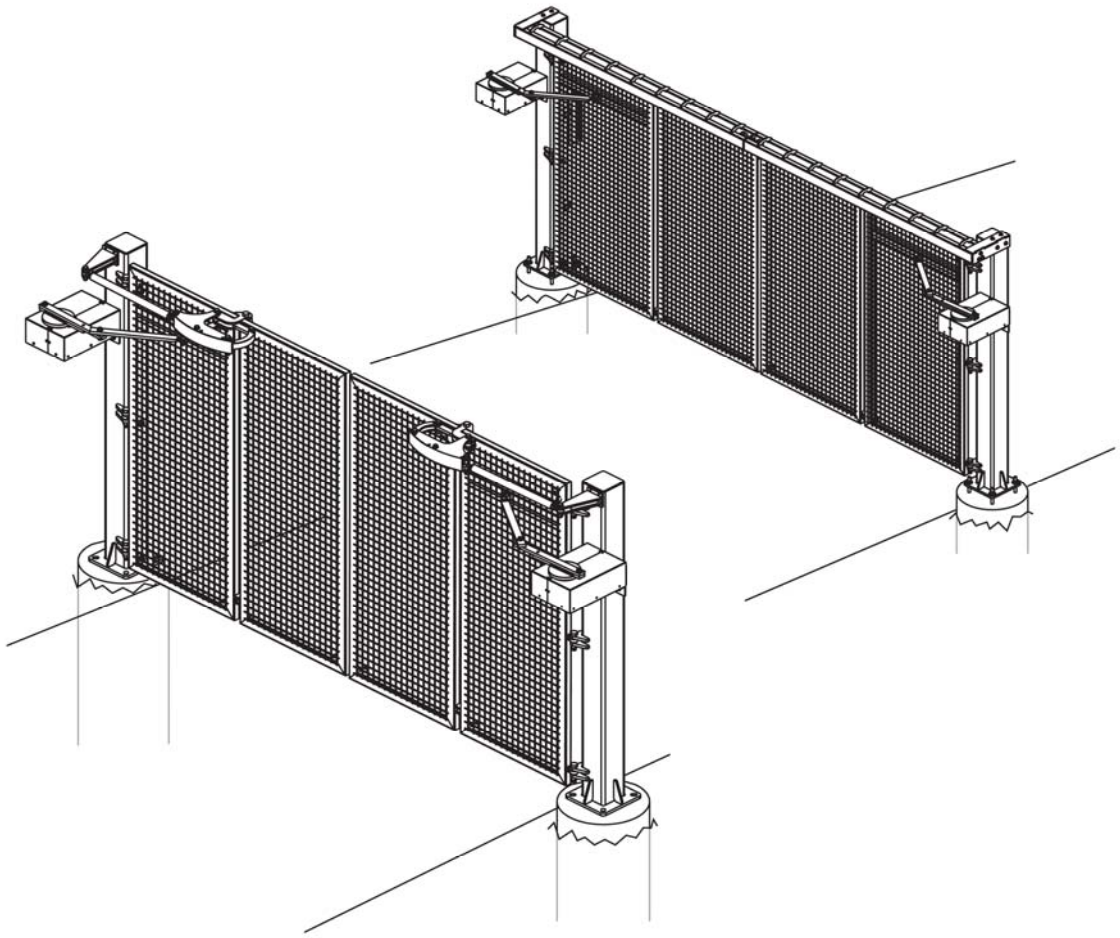
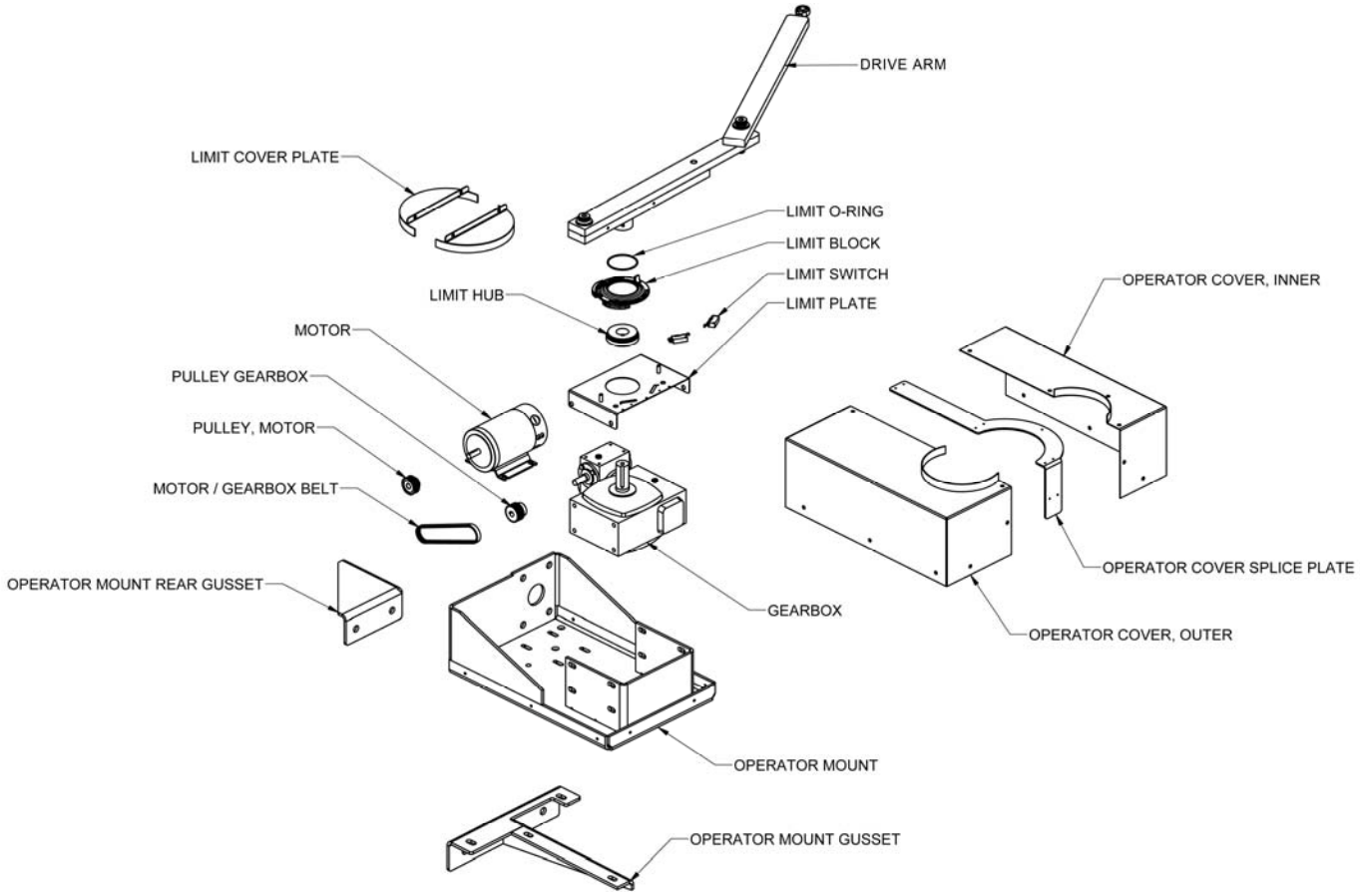


FoldSmart DC

Wallace International Reference Manual

Models: FoldSmart XT, FoldSmart TT, SpeedSmart DC and SpeedSmart DC HD


DRIVE ARM
LIMIT COVER PLATE
LIMIT O-RING
LIMIT BLOCK
LIMIT SWITCH
LIMIT HUB
LIMIT PLATE
MOTOR
PULLEY GEARBOX
PULLEY, MOTOR
MOTOR / GEARBOX BELT
OPERATOR MOUNT REAR GUSSET
GEARBOX
OPERATOR COVER, INNER
OPERATOR COVER SPLICE PLATE
OPERATOR COVER, OUTER
OPERATOR MOUNT
OPERATOR MOUNT GUSSET

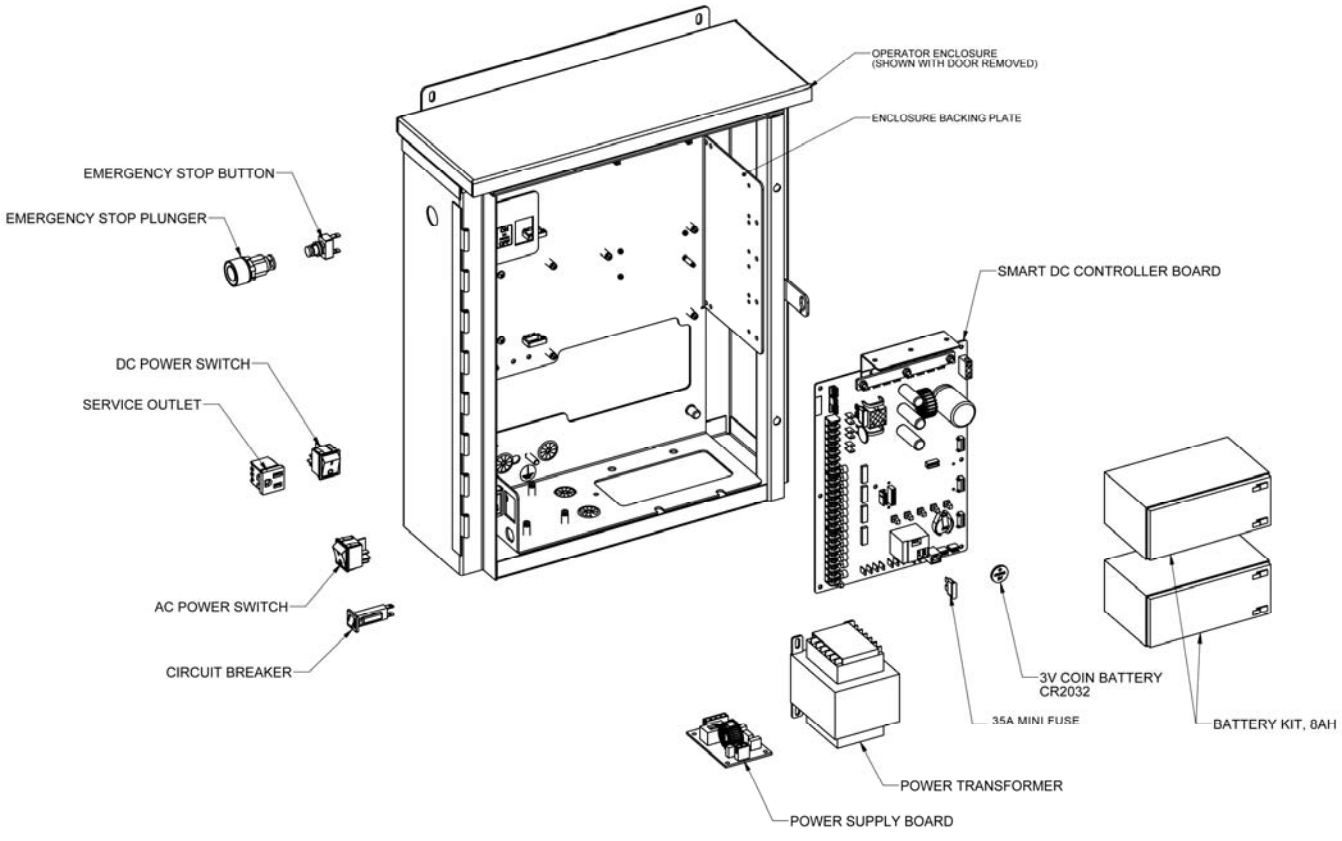

OPERATOR ENCLOSURE (SHOWN WITH DOOR REMOVED)
ENCLOSURE BACKING PLATE
EMERGENCY STOP BUTTON
EMERGENCY STOP PLUNGER
SMART DC CONTROLLER BOARD
DC POWER SWITCH
SERVICE OUTLET
AC POWER SWITCH
CIRCUIT BREAKER
3V COIN BATTERY CR2032
35A MINI FUSE
BATTERY KIT, 8AH
POWER TRANSFORMER
POWER SUPPLY BOARD

Table of Contents

Introducing FoldSmart DC

Robust - An especially strong twin channel steel chassis and manual disconnect greatly improves the ability for FoldSmart to resist damage from vehicle hits on the gate. The components on the Smart DC Controller are protected by opto-isolators which shield them from power surges and lightning strikes.

Power - A variable speed control board supplies a powerful, continuous 24V DC motor which drives a 600:1 gearbox providing variable speeds. The electronics, motor and gear box are rated to operate in very broad temperatures that range from -13°F to 158°F (-25°C to 70°C). FoldSmart DC is rated for gates up to 20 feet long and 1,300 pounds.

Finesse - A variable rate of gate acceleration and deceleration, dependent upon gate weight and length, assures very smooth handling.

Adaptable - The design incorporates left and right gate arms to assure aesthetic functionality

UPS backup - Two 12V, 8 amp hour (Ah) batteries will provide a fully functional gate system (up to 300 gate cycles) when AC power is unavailable. Four user-selectable UPS modes are available. 12VDC and 24VDC are available to power access controls.

Intelligent Features: Smart DC Controller™

Automatic adjustment and synchronization of bi-parting gates - The Smart DC Controller automatically adjusts the gate speed to synchronize the left and right gates so that they reach the open and close positions at the same time. Independent leaf delay adjustment for bi-parting gates is selectable in ½ second increments.

Menus and User relays - The Smart DC Controller has 48 menu items to allow installer configuration of gate function and two user relays, which can be configured for 25 different functions.

Independent adjustment for open and close gate speeds - An easy-to-use menu on the Smart DC Controller allows the installer to vary the open and close speed settings in a range between 10 and 15 seconds.

Intelligent Inherent Entrapment Sensor (IES) - Any impediment to gate travel is sensed by the system, stopping gate movement per UL 325 Safety Standards. The intelligent system monitors gate power then adapts the IES to trip at an adjustable threshold above normal power.

Improved Liquid Crystal Display (LCD) - A 32-character LCD provides increased readability for programming and troubleshooting.

USB communications port - A direct connection provides accessibility to download system diagnostics and upload system configurations using the Smart Touch Analyze and Retrieve Tool (S.T.A.R.T.) software.

S.T.A.R.T. software and diagnostics - With S.T.A.R.T. software loaded on a laptop computer, you have an invaluable management tool for all Smart DC operators. To download this free software, visit the Wallace International website at wallaceintl.com.

Technical Support

For technical support, call Wallace International at 1-866-300-1110. Obtain the serial number of your operator before calling. Refer to the blow-apart image on the inside of the front page.

For information about Wallace International training for installers, maintenance personnel and end-users, refer to the company website at ***www.wallaceintl.com*** or call 1-866-300-1110.

