gate

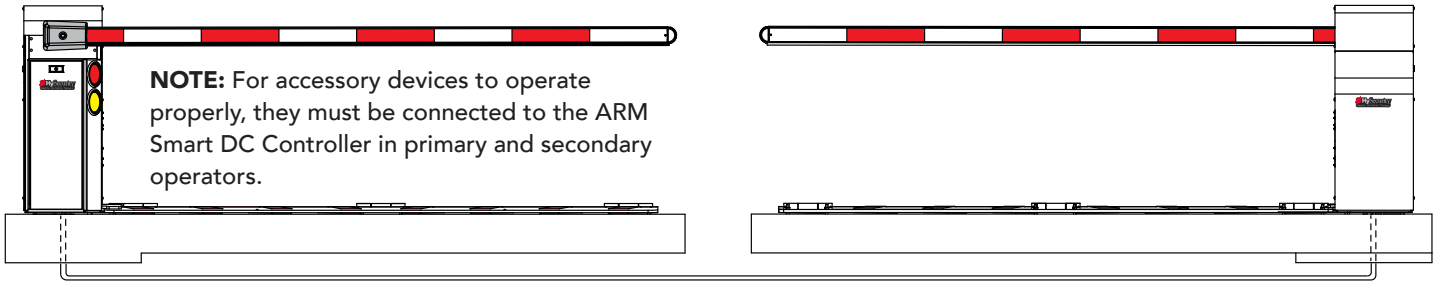
Configuring two operators in a dual gate system is easy with the Smart DC Controller. No need to order a special model or any adapters. The area of the board marked DUAL GATE employs a 3-wire, RS-485 serial port for communication between primary and secondary gate operators.

Power and Conduit Requirements

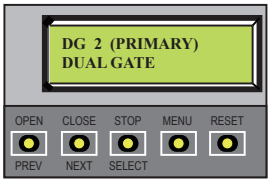
When installing a dual-gate system, the following must be adhered to:

- An electrical conduit for interconnecting wires must span between the two operators. The primary-secondary communication wires and any low voltage control wires must be installed in a conduit that is separate from the high voltage power wires.
- Complete the installation of both operators as separate machines and verify that their basic functions are correct as solo operators before interconnecting them.
- Be sure both operators are running the same software version. The software version is viewable on the display by pressing the RESET button on the operator. The software version appears beneath the word HYSECURITY.
- Keep the most current software loaded. It is available at www.hysecurity.com. Make it part of your maintenance routine to check for software upgrades on a regular basis.
- External control inputs (vehicle detectors and entrapment protection sensors) may be connected to either ARM (Model 1) Smart DC Controller in a Primary/Secondary configuration. The exception to this rule occurs if you want to perform a WEDGE open only. Wedge open only is wired to the Partial Open input on the WEDGE (Model 2) Smart DC Controller.
- Automatic closure of the gate operator requires two vehicle loops: Center Loop and Inner Arming Loop.

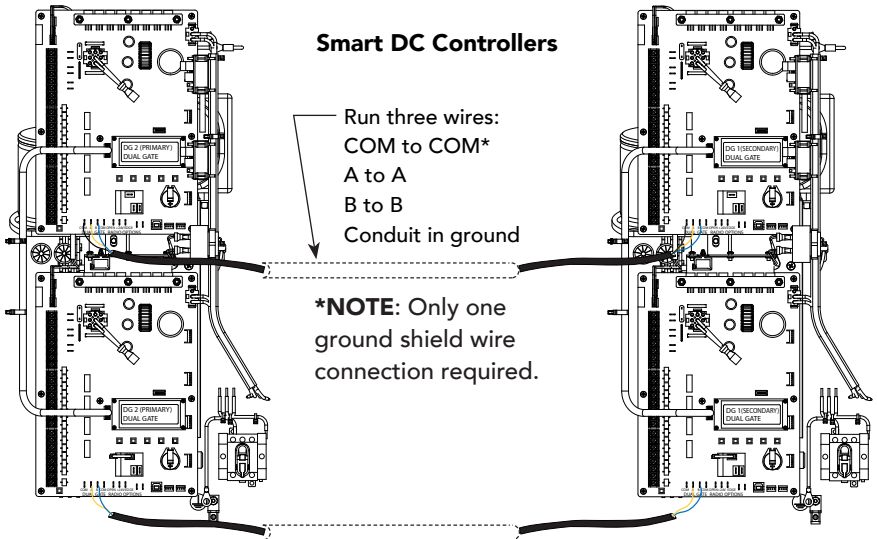
DUAL GATE: BI-DIRECTIONAL TRAFFIC



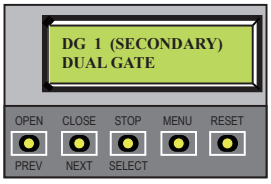
Installer Menu
DUAL GATE
PRIMARY



NOTE: Both Smart DC Controllers (Arm and Wedge), in the same operator, must be configured to the same Dual Gate setting.