Installer's Check List

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

- □ Site Prep - concrete pad location/dimensions/distance from gate, conduits and vehicle detector loops properly installed, gate bracket and linkage arm mounting considerations.
- □ Make sure gate installation complies with ASTM F2200 Specification for Automated Vehicular Gate Construction and UL325 Safety Standards. Install supplied WARNING signs on both sides of the gate.
- □ Check for compliance with local codes, site conditions, and NEC standards.
- □ Install operator on gate column with included hardware.
- □ Temporarily attach gate bracket and linkage arm(s).
- □ Adjust open and close limit switches through manual operation of the gate.
- □ Complete gate arm installation.
- □ Cut the excess off the over extension stop (angle iron) on the FoldSmart arm.
- □ Install the earth ground and AC wiring connections for AC power.
- □ Connect battery wire to switch.
- □ Complete Initial Setup Menu programming.
- □ Review the connections on the Smart DC Controller.
- □ Install Master/Slave operator connections, if the site is a bi-parting gate system.
- □ Attach accessory devices.
- □ Configure the User and Installer Menu options. Program applicable settings dependent on accessory devices installed.
- □ Set the Close Timer (in the User Menu), if necessary.
- □ Check the Smart DC Controller software version. If needed, upload the latest version from www.wallaceintl.com. See Smart Touch Analyze and Retrieve Tool (S.T.A.R.T.).
- □ Give a copy of the operator instructions to the end user. Show the end user how to:
- □ Remove the operator covers. Turn the power off and on.
- □ Turn the DC power switch off, which disengages the motor.
- □ Loosen the manual disconnect and manually push the gate(s) open & close.
- □ Remember to re-tighten the manual disconnect before turning the DC power switch back on and replacing the covers.
- □ Test the red Emergency Stop Button located on the side of the control box.
- □ Take photographs of the completed installation site and send them to service@wallaceintl.com.

Safety Requirements

Automatic gate systems provide user convenience and security. However, because these machines can produce high levels of force, it is imperative that gate system designers, installers and end users be aware of potential hazards associated with improperly designed, installed, or maintained systems. The gate system is only one component of the total gate operating system. It is the joint responsibility of the architect, site designer, purchaser, installer and end user to verify that the total system is appropriately configured for its intended use. Additionally, certain municipalities have established licensing, codes or regulations that regulate automated gate system design and installation. Consult local government agencies for up-to-date rules and regulations prior to gate system design or installation.

Important Safety Instructions

WARNING

A moving gate can cause serious injury or death. Start the gate system only when the gate's travel path is clear.

Hazards, associated with automatic gates, can be reduced with proper site design, installation, and use. Installers, maintenance crews, and owners/users must read and follow the Important Safety Instructions in this manual and review all the literature that accompanies the product. It is important that only qualified installer's handle the installation of the FoldSmart gate system. A "qualified" installer has one of the following:

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

Underwriter Laboratories (UL) and the American Society for Testing and Materials (ASTM) are responsible for current safety standards and regulations regarding gate systems and automated gates. To pass UL certification, all aspects of gate installation must comply with the appropriate safety standards. For the most up-to-date, ASTM F2200 Gate and Fence Standards, refer to ***www.astm.org***. For UL 325 Safety Standard, refer to ***www.ul.com***.

Safety Standards - Installer's Responsibility

- **Study the entire contents of this manual prior to installing, operating, or maintaining the FoldSmart gate system. Taking extra time to align the gate system and verify a fully functional installation will reduce maintenance, guarantee longest system life, and ensure customer satisfaction.**
- **Verify the gate system usage class for the site. Refer to Identifying Gate Operator Category and Usage Class for gate classifications. Install FoldSmart only when the gate system class is correct for the site, size, and type of gate.**
- **Install an automatic operator only on gates that comply with ASTM F2200 Gate and Fence Standards. Screen or enclose openings in the gate per UL 325 Safety Standards.**
- **Before attaching the operator to the gate, move the gate in both directions. Make sure it is level and moves freely. A gate that swings easily reduces strain on operator components. Gravity should play no part in the opening or closing of the gate.**

- **Make sure there is a separate walk-through entrance nearby. Make certain a clear pedestrian path is designated and signs direct pedestrians to the walk-through gate. The automated gate entry is for vehicle use only. No one should cross the path of a moving gate.**
- **Mount access control devices beyond reach of the gate. The control devices that operate the gate must be:**
  - **Located in a clear line of sight to the gate.**
  - **Mounted beyond 6 feet 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.**
- **The gate system must be properly grounded and the incoming power voltage must match the voltage label on the junction box.**
- **Install enough external entrapment protection sensors so that pedestrians are protected from entrapment in both directions of the gate travel and all hazard areas and possible pinch points are fully protected. Review the information found in Secondary Entrapment Protection Sensors.**
- **Install the supplied WARNING signs on the inside and outside of the gate so they are clearly visible from both sides of the gate. Installing the signs is a requirement for UL 325 compliance.**
- **Locate controls (Open, Close, Stop/Reset) where a user will have a clear view of the gate. Refer to the Emergency Stop Button. Connect radio and other remote access (non-resetting controls) to the REMOTE OPEN terminal.**
- **Connect radio and other remote access (non-resetting controls) to the RADIO OPTIONS terminals.**
- **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 per UL 325 Safety Standards. Have a qualified technician test the gate monthly.**
- **When you complete the installation, show the end user how to:**
  - **Remove the operator covers and turn the power off and on.**
  - **Turn the DC power switch off, which disengages the motor.**
  - **Loosen the quick disconnect and manually push the gate(s) open & close.**
- **Remember to re-tighten the quick disconnect before turning the DC power switch back on and replacing the covers.**
- **Test the red Emergency Stop Button located on the side of the control box.**

NOTE

Gate system instructions must be given to the owner per UL 325 Safety Standards.

Safety Standards - Owner/User Responsibility

WARNING

A moving gate can cause serious injury or death. Automatic gate systems move gates with high force. Make sure gates and gate systems are installed to reduce the risks of entrapment. Verify your gate system complies with UL 325 Safety Standards and ASTM F2200 Gate and Fence Standards. Ask for a copy of the gate system's product literature and review it. You are responsible for educating all gate system users about proper use of the automated gate system. Failure to adjust and test the gate system on a regularly maintained schedule can increase the risk of injury or death.

- **Automatic gates are for vehicular use only; provide and maintain walkways and signs to direct pedestrians to a separate walk-through entrance.**
- **An automatic gate can start at any time without warning; always keep people away from the gate area.**
- **Never let children operate or play with gate controls. Keep all remote controls, especially radio transmitters, away from children. Do not allow children to play on or around the gate.**
- **Learn how to turn the power on and off. Learn how to manually release the gate.**

CAUTION

Before attempting a manual release, make sure the gate is not moving.

- **WARNING signs supplied with the gate system must remain installed and clearly visible on both sides of the gate. The signs are required to maintain UL 325 compliance.**
- **Never disable the Warn Before Operate buzzer and NEVER disconnect or cut its wires. The buzzer provides an alert that the gate is about to move and it must be functional in the event of entrapment regardless of UL 325 gate usage class. Disabling the warning buzzer may increase the risk or extent of injury if entrapment occurs.**
- **Test the gate system monthly. Specifically, test the primary Inherent Entrapment Sensor (IES) and secondary entrapment protection sensors. The gate must stop upon contact with a rigid object, and stop or reverse direction, when an object activates the non-contact sensors. After adjusting the force or the limit of travel, retest the gate system. Failure to adjust and test the gate system on a regularly maintained schedule can increase the risk of injury or death.**
- **Have a professional gate installer routinely test the entire gate system and entrapment protection sensors. Have a qualified service person make repairs to gate hardware to keep the gate running smoothly.**

Hazardous Materials and Proper Disposal

FoldSmart uses sealed, state-of-the-art Absorbed Glass Mat (AGM) batteries and highly recommends replacing used batteries with new AGM-type batteries.

CAUTION

The batteries used with the FoldSmart gate contain materials that are considered hazardous to the environment. Proper disposal of the battery is required by federal law. Refer to federal guidelines found in Hazardous Waste Regulations.

To reduce the risk of fire or injury to persons:

- **Observe the polarity between the batteries and charging circuit.**
- **Never mix battery sizes, types, or brands. Wallace International strongly recommends that only sealed AGM style batteries be used.**
- **Exercise care in handling batteries. Be aware that the metal found in rings, bracelets, and keys can conduct electricity, short the batteries, and cause potential injury.**
- **Do not open or mutilate the batteries. Battery cells contain corrosive materials which may cause burns and other injuries. The material within batteries is toxic.**
- **Always dispose of batteries properly. Do NOT place batteries in fire. The battery cells may explode. Follow federal guidelines for proper disposal of hazardous waste.**
- **Replace batteries according to the instructions found in DC Battery Replacement.**

Secondary Entrapment Protection Sensors

FoldSmart is equipped with a primary, Type A, inherent entrapment sensor (IES). UL 325 Safety Standard compliance requires installation of secondary entrapment protection sensors, the number of which, depends on the entrapment hazards that exist at each particular installation.

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

- **Contact sensors, such as edge sensors**
- **Non-contact sensors, such as photoelectric eyes**

The site designer or installer can choose either photoelectric eyes or edge sensors or use these devices in combination. Whatever devices are used, protection in both the opening and closing directions of gate travel must be provided.

The UL 325 Safety Standard for automatic swinging gates specifically requires that edge sensors or photoelectric eyes or a combination of both devices be installed to protect against pedestrian entrapment in BOTH directions of the gate travel and where an entrapment hazard exists.

PHOTOELECTRIC EYES: One or more photoelectric eyes shall be located where the risk of entrapment or obstruction exists, such as the perimeter reachable by a moving gate.

CAUTION

A photoelectric eye or contact sensor is also required to protect against possible entrapment if the gate opens to a position less than 16 inches (40.6cm) from any object, such as a post or wall.

EDGE SENSORS: One or more edge sensors shall be located on the inner and outer leading edge of a swing gate where the risk of entrapment or obstruction exists. If the bottom edge of the swing gate is situated more than 6-inches (152 mm) above ground level at any point in its arc of travel, one or more contact sensors must be located on the bottom edge, as well.

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

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

UL 325 LISTING: The edge sensors and photo electric eyes must be tested and labelled as “Recognized Components” under UL 325 in order to be deemed acceptable for use in a gate system. Study the Important Safety Instructions and consider your specific installation to determine where the greatest entrapment risks exist. Locate edge sensors and/or photoelectric sensors accordingly.

Be certain that a sufficient number of sensors are used so that pedestrians are protected from entrapment in both directions of the gate travel and all hazard areas are fully protected. Refer to the UL website at ***www.ul.com*** for the most up-to-date list of gate system safety standards (UL 325). Refer to ***www.astm.org*** for a complete list of ASTM F2200 Gate and Fence Standards.

Identifying Gate System Category and Usage Class

The FoldSmart gate system, according to UL 325 Safety Standards, falls in the Swing Gate and Vertical Barrier Arm category for gate systems. Its usage class is determined by the area that the vehicular gate services. Four different vehicular usage classes are defined by UL 325:

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

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

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

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

Choosing Secondary Entrapment Protection

The site designer or installer must determine which secondary entrapment sensor devices will be installed with the FoldSmart operator to meet UL compliance. The type of entrapment sensor device systems are described below. For a complete listing of the requirements, see UL 325 Safety Standards.

NOTE

FoldSmart is equipped with a primary, Type A, inherent entrapment sensor (IES) that complies with UL 325. Any impediment to gate travel causes the gate to stop and reverse.

Usage Class	Primary Type Device	Secondary Type Device
Class I, II, III	A	B1, B2, C, or D
Class IV	A	B1, B2, C, D, or E

To comply with UL 325, refer to the chart and take the following steps:

Select the Usage Class according to the gate's locale and purpose.
The required UL 325 primary Type A sensor is an integral part of the FoldSmart gate system.
Based on the gate's usage class, choose Secondary Type Devices: B1, B2, C, D, or E.

- **To comply using B1 - install non-contact sensors (photoelectric sensor or the equivalent).**
- **To comply using B2 - install contact sensors (edge sensor device or the equivalent).**
- **To comply using a Type D device requires a CONSTANT HOLD push-button station. This CONSTANT HOLD push-button station must be the only device that opens and closes the gate. It can only be used where the gate and push button station will be monitored by personnel 24 hours a day in full view of the gate area. An automatic closing device (such as a timer, loop sensor, or similar device) must not be employed. A Warning placard stating, "WARNING - Moving Gate has the Potential of Inflicting Injury or Death - Do Not start the Gate Unless the Path is Clear" must be placed adjacent to the gate system controls.**

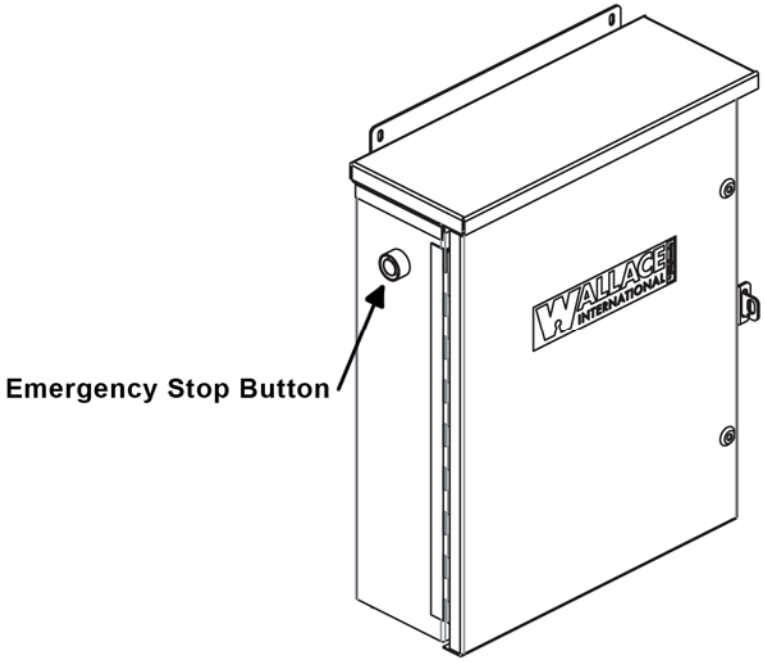
CAUTION

While compliance is possible with Type C, which is a low force limiting clutch, the FoldSmart operator develops more gate actuation force than is permitted under the UL 325 Safety Standards and, therefore, its clutch cannot be considered an entrapment protection device.

Similar compliance issues exist with a Type E device (audible warn before operate alarm). A Type E device is permitted as a means of secondary entrapment protection by UL 325 in Class IV applications, but it is not recommended by Wallace International because a buzzer warns, but cannot protect against possible entrapment. Wallace International highly recommends, even for Class IV use, that secondary entrapment protection (edge or photo-eye sensor) devices be installed to detect possible entrapment.

Emergency Stop Button

An emergency stop button that is accessible from the outside of the operator is a requirement for compliance with UL325 Safety Standards. The red emergency stop button on the FoldSmart operator is located on the side of the control enclosure.



Pressing the emergency stop button while the gate is opening or closing disables the automatic close timer and stops gate travel. The gate travel remains stopped until the operator receives any open or close signal.
Make sure all users of the gate know where the emergency stop button is located.

Emergency Release

Make sure to teach all users how to turn off electric power and how to move the gate manually FoldSmart allows a gate to be pushed manually if the quick disconnect bolt is removed from the actuator arm. It is recommended that you turn off DC power which disengages the motor allowing you to easily move the gate.

When you turn DC power off, the following occurs:

- **The motor disengages which keeps it from running should any relay or open/close leaf functions be set.**
- **The GATE NO LOAD (FAULT 4) may appear on the display.**

To manually open the gate(s), take the following steps:

1. **Remove the covers and turn off.**
2. **Removed the quick disconnect bolt using the included key.**
3. **Swing the gate(s) open or close.**

To return FoldSmart to automatic operation, take the following steps:

1. **Make sure the gate(s) is not moving.**
2. **Reinstall the manual disconnect.**
3. **Flip the DC power switch ON.**
4. **Clear any faults by pressing STOP or RESET.**

Wind Load Factors & Site Prep

Wind load is always a factor when considering the appropriate gate for a particular site. Solid gate panels produce a larger wind load than gates with slats or open decorative features. If you are installing a gate system in high wind areas, the gate design will affect the load on the gate system. Because wind force acts the same as an obstruction, it is important that gates be designed to present a relatively low surface area for the wind to push on the gate panel.

If the gate is heavy and near the weight capacity of what the gate system can handle (see specifications for FoldSmart on the back cover), make sure it has an open design that allows wind to flow through it. A solid or semi-solid gate design under certain wind load conditions may cause damage to the gate system and is not covered by the ***Wallace International*** Limited Warranty.

Several factors play into the calculations of the wind load on a gate panel. To find out the maximum wind speed in areas around the United States/Canada, search for US/Cdn. government wind speed maps on the internet. If you don't know how to calculate for wind load, ask a mechanical engineer or site architect for assistance prior to installing the gate system and gate panels.

FoldSmart incorporates a primary Type-A inherent entrapment sensor (IES) into its design per UL 325 Safety Standards. (More information about adjusting the adaptive IES software can be found in this manual under Adjusting the IES Sensitivity.) When the IES trips, it sends a signal to the gate system to stop and reverse direction. This feature may be falsely triggered in excessively windy conditions because the wind itself, acting over the surface area of the gate panel, can provide the necessary force to trigger the IES.

⚠ CAUTION

Do not adjust IES sensitivity to accommodate for inappropriately designed gate panels. Loss of IES sensitivity increases mechanical wear on the gate hardware and the gate system. It may also pose a safety hazard. Compensating for wind loads by adjusting the IES may set the IES sensitivity to a level which, when encountering an obstruction, ignores the obstruction and fails to reverse direction. For more information, refer to Adjusting the IES Sensitivity.

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.

CAUTION

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

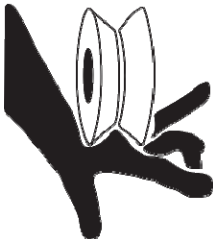
Common Industrial Symbols

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.

Attention - Take Notice

DANGER - Keep Away

Entrapment Zone



Possible Pinch Point

Power

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 systems. National Electric Code (NEC) requires a separate earth ground in addition to the required equipment ground.

Wallace International recommends grounding the operator with a separate earth ground connected to a ground rod to assure proper operation and shield it against electromagnetism and other electrical signals that may cause erratic operation with or damage to the Smart DC Controller.

NOTE

If you do not ground the operator with a separate earth ground rod, you risk voiding the Limited Warranty.

For earth grounding requirements, refer to the National Fire Protection Association (NFPA) 780 - ***Standard for the Installation of Lightning Protection Systems/Canadian Standard.*** Highlights of the standard include.

- **The ground rod is a solid copper rod: minimum requirements: ⅝" (16mm) diameter and 10 feet (3m) 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.**
- **Local jurisdictions may impose additional requirements above the NEC and NFPA 780. Consult the local codes and regulations regarding requirements in your area.**

Take the following steps to comply with NEC and NFPA 780 standards:

1. **Install a grounding rod per local building codes. See Figure 2-1.**
2. **Attach a ring terminal to the earth ground wire (6 AWG) and terminate at the labelled grounding location in the AC junction box.**

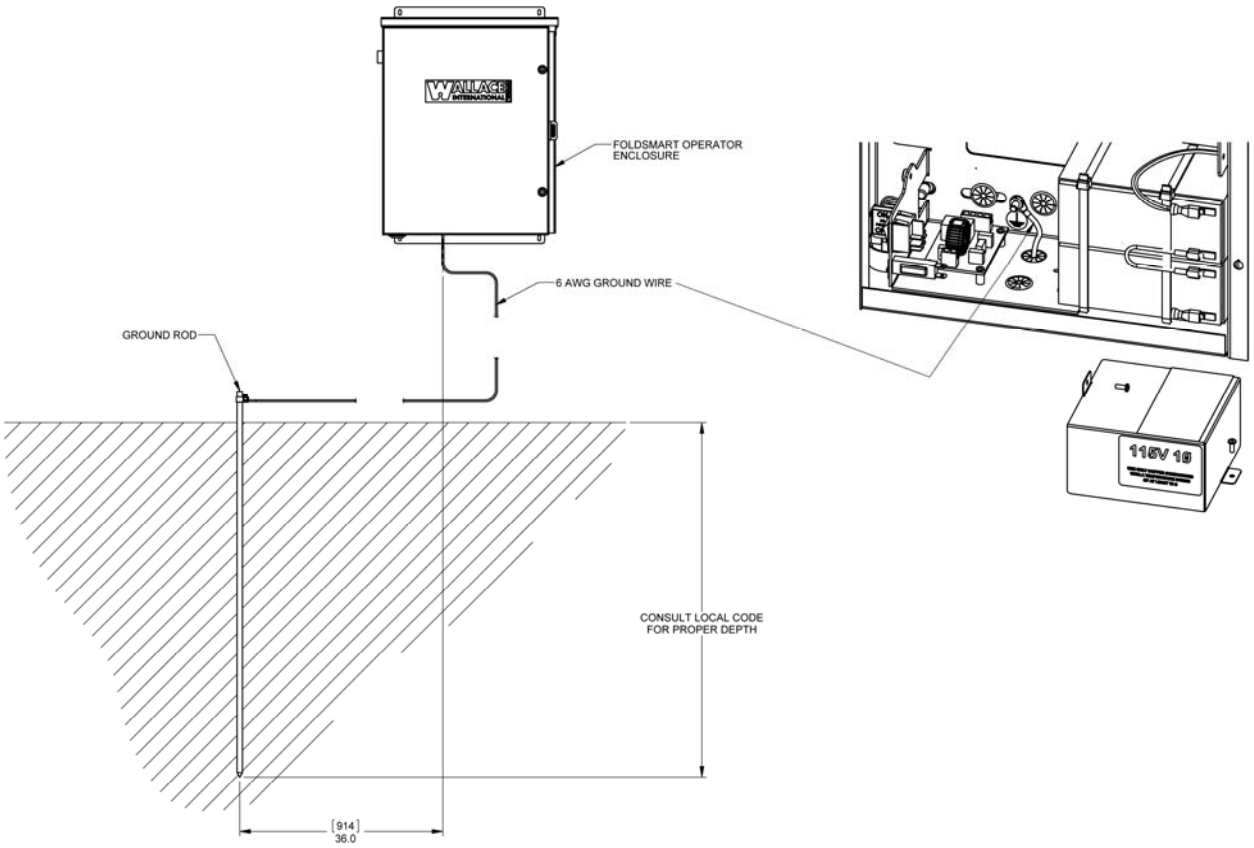


Figure 2-1.

Properly grounding the gate system is critical to gate system performance and the life of its electrical components. Use sufficient wire size during installation. Refer to Wiring 115VAC Power or Wiring 208/230VAC Power.

Wiring AC Power

DANGER

Turn off AC power at the source (circuit breaker panel) before accessing the wires in the FoldSmart junction box. Follow facility Lock Out/Tag Out procedures. Make sure both the DC and AC power switches, on the side of the FoldSmart control box are in the off position. See Figure 2-2.

WARNING

Wiring of gate systems must conform to the NEC standards and comply with all local codes. If you plan to connect to 208/230VAC power, read the WARNING in Figure 2-2. The voltage selector switch on the AC Power board must be moved to the 230V position or damage to the operator will occur and void the Limited Warranty.

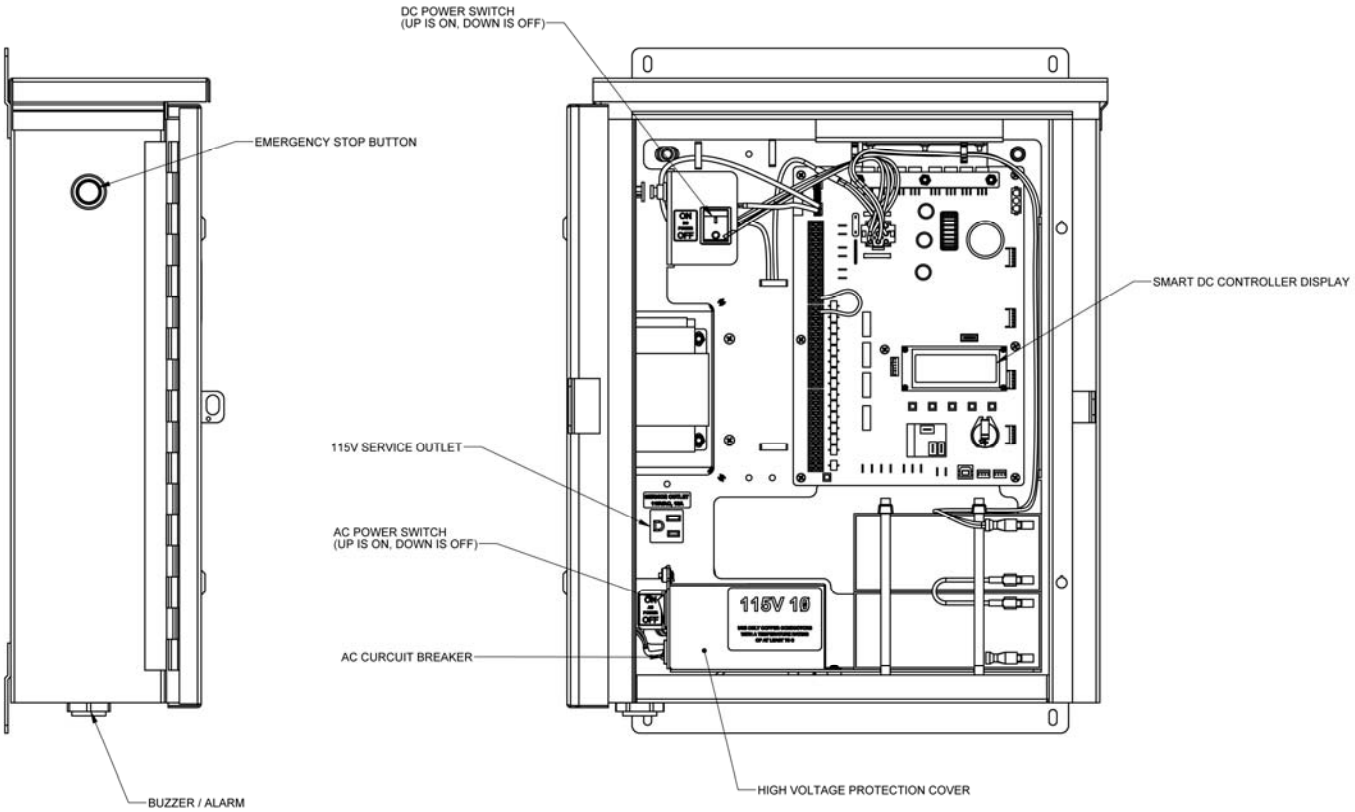


Figure 2-2.

Wiring 115VAC Power

For standard 115VAC power connection:

- **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 FoldSmart operation if the high and low voltage wires are routed through the same conduit.**

- **Maximum gate system current draw is 3 Amps on a dedicated 115VAC circuit (20A dedicated circuit is recommended).**
- **Make sure proper wiring is being used. The following table shows the maximum allowable wire run from the power source to the operator for various wire sizes.**

Table 2-1. 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)

Table 2-1 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.

To connect to 115VAC power, take the following steps:

1. **Make sure the AC power is turned off at its source and the DC and AC power switches on the operator are in the off position.**
2. **Access the input power wires and service outlet wires by removing the two Phillips-head screws that secure the high voltage junction box cover. See Figure 2-2.**

NOTE

The service outlet wires are solid copper and are labelled and bound together to keep them separate from the AC power switch wires.

3. **Terminate the power supply wires to the corresponding black and white lead wires terminated in the top of the screw terminal termination strip.**
4. **Terminate the equipment ground wire to the corresponding green ground wire terminated in the top of the screw terminal termination strip.**
5. **To activate the 115VAC service outlet, include the black and white outlet lead wires and the green ground wire in the connections made above.**
6. **Neatly organize all wire connections and replace the high voltage junction box cover. Secure it with the two Phillips-head screws.**

Wiring 208/230VAC Power

CAUTION

All FoldSmart operators are shipped from the factory as 115VAC units. When connecting to 208/230VAC power, the voltage selector switch on the AC power board must be moved to the 230V position or damage to the operator will occur and void the Limited Warranty.

For the 208/230VAC power connection:

- **Verify AC power supply wires and low voltage (12V & 24V accessory power wires) run through two separate conduits as discussed in Wiring 115VAC Power.**
- **Maximum gate system current draw is 1.5 Amps on a dedicated 208/230VAC circuit (20A dedicated circuit is recommended).**
- **Make sure proper wiring is being used. Refer to the following table:**

Table 2-2. Wire Gauge versus Run for 208/230VAC

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)

Table 2-2 assumes a dedicated circuit. Additional loads require that the wire size be increased or the distance of the run be decreased.

To connect to 208/230VAC power, take the following steps:

1. **Make sure the AC power is turned off at its source and the DC and AC power switches on the operator are in the off position.**

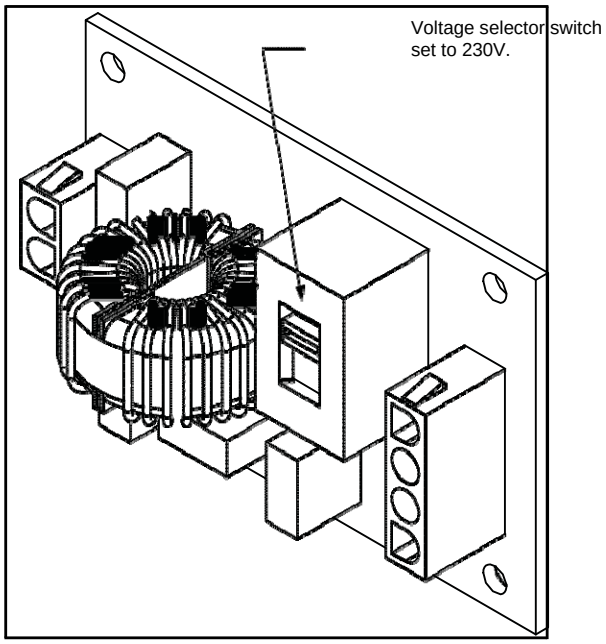


Figure 2-3.