Installer Menu
DUAL GATE
SECONDARY



WARRANTY

1. Warranty.

Hy-Security Gate, Inc. ("HySecurity") warrants that at the time of sale each of its products will, in all material respects, conform to its then applicable specification and will be free from defects in material and manufacture.

The following additional durational warranties apply to HySecurity products, depending on whether (1) the product is purchased through an authorized HySecurity 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 www.hysecurity.com), within the 60-day period described below.

1(a) HySecurity Products Purchased Through Authorized Distributors and Properly Registered

For any gate operator product that is purchased from an authorized HySecurity distributor (this excludes product purchased through internet resellers or any distributor not authorized by HySecurity), if the product registration is completed by the Dealer/Installer/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. Hydraulic Industrial Gate Operators: Five Years or 500,000 gate cycles (whichever occurs first) after the date of installation,
b. Electromechanical Slide and Swing operators: Five Years after the date of installation—unless installed in a single family residential application, in which case the warranty term shall be Seven Years after the date the product is shipped from HySecurity,
c. Electromechanical Barrier Arm Operators: Two Years or 1,000,000 gate cycles (whichever occurs first) after the date of installation,
d. Hydraulic Wedge Operators and Electromechanical Surface Mount Wedge Operator: Two Years or 500,000 gate cycles (whichever occurs first) after the date of installation;

provided that the preceding 5-year warranty period in (a) and (b) will not extend beyond seven years from the date that the product was shipped from HySecurity, and the 2-year warranty period in (c) and (d) 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-h), which have a shorter warranty period.

e. Hydraulic Gate Operator Drive Wheels including XtremeDrive™ wheels and rack: Two Years from date of installation.
f. AC and DC power supplies, chargers and inverters and HyNet module: Two years from date of installation, except batteries.
g. Batteries: One Year from date of shipment from HySecurity.
h. 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) HySecurity Products Not Purchased Through an Authorized Distributor or Not Properly Registered within 60 Days

For any product that is not purchased from an authorized HySecurity distributor or for which the product registration was not completed by the Dealer/Installer/End User within 60 days of the date of purchase, the following One-Year Limited Warranty will apply: HySecurity warrants that the product will remain serviceable for the following periods, which begin on the date that the product was shipped from HySecurity:

a. All Gate Operators: One Year or 100,000 gate cycles whichever comes first.
b. AC and DC power supplies, chargers or inverters: One Year.
c. HyNet module: One Year.
d. Hydraulic Gate Operator Drive Wheels: One Year.

1(c) Replacement Parts

HySecurity warrants that replacement parts (whether new or reconditioned) will remain serviceable for One Year from the date that the product 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, 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 another manufacturer's name plate 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.

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. Exclusion of Other Warranties.

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

3. Buyer's Exclusive Remedies for Any Nonconformity.

If a HySecurity 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 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 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.

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 retains and reserves all right, title, and interest in the intellectual property rights of its 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.

Warranty D0317 revised June 5, 2015

SPECIFICATIONS

Standard	**WedgeSmart DC**
Solar	**WedgeSmart DCS**
Crash Rated	SC40 – Small Car - 2,430 lb @ 40 mph (1.1 metric tons @ 64 km/h) FS30 – Full Size Sedan - 4,630 lb @ 30mph (2.1 metric tons @ 48 km/h)
Lane Width Max.	9, 10, 12, 14 ft
Open/Close Time	5 seconds up / 5 seconds down
Full Open Angle	Adjustable 90° ± 10°
Handing	Left handing standard right handing (optional)
Arm Design	Custom aluminum (standard)
	Articulating arm – 8 ft (2.4 m) or 9 ft (2.7 m) clearance, combination aluminum-PVC
Duty Cycle	Continuous
Uninterrupted Power Supply*	Two 12V, 50Ah batteries, Operates for over 150 cycles after AC power loss.* Field configurable to fail open or secure when batteries deplete.
Voltage Input	115VAC, 3A, 50/60 Hz, 208/230VAC, 1.5A, 50/60 Hz Solar: 24VDC solar panels
Accessory Power	12VDC and 24VDC 1A each
Temperature Rating	-13° F to 158° F (-25° C to 70° C) No heater necessary.
Communication	USB, RS-232, RS-485, Ethernet option
User Controls	Dual gate communication using two Smart DC Controllers with 70+ configurable settings, 32 character LCD display and 5 tact buttons or a PC using S.T.A.R.T. software.
Relays	Two configurable user relays: 30VDC, 3A solid state and 250VAC, 10A electromechanical. Hy8Relay option.
Foundation	3000 psi concrete
Warranty	2 years

* Actual UPS cycles depend on accessory power draw, frequency of cycles, battery health, ambient temperature and other conditions.