2. **Remove the High Voltage Protection cover by unscrewing the two Phillips-head screws that secure it.**
3. **Toggle the voltage selector switch from 115V to 230V. Replace the High Voltage cover and secure it. See Figure 2-3.**

4. **Access the input power wires by removing the two Phillips-head screws that secure the High Voltage Junction Box Cover. See Figure 2-2.**

5. **Terminate the power supply wires to the corresponding black and white lead wires terminated in the top of the screw terminal termination strip.**

6. **Terminate the equipment ground wire to the corresponding green ground wire terminated in the top of the screw terminal termination strip.**

DANGER

To use the service outlet with 208/230VAC, a separate neutral wire (white) must be run from the power source. Make sure the incoming power wires are sized appropriately to support the load expected on the service outlet. Follow guidelines per the National Electrical Code Article 250.

7. **Neatly organize all wire connections and replace the high voltage junction box cover. Secure it with the two Phillips-head screws.**

8. **Place the 208V or 230V 1Ø label on the Junction Box Cover over the 115V 1Ø label.**

Connecting DC Power

To connect the DC power:

1. **Turn off the DC and AC power switches.**
2. **Attach the red spade connector to the battery terminal on the DC power switch.**

Important Considerations for DC-Power Connection

- **Since the operator is intended to run on batteries, control of the load is important. 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 a series circuit: Join the positive (+) terminal from one battery to the negative (-) terminal of the next battery.**
- **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.**
- **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. Refer to Hazardous Materials and Proper Disposal.**

⚠ WARNING

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.

- **Batteries are rated to perform to capacity at certain temperatures. Variations in temperature affect performance of the batteries. An example of amp hour performance is shown in Table 2-3. Wallace International supplies a heater option that mounts near the battery pack, providing residual heat which guards against amp hour loss in colder climates.**

Table 2-3. Amp Hour - Example of Battery Performance

Temperature	Capacity
77°F (25°C)	100
32°F (0°C)	80
-22°F (-27°C)	50

- **Wallace International uses a permanently sealed AGM-type battery which last much longer than wet cell batteries and needs no maintenance over its life span. Batteries are protected from over discharge by a low voltage sensing circuit. The charger circuit**

regulates to allow high charger output when the battery is partially discharged. The charger circuit automatically reduces the output to near zero as the batteries become fully charged.

NOTE

The FoldSmart operator 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 and Menu Options

This section of the manual provides information about the display and menu options. It includes how to:

- **Turn both AC and DC power switches on.**
- **Configure the Setup Menu**
- **Review how to use the Smart DC Controller Buttons in Menu Mode**
- **Review Run Mode and Gate Status Displays**
- **Access and Configure User Menu Options**
- **Adjust the Close Timer**
- **Set the Time and Date**
- **Set the AC Power Loss Gate Function**
- **Adjust the Display Contrast**
- **Access and Configure Installer Menu Options**
- **Set the Open and Close Gate Speed**
- **Adjust IES Sensitivity**
- **Enable Fire Department Access**
- **Reinstate Factory Defaults**

It describes what you will see on the display and explains the functionality of the buttons. User and Installer Menu charts provide information about peripheral connections and the corresponding menu items that need to be configured.

INITIAL SETUP

Once you've completed the installation of the FoldSmart operator and attached the wired accessories, you're ready to program the operator. Two different approaches exist:

- **Connect a laptop computer to the USB or serial (RS-232) port and upload the gate settings and set the operator menu configurations via the S.T.A.R.T. software.**

NOTE

Use a laptop computer at your place of business to conveniently download the free S.T.A.R.T. software from www.wallaceintl.com before heading out into the field. A S.T.A.R.T. User Guide is also available online.

- **Manually navigate through the User and Installer Menus using the buttons located on the Smart DC Controller. The instructions for performing this second option are provided in this section.**

Turning Both Power Switches On

One AC and one DC rocker power switch are located on the outside edge of the control box. Refer to Figure 3-1.

1. **Turn both power switches ON. An audible beep occurs and a red light pulsates next to the OPEN button on the Smart DC Controller which indicates the system is functioning.**

NOTE

If AC power is lost, the rate of flashing slows down. Other indicator lights are described below.

2. **The software version briefly appears on the LCD display and the display settles on one of the following modes:**

   - **Gate status - indicates the operator is in Run Mode. Refer to Run Mode.**
   - **Usage class - indicates that the Setup Menu, which consists of four sequential displays, needs to be programmed. Refer to Configuring the Setup Menu.**
   - **Error message - indicates a problem exists with the operator which needs to be resolved before the operator can function properly. Refer to Smart DC Controller Troubleshooting.**

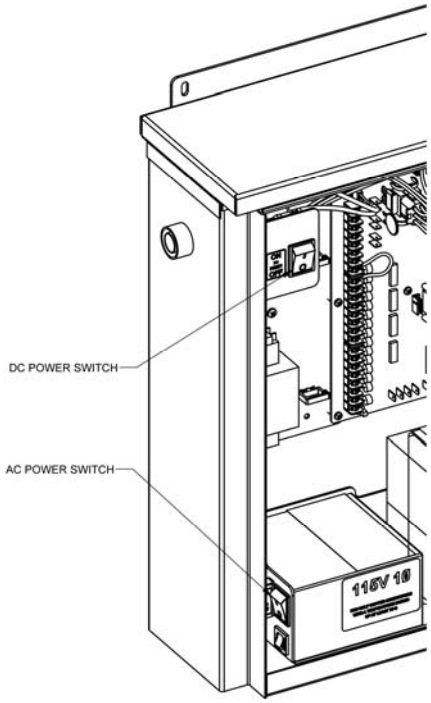


Figure 3-1.

NOTE

The Smart DC Controller can be powered when either switch is turned on. However, the operator is a DC-powered unit and runs on its batteries. If the DC power switch is off, the operator will not function (even though the AC power switch is on). When the operator is

connected to AC power and the unit is turned on, the charge level of the battery is being monitored and maintained.

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 electronics board is receiving power. When AC power is lost, the rate of flashing slows down. Another indicator light, above the display, is multi-colored and corresponds to the action that the operator is performing:

- **Green - the operator is stopped.**
- **Flashing yellow - the operator is running.**
- **Red - the operator has experienced an error.**

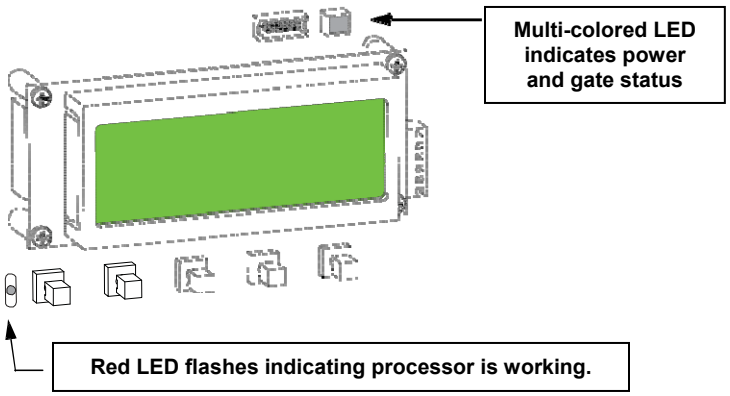


Figure 4-2.

- **Not lit - AC power is lost. Pressing the SHOW LEDs button indicates which inputs, if any, are active.**

Using the Smart DC Controller Buttons In Menu Mode

The buttons on the Smart DC Controller let you navigate, change, or clear the information in the display menus. Refer to Figure 3-2.

The buttons with text above and below are variable function keys (VFK). Use these buttons to enter or change operational data and navigate through the User and Installer Menus. The singular use of a variable function key is dependent on operator mode. Three different modes exist:

- **Run Mode - gate is operational awaiting commands. Refer to Using the Smart DC Controller Buttons In RUN Mode:**
  - **RUN Mode.**
  - **Menu Mode - motor disengages and operator commands are ignored. Data entry, menu navigation, and menu selection can be accomplished via the Controller buttons or through a S.T.A.R.T. software connection using the USB port.**
  - **Fault Mode - errors, faults or alerts appear on the display. Some errors or faults can be reset with the STOP button while more serious faults require the RESET button or cycling power, and then pressing RESET. Faults indicate a need for diagnosis and resolution. Refer to Smart DC Controller Troubleshooting.**

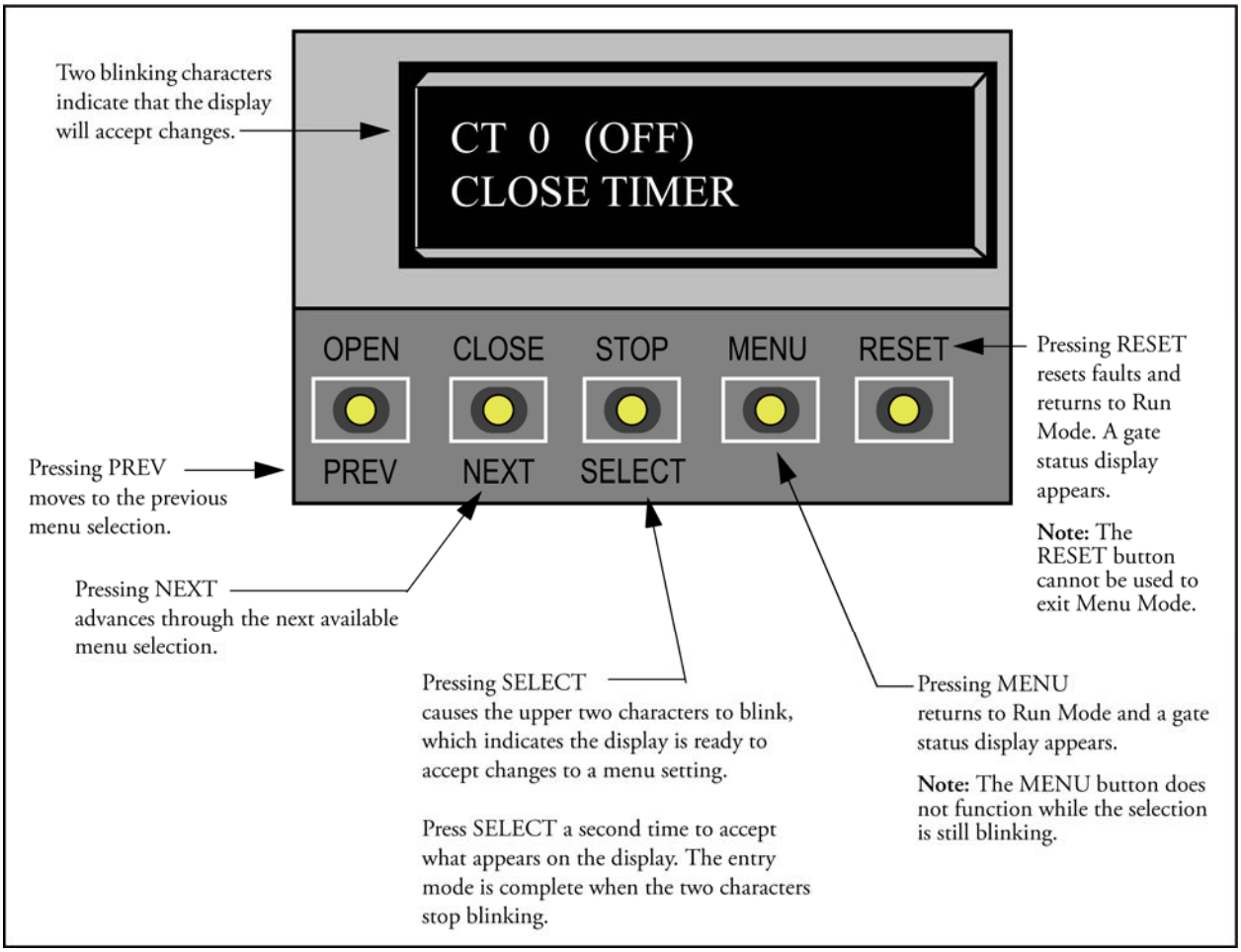


Figure 3-2. Function of the Smart DC Controller Buttons in Menu Mode

Configuring the Setup Menu

The USAGE CLASS display appears the first time power is supplied. See Figure 3-3.

Note:If a gate status display appears, the Setup Menu has already been configured. Refer to Understanding Gate Status Displays.

Four sequential displays present information which must be configured before FoldSmart will function. Once the configuration is complete, the information is retained even when a power loss occurs.

Programming the Setup Menu is usually a one-time occurrence unless factory defaults are reinstated through the Installer Menu. Refer to Reinstating Factory Defaults.

To navigate within the Setup Menu, use the SELECT, NEXT, and PREV buttons. All menu options cycle, so you eventually return to the first menu option by continually pressing the NEXT or PREV key.

From the USAGE CLASS display, take the following steps:

1. **Press SELECT.**
   The two top characters blink.
2. **Press NEXT.**
   Continue to press NEXT to view all the selections.
3. **When the desired selection appears, press SELECT.**
   The blinking characters become static.
4. **Press NEXT.**
   Advance to the next menu display.
5. **Continue to configure each menu display that appears.**

An audible beep occurs as the gate status display appears when the initial setup is complete. The operator enters Run Mode.

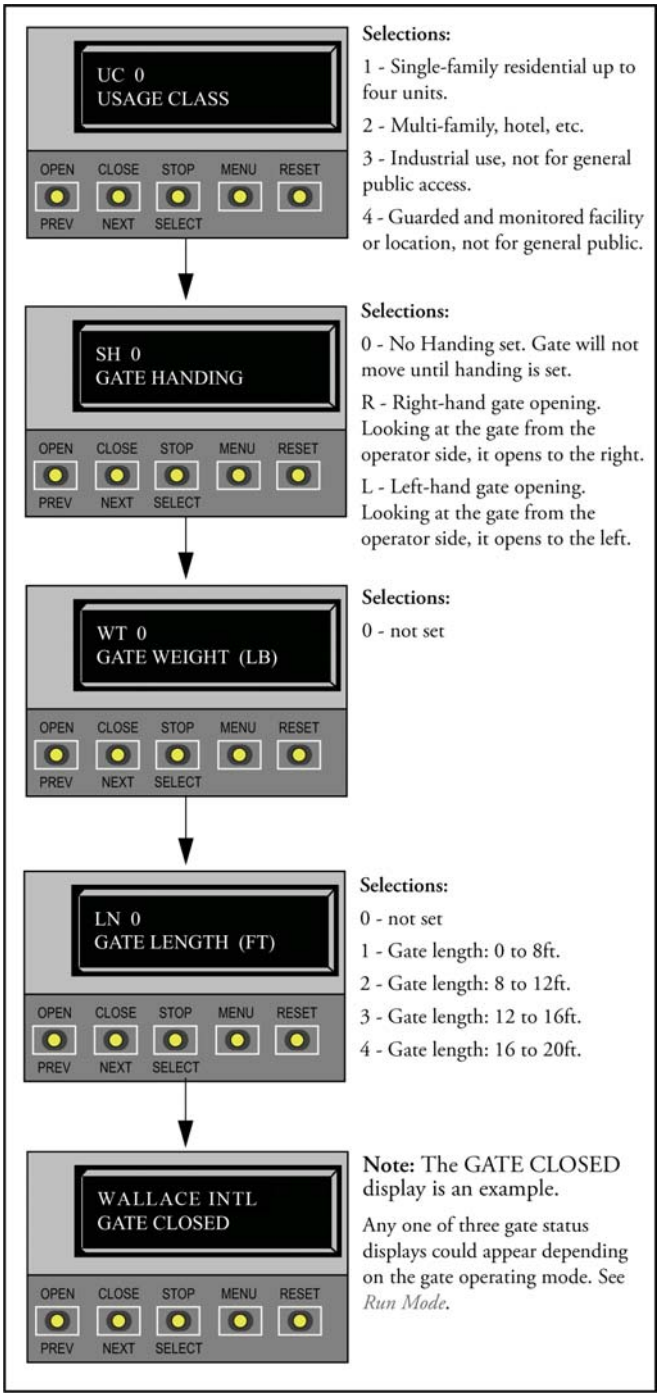


Figure 3-3. Setup Menu

RUN MODE

Gate status displays appear when the operator is ready and waiting for a gate operation command. When the menu display is flashing “GATE OPENING” or “GATE CLOSING” a command has been received and the operator is responding appropriately. The command may come from a variety of sources: a card reader, pushbutton remote, or recognition of a vehicle passing over a loop detector. In all cases, the operator “runs” the motor when it receives a gate operation command.

Understanding Gate Status Displays

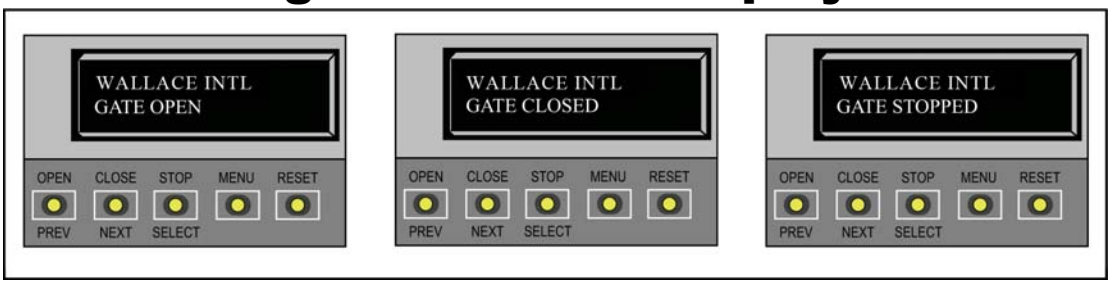


Figure 3-4. Gate Status Displays

Three gate status displays are shown in Figure 3-4. Each indicates the position or status of the gate. When accessing the User or Installer menus, you must begin at one of these gate status displays.

NOTE

To access the User or Installer menus, the motor cannot be engaged and the gate cannot be moving.

Using the Smart DC Controller Buttons In RUN Mode

The Run Mode buttons are distinguished by the fact that their name appears above each button. The buttons with text above and below are variable function keys (VFK) and function differently depending on the mode of the operator. Three different modes exist:

- **Run Mode - gate is operational awaiting commands.**
- **Menu Mode - motor disengages and operator commands are ignored. Menu navigation and menu:**
  - **selection can be accomplished using the Smart DC Controller buttons or through a S.T.A.R.T. software**
  - **connection via the USB port. Refer to Using the Smart DC Controller Buttons In Menu Mode.**
- **Fault Mode - errors, faults or alerts appear on the display. Some errors or faults can be reset with the STOP button while more serious faults require the RESET button or cycling power, and then pressing RESET. Faults indicate a need for diagnosis and resolution. Refer to Smart DC Controller Troubleshooting.**

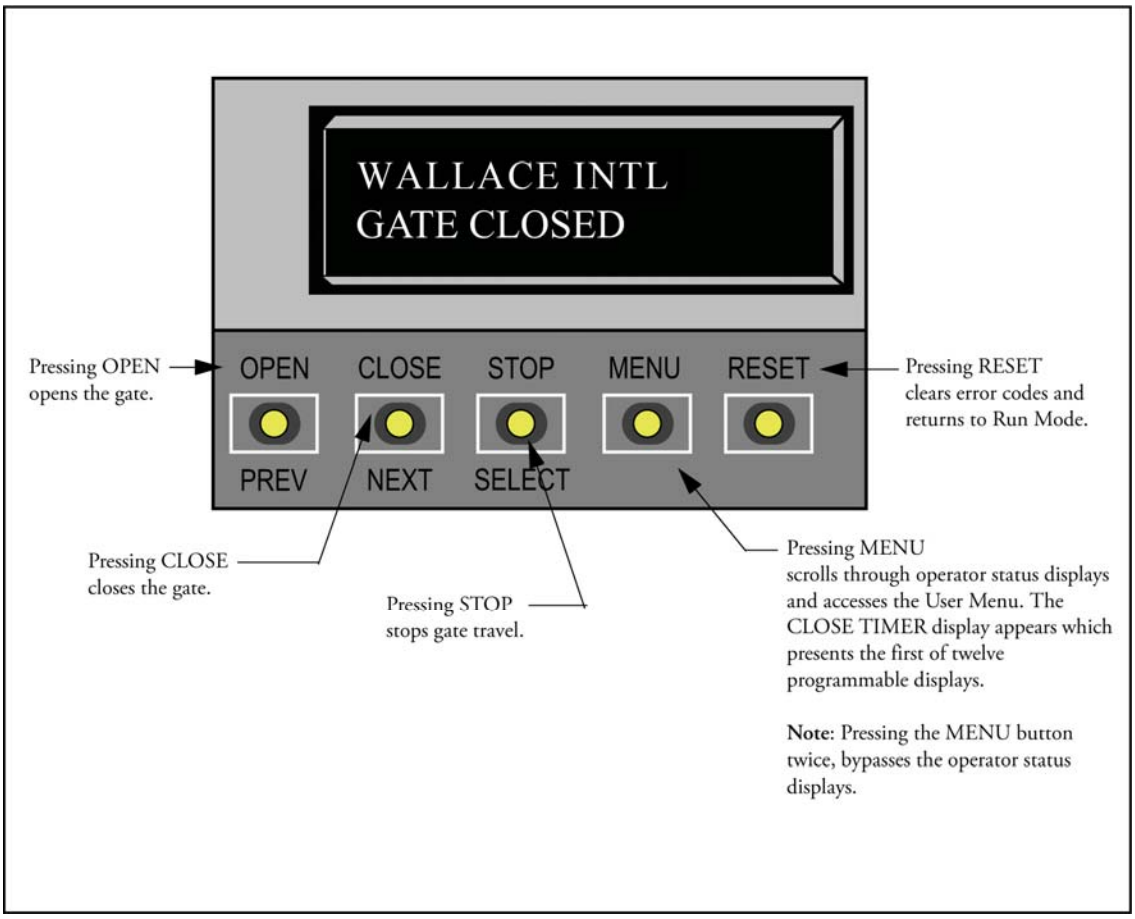


Figure 3-5. Function of Smart DC Controller Buttons in Run Mode

Viewing Operator Status Displays

Eight operator status displays appear in two second intervals and show pertinent information which provides a quick overview of the operator's status or configurations. Refer to Figure 3-6.

NOTE

Items shown inside the brackets < > are variables that may change depending on operator configurations. The examples shown in Figure 3-6 may appear differently on your operator.

	Variables	Description
SOFTWARE VERSION H5.##	The software version and revision number are hard-coded in the Smart DC Controller.	Displays the software version when you press RESET or cycle power. You will need the software version when calling Technical Support.
DUAL GATE <MASTER>	MASTER or SLAVE (This display only appears when the operator is used in bi-parting gate systems.)	Indicates, in a dual gate setting, whether the operator is set to Master or Slave. The setting is assigned in the Installer Menu.
OT <12>D SWINGSMART DC20	1, 2, 3, 4, 5, 6, 7 and 11, 12, 13, 14	Indicates the software configuration number which is preset at the factory and cannot be changed.
<LEFT> HAND	LEFT or RIGHT	Designates which way a gate opens viewed from the operator. If it swings to the left, it is a left-hand gate. Gate handing is established in the initial Setup Menu.
UC <2> USAGE CLASS	1, 2, 3, or 4	Displays the operator's Usage Class designation per UL 325 standards. Refer to *Identifying Gate Operator Category and Usage Class*.
BT <0> STANDARD BATTERY	0, 1, or 2 0 = 8Ah 1 = 50Ah (Extended) 2 = 110Ah (Maximum)	Confirms the operator's battery type which is assigned through the Installer Menu.
D <32>.0 VDC BATTERY VOLTAGE	Number varies depending on the voltage that the charger is providing.	Displays the actual voltage that the batteries are delivering to the Smart DC Controller.
CC<002600> CYCLE COUNT	Number varies depending on open and close cycles. One cycle equals a full open and close sequence.	Displays the number of cycles the gate operator has incurred. Similar to an odometer, it resets to zero after 999,999 cycles.

Figure 3-6. Operator Status Displays

USER MENU

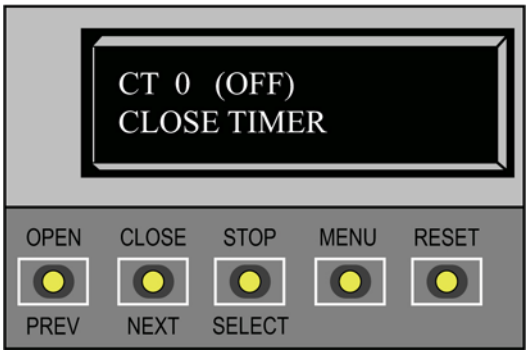
The User Menu consists of twelve functions which can be modified using the Smart DC Controller buttons. Refer to Using the Smart DC Controller Buttons In Menu Mode.

To access the User Menu, take the following steps:

1. **At a gate status display, press the MENU button. Eight operator status displays scroll past and the CLOSE TIMER display appears.**

NOTE

To access the User Menu, the operator must be in Run Mode. The motor cannot be engaged and the gate cannot be moving.



2. **To bypass the operator status displays and access the User Menu, press the MENU button twice.**

   The CLOSE TIMER display appears.

In the pages that follow, a detailed view of the more commonly used menus is provided:

- **Adjusting the Close Timer**
- **Setting the Time & Date**
- **Setting the AC Power Loss Gate Function**
- **Adjusting the Display Contrast**

Table 3-1 describes the User Menus, supplies the factory defaults, and references the hard-wire connections.

For information on how the menu buttons function, review Using the Smart DC Controller Buttons In Menu Mode.

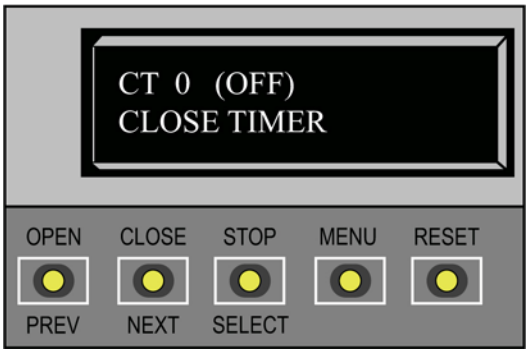
Adjusting the Close Timer

The close timer assigns how many seconds will pass before the operator initiates closure of a fully opened gate after all open commands and reversing sensor inputs have ceased. Every gate operator needs to have the close timer set to a specific number of seconds unless a hard-wired closing device is connected to the unit such as a 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.



3. **Use the SELECT and NEXT or PREV buttons to navigate and change the number on the display.**

NOTE

Keep the close time at zero if gate personnel operate the gate or the owner plans to use a remote control.

4. **To exit the User Menu, press the MENU button.**

   The gate status appears in the display indicating you have returned to Run Mode.

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 via a laptop connected to the USB or RS232 port. For more information, refer to Smart DC Controller Troubleshooting.

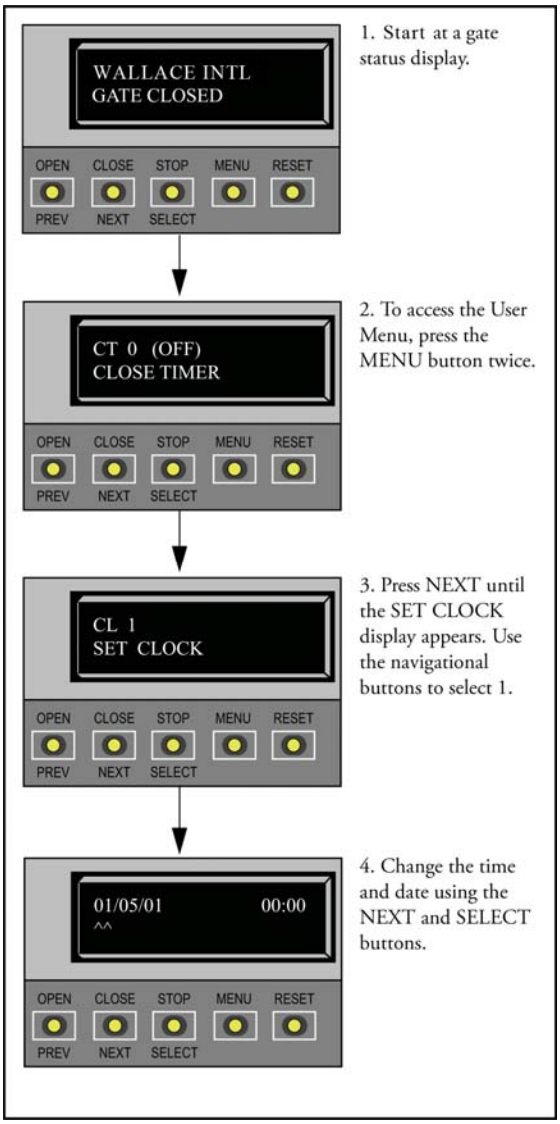
To set or adjust the time or date, take the following steps:

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. CL blinks.**
4. **Press NEXT or PREV to change the number to 1.**
5. **Press SELECT to accept the display.**
6. **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.

7. **To accept what appears on the date and time display, press SELECT.**
8. **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.

Setting AC Power Loss Gate Function

The setting in the AC LOSS display determines what action the operator performs during an AC power loss. The settings help reduce drain on the battery. You can choose between four settings depending on customer preferences.

Normal gate functions continue until the system detects a battery voltage drop below 21V. DEAD BATTERY appears on the display and the gate automatically opens. Any pushbutton CLOSE command will close the gate and any open command will re-open the gate. If the battery continues to diminish and the system detects 18V or less, the system initiates an automatic open cycle. Any new open or close command is ignored and the LCD appears blank. The system remains in this disabled state until reset or the battery recovers to 24V.

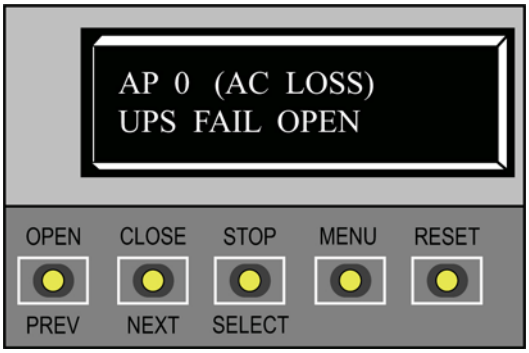
Normal gate functions continue until the system detects a battery voltage drop below 21V.DEAD BATTERY appears on the display and the gate automatically closes. The gate can be opened by a special sequence of a STOP input followed by an OPEN push-button or directly opened with the Fire Department Open command. Any push-button CLOSE command will close the gate. If the battery continues to diminish and the system detects 18V or less, the system initiates an automatic open cycle if not already on a limit. Any new open or close command is ignored and the LCD appears blank. The system remains in this disabled state until reset or the battery recovers to 24V.

The operator automatically opens the gate five seconds after it detects an AC power loss. The gate remains open until AC power is restored. Any push-button CLOSE command will close the gate and any open command will open the gate. When the battery voltage drops below 21V or less, the system initiates an automatic open cycle. The gate will remain open until the battery recovers to 24V.

The operator initially does nothing after it detects AC power loss until it receives an open command. Once an open command is received, the operator opens and remains in that state. Any push-button CLOSE command will close the gate and any open command will open the gate. When the battery voltage drops below 21V or less, the system initiates an automatic open cycle. The gate will remain open until the battery recovers to 24V.

To designate what you want the operator to do during an AC power loss, 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 until the AC LOSS display appears.**
3. **Use the SELECT and NEXT buttons to navigate and change the number on the display. Review Using the Smart DC Controller Buttons In Menu Mode.**
4. **To exit the User Menu, press the MENU button. A gate status appears in the display indicating you have returned to Run Mode.**



Adjusting the Display Contrast

The display contrast can be adjusted from 1 to 9 to increase visibility and ease of use. It is set at the factory to level 5. The text becomes darker as you go up the scale.

To adjust the contrast (1 to 9), 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 until the LCD CONTRAST display appears.**
3. **Use the SELECT and NEXT buttons to navigate and change the number on the display.**
4. **To exit the User Menu, press the MENU button. A gate status appears in the display indicating you have returned to Run Mode.**

Ref. No. *	User Menu Display	Setting Options (**Bold** = Factory Settings)	Menu Tasks and Explanations	Associated DC Controller Connections
1	CT 0 (OFF) CLOSE TIMER	**0 = Timer disabled** 1 second to 99 seconds	Assign how many seconds before the open gate initiates closure. Keep the setting at 0 if a hard-wired, push-button control device is being used. **Note:** The CLOSE TIMER display does not appear when the HOLD TO CLOSE is set to 1.	Not applicable (N/A)
2	HC 0 (OFF) HOLD TO CLOSE	**0 = off** 1 = on	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 the automatic close timer and causes its menu to disappear. You must set HC to 1 to comply with UL 325 Type D protection. Refer to Table Notes.	COM CLOSE
3	HO 0 (OFF) HOLD TO OPEN	**0 = off** 1 = on	Similar to HOLD TO CLOSE, but configures the Open push button for a constant-hold function. 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. Refer to Table Notes	COM OPEN
4	AP 0 AC LOSS UPS FAIL OPEN	**0 = UPS FAIL OPEN** 1 = UPS FAIL CLOSE 2 = AUTO OPEN 3 = NO CLOSE TIMER	The setting designates what action the gate performs during an AC power loss. Refer to *Setting AC Power Loss Procedures*	Dependent on setting.
5	RO 0 (OFF) RADIO OPEN/CLOSE	**0 = off** 1 = on	Configures radio input for open only (0) or at setting 1 adds the capability for radio input to close the gate when it is fully open.	COM RADIO OPEN

Table 3.1. Smart DC Controller - User Menu Functions

Ref. No. *	User Menu Display	Setting Options (**Bold** = Factory Settings)	Menu Tasks and Explanations	Associated DC Controller Connections
10	CL 0 SET CLOCK	**0 = Display** 1 = Set Clock	The Smart DC Controller is equipped with a 24 hour 365 day clock; thus events of significance are logged and stamped with the time and date. This feature is useful to read historical operation data, which can be accessed with a computer via the USB or RS232 port. To set or adjust the hour, minute, day or month, see *Setting the Time and Date*.	(N/A)
11	LD 5 LCD CONTRAST	**5** 0 through 9	Under some extreme high or low temperature conditions, it may be necessary to adjust the contrast of the LCD display. The display is adjustable from 0-9 with a factory default setting of 5.	(N/A)
12	DS 0 (OFF) DIAGNOSTIC LOGS	**0** = off (standard) 1 = on (detailed)	Set this item to 1 to record all gate operator open and close events, in addition to the normal alert, fault and error logs. This parameter automatically resets to the default 0 (off) after 24 hours, which is useful when experiencing intermittent problems. Set to 0, the DC Controller logs pertinent gate operator events such as faults, errors, or menu manipulation.	USB or RS232 cable and laptop computer with HySecurity's free S.T.A.R.T. software is required to read the log file.

Table Notes:
The following conditions apply to the indicated reference-numbered menu selections:
2 & 3 For gate operators using Type D entrapment protection, an automatic closing device (such as a timer, loop sensor, or similar device) shall not be employed. For additional information, refer to *Choosing Secondary Entrapment Protection*.

Table 3.1. Smart DC Controller - User Menu Functions

Ref. No. *	User Menu Display	Setting Options (**Bold** = Factory Settings)	Menu Tasks and Explanations	Associated DC Controller Connections
6	BF 2 (ON 2 SEC) WARN BEFORE OPER	0 = off 1 = on **2 = on**	Controls the warn-before-operate buzzer and can be configured three ways: Set to 1: Buzzer beeps for 3 seconds before gate motion begins and continues through entire gate travel. Set to 2: Buzzer beeps for 3 seconds before gate motion begins and continues for 2 seconds of gate travel. Set to 0: Buzzer is disabled. Set at 0 the buzzer will still beep when alerts, faults, errors, or entrapment are detected. **WARNING: Do NOT cut the wires to the buzzer or unplug it as the operator will not be in compliance with UL 325. Failure to comply may result in serious injury or death.**	(N/A)
7	FA 0 (OFF) FORCE OPEN ALERT	**0 = off** 1 = on	Intended for highly secure facilities. Set to 1, the operator sounds the 3-second "warn before operate" buzzer alarm, and then initiates a closure if the gate is forced open and the closed limit switch disengages. The motor restarts to secure the gate. If the gate does not fully close within 4 seconds, the motor turns off and the alert buzzer sounds for 30 seconds. The display shows ALERT 1 - FORCED OPEN.	(N/A)
8	DA 0 (OFF) DRIFT CLOSE ALERT	**0 = off** 1 = on	Set to 1, the operator sounds the 3-second "warn before operate" buzzer alarm and initiates an open command if the gate is forced, or drifts, off the open limit switch. The motor starts to reopen the gate. The motor runs for a maximum of 4 seconds and, if the gate is not fully open at the end of this period, the buzzer sounds for 10 seconds. The display shows ALERT 2 - DRIFT CLOSED	(N/A)
9	PE 0 (OFF) PHOTO EYE ALIGN	**0 = off** 1 = on	When set to 1, the operator serves as an aide in photo-eye transmitter/receiver alignment. The buzzer chirps once when the emitter and receiver are not aligned. When the emitter and receiver are aligned, the buzzer chirps twice. If they go out of alignment again, the buzzer will chirp once. The Alignment Mode is reset with a close-limit input or reset input.	EYE OPEN EYE CLOSE EYE COM

Table 3.1. Smart DC Controller - User Menu Functions

INSTALLER MENU

The Installer Menu consists of several functions which can be modified using the Smart DC Controller buttons or configured through the use of a laptop computer and the S.T.A.R.T. software available from the Wallace International website.

The Installer Menu options provide more advanced configurations for the FoldSmart gate system. Access to the Installer Menu is through the User Menu. The navigational buttons are the same in both menu modes. To review how to use the navigational buttons on the Smart DC Controller, refer to Using the Smart DC Controller Buttons In Menu Mode.

NOTE

To access the User or Installer menus, the operator must be in Run Mode with a gate status showing on the display. The motor cannot be engaged and the gate cannot be moving.

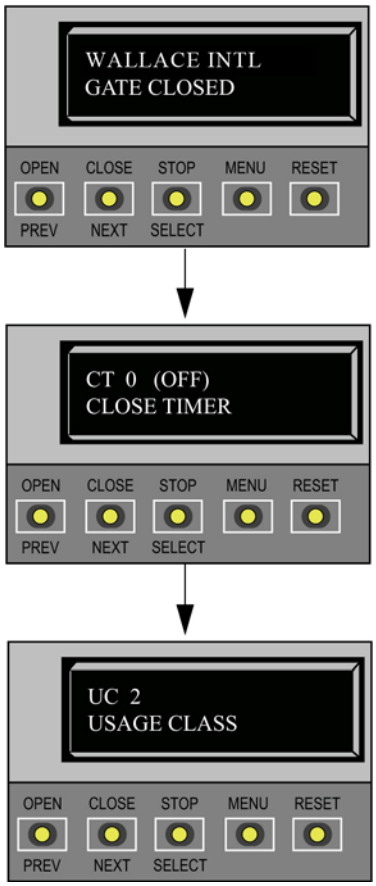
To access the Installer Menu, take the following steps:

NOTE

Four menu items, Usage Class, Gate Handing, Gate Weight, and Gate Length must be configured before the operator will function. Refer to Configuring the Setup Menu.

In the pages that follow, a detailed view of the more commonly used menus is provided.

- **Adjusting the Open Speed**
- **Adjusting the Close Speed**
- **Adjusting the IES Sensitivity**
- **Enabling the Fire Department Override**
- **Reinstating Factory Defaults**



1. Start at a gate status display. To bypass the Operator Status Displays, press the MENU button twice.

The CLOSE TIMER display appears indicating you have accessed the User Menu.

2. To access the Installer Menu, simultaneously, press OPEN and RESET.

Release the buttons and the Usage Class display appears indicating entrance to the Installer Menu. The USAGE CLASS display is the first item in the Installer Menu.

Table 3-2 describes the Installer Menus, supplies the factory defaults, and references the hard-wire connections.

For information on how the menu buttons function, review Using the Smart DC Controller Buttons In Menu Mode.

Adjusting the Gate Speed

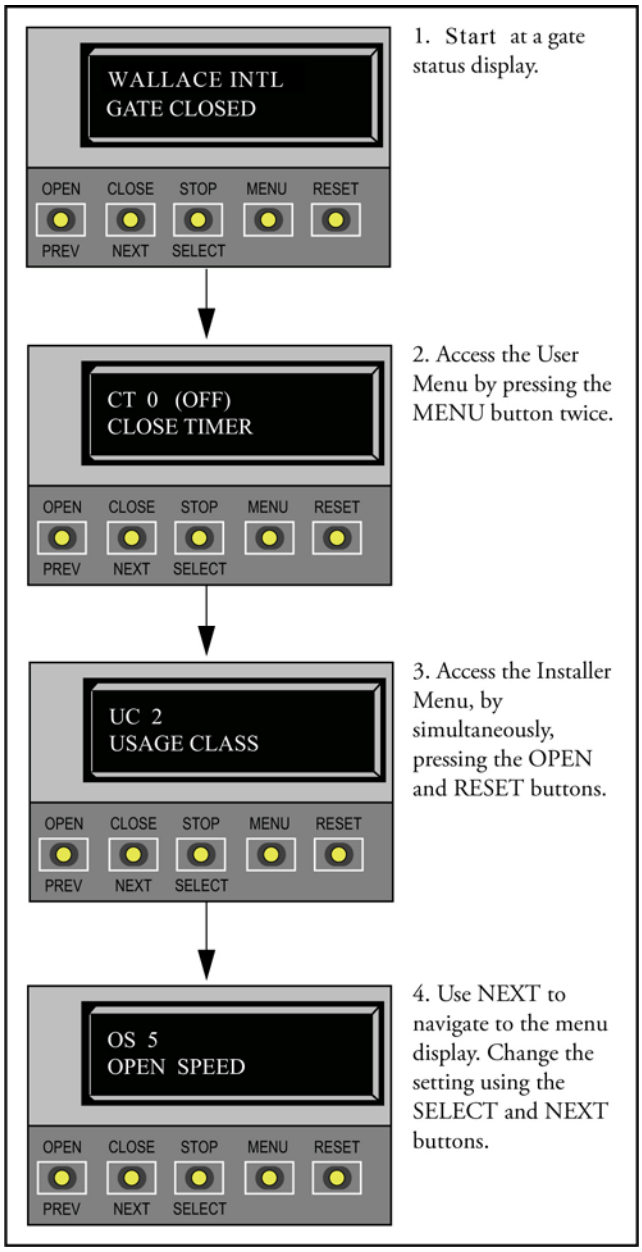
The gate speed designates how quickly the gate opens and closes. The available range from 1 to 10 varies the speed of the motor and the gate speed increases as you go up the number scale. The adjustable speed range is approximately 15 seconds to 10 seconds.

NOTE

Two displays, one for OPEN SPEED the other for CLOSE SPEED, exist in the Smart DC Controller. The steps involved in changing the open speed are shown below. The steps to set the close speed are the same, you just need to access at the CLOSE SPEED display. The factory defaults for both are set to a level 5, a mid-range setting.

To adjust the gate speed (1 to 10), 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. **Simultaneously, press the OPEN and RESET buttons to enter the Installer Menu. Release the buttons and the USAGE CLASS display appears. It is the first item in the Installer Menu.**
3. **Press NEXT until the OPEN SPEED (or CLOSE SPEED) display appears. The factory default setting is 5.**
   A speed setting of 1 slows the gate travel speed to open or close in approximately 15 seconds.
   A speed setting of 10 increases gate travel and opens or closes in approximately 10 seconds.
4. **Use the SELECT and NEXT buttons to navigate and change the speed setting on the display.**
5. **To exit the Installer Menu, press the MENU button. The gate status appears in the display indicating you have returned to Run Mode.**

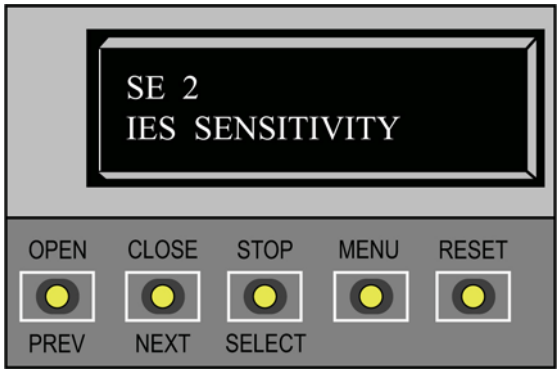


Adjusting the IES Sensitivity

FoldSmart uses a primary Type-A inherent entrapment sensor (IES) per UL325 Safety Standards. A solid immovable object blocking the gate will trip the IES and cause the operator to stop and reverse (for two seconds) and enter safe mode.

The adaptive IES software monitors the average running motor current while the gate is in motion and reverses the gate when the current exceeds an automatically self-adapting average.

The IES display, accessed through the Installer Menu, allows you to input a number between 0 and 9. The settings (0 through 6) allow an increasingly higher threshold (amount of headroom) above the average current draw before tripping. For IES settings 7 through 9, the current limit is a fixed relatively high value before the IES will be tripped. The factory setting is 2, which is adequate for most sites.



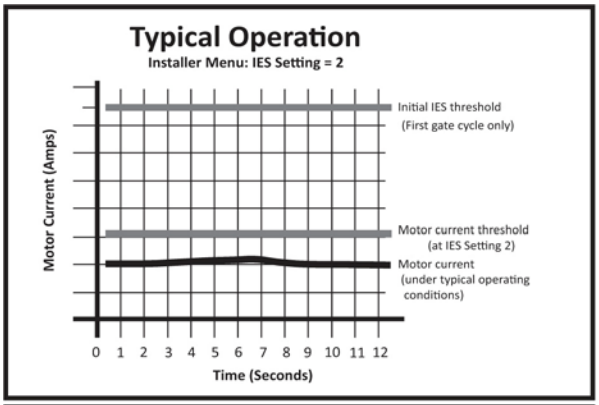
CAUTION

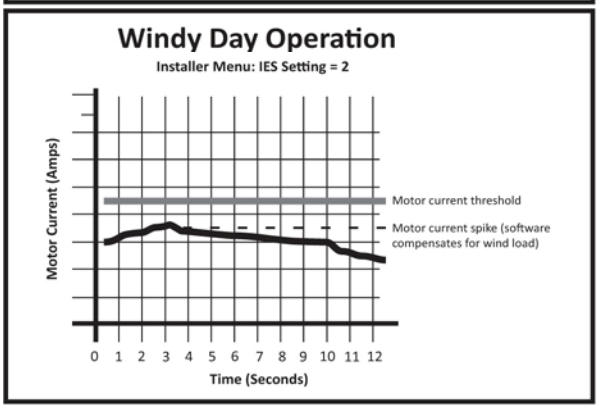
Avoid setting the IES sensitivity to a fixed level (7 - 9 setting). The high motor current required for the IES to trip could cause severe injury or death to people caught in the moving gate.

For IES settings (0 through 6), the motor current is continually being measured and the IES threshold automatically set to trip at the average current plus the additional “headroom” provided by the IES setting selected.

To prevent false IES trips, the software boosts the IES current threshold for one gate cycle after an IES event, then returns to the normal sensitivity threshold.

Over time, a gate may sag or a hinge begin to fail or other site issues, such as wind loading, can occur. As the gate hardware ages and becomes stiffer, the FoldSmart motor current increases. A failing hinge or other gate condition which causes excessive drag may create the need to use a higher IES setting level.The higher settings should only be used on a TEMPORARY basis until the gate sag or bad hinge is repaired so the gate swings smoothly with minimum resistance.





NOTE: When wind load increases, IES software adapts and changes the threshold allowance. The IES threshold automatically increases by 50% when the temperature drops below 32°F.

NOTE

When changing the IES 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.

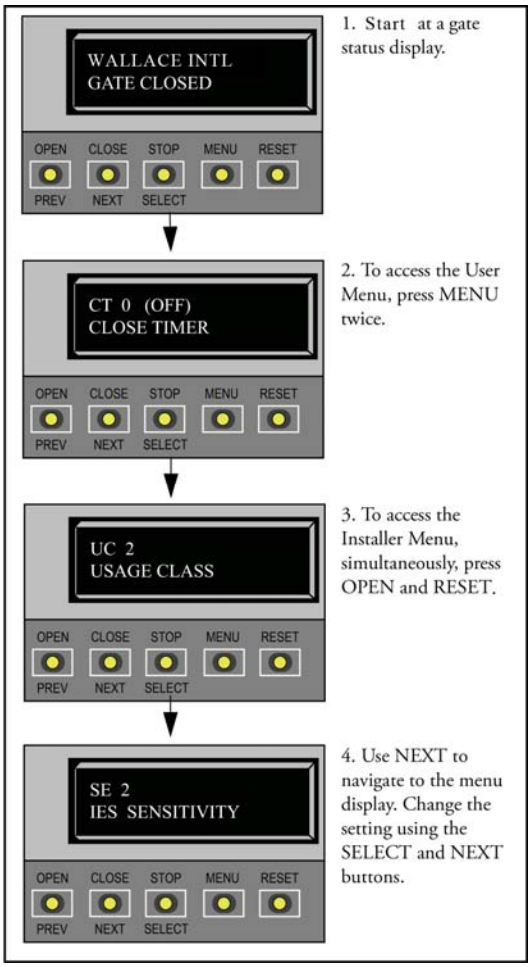
Examples of conditions which affect IES sensitivity include:

Gate design - Do not use a solid panel gate design in areas of high wind. Though a higher IES setting may compensate for a minimal amount of wind load, do not use it to compensate for poor site planning and gate design. Refer to Wind Load Factors & Site Prep.

If you have gate panels that are open and present little wind resistance, the deviation from the average current will be relatively small and you can use a more sensitive (lower) IES setting.

Gate condition - Over time, a gate may sag or a hinge begin to fail. Gate hinges will deteriorate more rapidly near salty sea air. For these issues, you may want to use a higher (less sensitive) IES setting until repairs are made.

If gate hardware is an issue, upgrade the gate hardware to reduce resistance and increase the longevity of the gate and gate operator.



To adjust the IES sensitivity, 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. **Simultaneously, press the OPEN and RESET buttons to enter the Installer Menu. Release the buttons and the USAGE CLASS display appears. It is the first item in the Installer Menu.**
3. **Press NEXT until the IES SENSITIVITY display appears. The factory default setting is 2.**

CAUTION

Avoid setting the IES sensitivity to a fixed level (7 - 9 setting). The high motor current required for the IES to trip could cause severe injury or death to people caught in the moving gate.

4. **Use the SELECT and NEXT buttons to navigate and change the number on the display.**
5. **To exit the Installer Menu, press the MENU button. The gate status appears in the display indicating you have returned to Run Mode.**

If errors occur due to IES issues, SAFE MODE or ENTRAPMENT MODE will appear on the display. For more information about troubleshooting, refer to Table 6-1 in the “Reference” section.

Reinstating Factory Defaults

Twelve menu configurations are available in the User Menu. Another 32 items in the Installer Menu let you customize the operator depending on the number of attached accessories and your customer's needs.

CAUTION

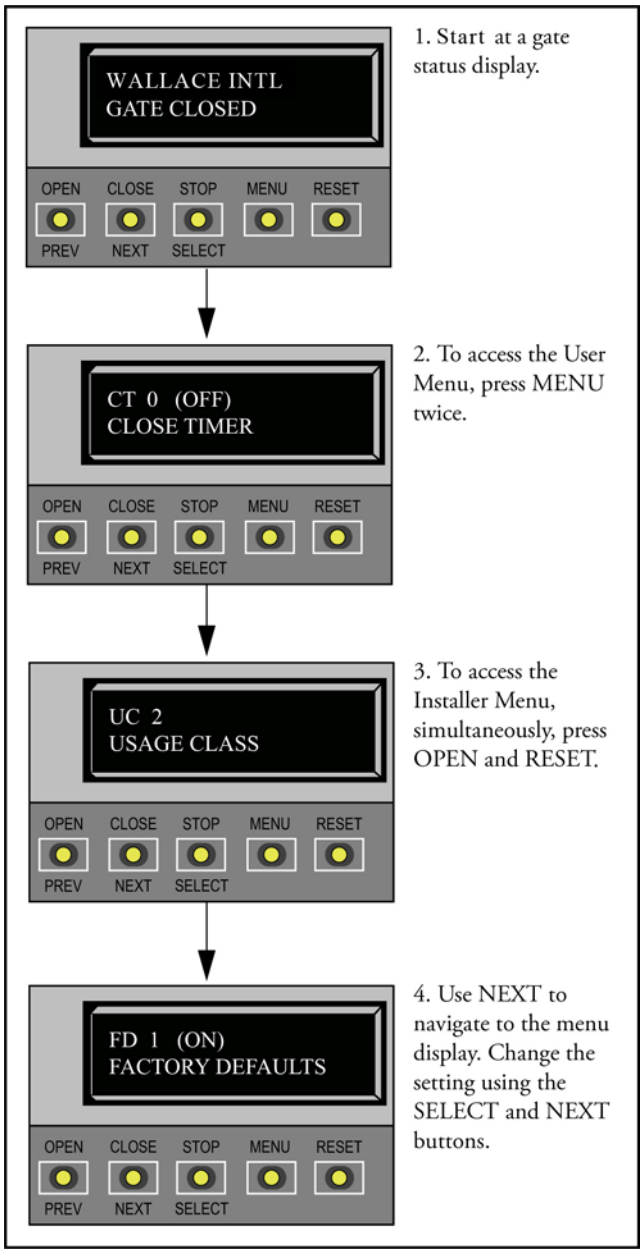
Reinstating factory default clears ALL menu display settings stored in the operator and returns them to factory defaults. It is recommended that you save the menu settings before reinstating factory defaults. You can write the settings in a notebook or, if you have a laptop computer, you can use HySecurity's S.T.A.R.T. software and download the menu settings as part of the diagnostic log.

To reinstate factory defaults, 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. **Simultaneously, press the OPEN and RESET buttons to enter the Installer Menu.**
3. **Release the buttons and the USAGE CLASS display appears. It is the first item in the Installer Menu.**
4. **Press NEXT until the FACTORY DEFAULTS display appears. The factory default setting is 0.**
5. **Use the SELECT and NEXT buttons to navigate and change the number on the display to 1.**

NOTE

When you press SELECT to accept FD 1, the factory settings are reinstated immediately and the menu display returns to the initial Setup Menu. The gate operator will not run until all four sequential menu parameters are entered: Usage Class, Gate Handing, Gate Weight, and Gate Length. Refer to Configuring the Setup Menu.



Enabling the Fire Department Override

Many counties and cities require a Fire Department override system for gate operators. The fire department's alert system is a separate unit that must be connected to the FoldSmart DC Controller. The FIRE DEPARTMENT OPEN option must be properly configured through the Installer Menu before the operator will recognize the alert system.

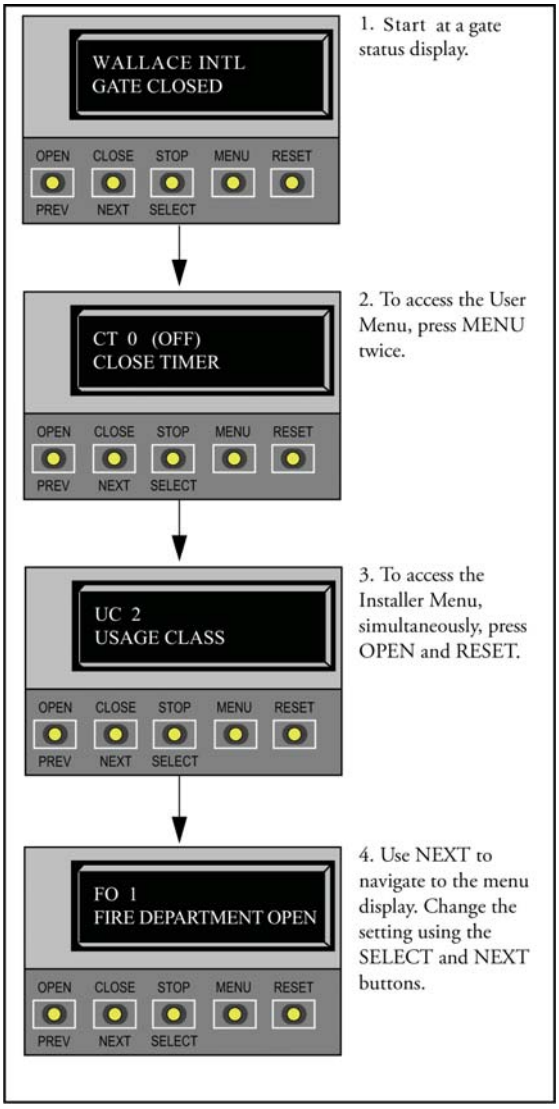
To enable the Fire Department Override, take the following steps:

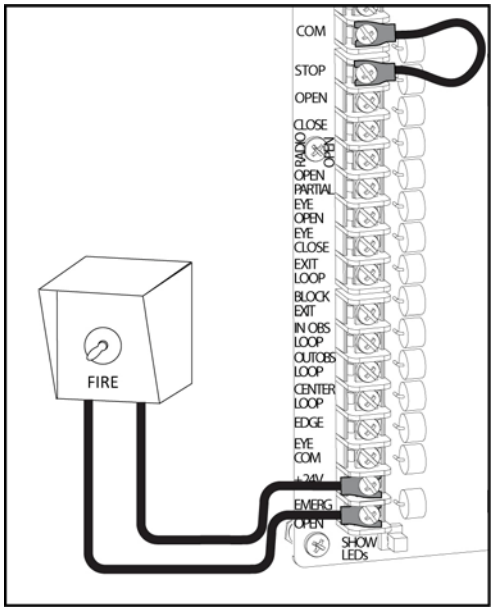
1. **Connect the contact NO from the alert system or key switch to the following Smart DC Controller terminals:**

   EMERG OPEN
   +24V

2. **Configure the Installer Menu.**
   At a gate status display, press the MENU button twice. This accesses the User Menu and the CLOSE TIMER display appears.
3. **Simultaneously, press the OPEN and RESET buttons to enter the Installer Menu. Release the buttons and the USAGE CLASS display appears. It is the first item in the Installer Menu.**
4. **Press NEXT until the FIRE DEPARTMENT OPEN display appears. The factory default setting is 0.**
5. **Use the NEXT button to change the number on the display to 1 and then press SELECT.**

To exit the Installer Menu, press the MENU button. The gate status appears in the display indicating you have returned to Run Mode.





Ref. No. *	Installer Menu Display	Setting Options (**Bold** = Factory Settings)	Tasks and Explanations	Associated DC Controller Connections
1	UC 0 USAGE CLASS	**0 = Gate disabled** 1 = Residential 1 to 4 units 2 = Comm./public access 3 = Light industrial 4 = Industrial secure	Assign the operator's Usage Class designation per UL 325 standards. See *Identifying Gate Operator Category and Usage Class*. The installer must designate a usage class before the operator will function. See *Configuring the Setup Menu*.	Not applicable (N/A)
2	SH 0 GATE HANDING	**0 = Gate disabled** R = Right hand L = Left hand	The handing determines which way the gate opens as you view it from the operator side. See *Adjusting the Limit Switches*. The installer must designate a left or right handing before the operator will function. See *Configuring the Setup Menu*.	(N/A)
3	WT 0 GATE WEIGHT (LB)	**0 = Gate disabled** 1 = 0 to 300lbs. 2 = 301 to 600lbs. 3 = 601 to 800lbs. 4 = 800 to 1300lbs.	Select the gate's weight range in pounds. The installer must designate the gate's weight before the operator will function. See *Configuring the Setup Menu*. Designating the correct gate weight allows the operator to determine the appropriate acceleration and deceleration rates.	(N/A)
4	LN 0 GATE LENGTH (FT)	**0 = Gate disabled** 1 = 0 to 8 feet 2 = 8 to 12 feet 3 = 12 to 16 feet 4 = 16 to 20 feet	Select the gate's length in feet. The installer must designate the gate's length before the operator will function. See *Configuring the Setup Menu*. Designating the correct gate length allows the operator to determine the appropriate acceleration and deceleration rates.	(N/A)

Table 3-2. Smart DC Controller - Installer Menu Functions

Ref. No. *	Installer Menu Display	Setting Options (**Bold** = Factory Settings)	Tasks and Explanations	Associated DC Controller Connections
5	OS 5 OPEN SPEED	**5** 1 through 10 1 = slowest speed 10 = fastest speed	Designate how quickly the gate opens. The range 1 through 10 varies the speed of the motor and the gate opening speed increases as you go up the number scale. A setting of 1 slows the gate travel to approximately 15 seconds. A setting of 10 speeds up gate travel to approximately 10 seconds. See *Adjusting the Gate Speed*.	(N/A)
6	CS 5 CLOSE SPEED	**5** 1 through 10 1 = slowest speed 10 = fastest speed	Designate how quickly the gate closes. The range 1 through 10 varies the speed of the motor and the gate closing speed increases as you go up the number scale. A setting of 1 slows the gate travel to approximately 15 seconds. A setting of 10 speeds up gate travel to approximately 10 seconds. See *Adjusting the Gate Speed*.	(N/A)
7	FD 0 (OFF) FACTORY DEFAULTS	**0 = user settings** 1 = reload factory settings	Globally restores all menu settings back to new operator status. Select setting 1 to return the operator to factory defaults. **Note:** If factory defaults are restored, the UL usage class, handing, gate weight and length and any other modified menu settings will need to be configured again.	(N/A)
8	DG 0 (OFF) DUAL GATE	**0 = solo operator** 1 = Slave unit 2 = Master unit 3 = Sally Port A 4 = Sally Port B	Programs and establishes communication protocols when wiring two operators as dual gates in a Master/Slave or Sally Port configuration. This menu item appears if the sequenced gate (SG) is set at 0 (solo operator). When you assign one unit as the Master (or Sally Port A), you must configure the other as Slave (or Sally Port B) through the Installer Menu. See *Master and Slave Menu Setup*. **Note:** Use the most up-to-date version of S.T.A.R.T. and make sure both operator's have the same software version loaded on the SDC. Press the RESET button to display the version of software on your operator.	3-wire shielded cable to DUAL GATE input terminals. Connect Dual Gate COM (Gate 1) to Dual Gate COM (Gate 2). Pair wires: A - A, COM - COM, and B - B

Table 3-2. Smart DC Controller - Installer Menu Functions

Ref. No. *	Installer Menu Display	Setting Options (**Bold** = Factory Settings)	Tasks and Explanations	Associated DC Controller Connections
8	SG 0 (OFF) SEQUENCED GATE	**0 = solo operator** 1 = Loop Layout/Site #1 2 = Loop Layout/Site #2	Programs and establishes communication protocols when wiring two operators as sequential gates. This menu item only appears if the Dual Gate (DG) is set to 0. **Note:** Use the most up-to-dare version of S.T.A.R.T. and make sure both operator's have the same software version loaded on the SDC. Press the RESET button to display the version of software on your operator.	3-wire shielded cable to DUAL GATE input terminals on both operators. Pair wires: A - A, COM - COM, and B - B
9	CH 0 (AC) CHARGER TYPE	**0 = AC powered charger** 1 = solar powered charger	Assigns charger type. **Note:** If a solar-powered unit is ordered and delivered factory-ready, this menu will not appear. The battery type for a solar-charger is set to 50Ah even though your operator may have 8Ah batteries installed.	(N/A)
10	BT 0 (STANDARD) BATTERY TYPE	**0 = standard (8Ah)** 1 = extended (50Ah) 2 = maximum (110Ah)	Assign the battery type used by the operator. **Note:** Smaller batteries are charged with less current to avoid overheating and larger batteries are charged with more current to supply a more rapid charge.	50 Ah and 110 Ah batteries require separate housing and wiring.
11	FO 0 (OFF) FIRE DEPT OPEN	**0 = disabled** 1 = enabled	Provides the Fire Department Open input. When set to 1, the open signal received by the operator overrides all photoelectric eyes and edge sensors and opens the gate. Pressing the RESET button (or the OPEN push button) is required before the gate can be closed.	+24V DC EMERG OPEN
12	SE 2 IES SENSITIVITY	1 = maximum sensitivity **2 = moderate sensitivity** 9 = least sensitivity	Adjusts the sensitivity of the internal inherent entrapment sensor (IES). Available settings are 1 to 9 with 9 being the least sensitive. Wallace International strongly recommends that you aviod setting the IES sensitivity higher than 6.	

Table 3-2. Smart DC Controller - Installer Menu Functions

Ref. No. *	Installer Menu Display	Setting Options (**Bold** = Factory Settings)	Tasks and Explanations	Associated DC Controller Connections
13	SS 0 (OFF) IES STOP ONLY	**0 = stop, reverse for 2s** 1 = stop only	In a Usage Class 4 environment, the operator can be set to stop the gate and not reverse gate travel after an IES trip. **Note:** This menu option only appears when the Usage Class is set to 4.	(N/A)
14	LC 0 (0.0 SECS) LEAF DELAY CLOSE	**0 = none** 1 through 20 For example: 1 = ½ second 4 = 2 seconds 20 = 10 seconds	Delays gate closure. This menu option appears if the gate operator is designated as a Master or a Slave. Available settings are 1 to 20. Each increment adds ½ second, to a maximum of 10 seconds time delay, before the operator activates when commanded to close.	DUAL GATE inputs on both operators
15	LO 0 (0.0 SECS) LEAF DELAY OPEN	**0 = none** 1 through 20 For example: 1 = ½ second 4 = 2 seconds 20 = 10 seconds	Delays gate opening. This menu appears if the gate operator is set up as a Master or a Slave. Available settings are 1 to 20. Each increment adds ½ second (with a maximum of 10 seconds) time delay following a command to open before the operator activates.	DUAL GATE inputs on both operators
16	RT 0 (30 SECS) MAXIMUM RUN TIMER	**0 = 30 Seconds max run** 1 = 300 Seconds max run	Assigns a motor run time of 30 or 300 seconds. If the gate opening or closure takes longer than 30 seconds, you'll need to set the run timer to 1.	(N/A)

Table 3-2. Smart DC Controller - Installer Menu Functions

Ref. No. *	Installer Menu Display	Setting Options (Bold = Factory Settings)	Tasks and Explanations	Associated DC Controller Connections
17	EC 0 (STOP ONLY) EYE CLOSE LOGIC	**0 = Close eye stops only** 1 = 2s reverse to open	The default setting is non-reversal if the close photo eye is triggered. A setting of 1 causes the gate to reverse and travel open for two seconds if triggered while closing.	EYE CLOSE EYE COM
18	EO 0 (STOP ONLY) EYE OPEN LOGIC	**0 = Open eye stops only** 1 = 2s reverse to close	The default setting is non-reversal if the open photo eye is triggered. A setting of 1 causes the gate to reverse travel and close for two seconds if triggered while opening.	EYE OPEN EYE COM
19	GR 0 (FULL OPEN) GATE EDGE LOGIC	**0 = Edge reverses full open** 1 = 2s reversal only	The default setting is a full-open reversal if the gate edge is triggered while closing. The optional setting of 1 causes the gate to reverse for 2 seconds if triggered while closing.	EDGE COM
20	SR 0 (FULL OPEN) IES SENSOR LOGIC	0 = IES reverses full open **1 = 2 second reversal only**	The default setting is a 2-second duration reversal if the inherent sensor is triggered. The optional setting of 0 will cause the gate to reopen fully if triggered while closing.	N/A
21	PC 0 NO CONTACT PHOTO EYE OUTPUT	**0 = Normal Open PE output** 1 = Normal Closed (supervised)	The default setting is photo eyes with Normally Open outputs. The optional setting 1 requires a Normally Closed (NC) output which requires that both a photo EYE OPEN and a photo EYE CLOSE are connected. If set for NC, the connection is also supervised and any open or short circuit fault will generate a FAULT 2 alert which requires a STOP button reset to re-enable any function if triggered.	Photo eye connections: EYE OPEN EYE CLOSE EYE COM +24V

Table 3-2. Smart DC Controller - Installer Menu Functions

Ref. No. *	Installer Menu Display	Setting Options (**Bold** = Factory Settings)	Tasks and Explanations	Associated DC Controller Connections
22	GC 0 NO CONTACT GATE EDGE OUTPUT	**0 = Normally Open Edge** 1 = Normally Closed	The default setting is edge sensor with Normally Open (NO) output. The optional setting of 1 requires an (NC) output.	EDGE COM
23	DT 0 FREE EXIT DISABLE FUNCTION	**0 = Disable Free Exit** 1 = Disable Close Timer	Configures the BLOCK EXIT input to disable either the Free Exit Detector function or, alternately, the Timer To Close function. The default setting disables the free exit detector. **Note:** The free exit is disabled when the gate is at its closed limit. If the closed limit is not tripped, the free exit continues to work normally.	BLOCK EXIT COM
24	OR 1 REVERSE OUTSIDE OBS LOOP	**0 = Pause closing only** **1 = Enable reversing to open**	The default is for full reversal when the Outside Obstruction Loop is triggered. A setting of 0 causes the gate to only pause when triggered. Gate closure begins as soon as the loop is clear again.	OUTSIDE OBS LOOP COM
25	IR 1 REVERSE INSIDE OBS LOOP	0 = Pause closing only **1 = Enable reversing to open**	The default is for full reversal when the Inside Obstruction Loop is triggered. A setting of 0 causes the gate to only pause when triggered. Closure begins as soon as the loop is clear again.	INSIDE OBS LOOP COM

Table 3-2. Smart DC Controller - Installer Menu Functions

Ref. No. *	Installer Menu Display	Setting Options (Bold = Factory Settings)	Tasks and Explanations	Associated DC Controller Connections
26	HD 1 HOLD OPEN CENTER LOOP HOLD	0 = Hold open only **1 = Hold close and hold open**	Configures the function of the Center Loop (Shadow Loop) when triggered: Setting 1 - holds the gate from starting open and from starting closed. This setting prevents opening and closing of the gate when the Center Loop is tripped if the gate is on either (opened or closed) limit switches. Setting 0 - holds the gate from starting closed. This setting prevent closing when on the open limit switch.	CENTER LOOP COM
27	DL 1 STANDARD DETECTOR LOGIC	**1 = Standard** 2 = Quick close	Configures for faster closure. This selection determines whether the close timer begins to count after vehicles have departed the detector loops or whether the close timer will count down while the loops are occupied. The gate can only close when all loop detectors are not triggered. The default setting causes the Close Timer to start when the Center Loop is clear. A setting of 2 causes the Close Timer to start when the open limit switch trips.	HY-5A
27	RL 1 0 DISABLED RELAY 1 LOGIC	**0 = Disabled** 1 to 24 available	Configures the function of the user 1 output relay, which is a large relay. It has the 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 the relay: COM plus NO and NC contacts. Additionally, there are 24 optional logic function choices, which are described in detail in *Setting the User Relay Function in the Installer Menu*	User 1 Relay

Table 3-2. Smart DC Controller - Installer Menu Functions

Ref. No. *	Installer Menu Display	Setting Options (**Bold** = Factory Settings)	Tasks and Explanations	Associated DC Controller Connections
28	RL 2 1 CLOSE LIMIT RELAY 2 LOGIC	0 = Disabled **1 = default** 1 to 24 available	Configures the function of the user 2 output relay, which is an electronic relay with the capacity for switching a DC load only. The User 2 Relay is limited to 48 Volts DC and 4 Amps maximum load. Connect a device directly to the two spade terminals at the bottom of the control board, next to the label USER 2. There are 24 optional logic function choices, which are described in detail in *Setting the User Relay Function in the Installer Menu*	User 2 Relay
29	TL 2 (45 SECS) OPEN TIME ALERT	0 = 0 seconds 1 = 15 seconds **2 = 45 seconds** 3 = 75 seconds 4 = 105 seconds 5 = 135 seconds	Adjusts the time delay before activating a user relay function. Maximum time setting is 135 seconds. See *Setting the User Relay Function in the Installer Menu* **Note:** This menu appears only when a user relay is set to Function No. 8.	User relays
30	LT 3 (75 SECS) LOITERING ALERT	0 = 0 seconds 1 = 15 seconds 2 = 45 seconds **3 = 75 seconds** 4 = 105 seconds 5 = 135 seconds	This function monitors activation of the Outside Obstruction Loop when there is no activation of the gate. When the adjustable period of time is exceeded, User Relay No. 13 triggers and reports loitering in the diagnostics log. Adjust the time delay before activating the user relay function. Maximum time setting is 135 seconds. See *Setting the User Relay Function in the Installer Menu* **Note:** This menu appears only when a user relay is set to Function No. 13.	User relays
31	SA 0 (OFF) STC ADDRESS	**0 = No network** 1 to 99 = Network "drop" address	Sets the system address for network communication: 0 = no network communication 1-99 sets individual polling addresses.	RS-485

Table 3-2. Smart DC Controller - Installer Menu Functions

Ref. No. *	Installer Menu Display	Setting Options (Bold = Factory Settings)	Tasks and Explanations	Associated DC Controller Connections
32	ELD 0 (RUN MODE) EXIT LOOP SET	**0 = Run mode** 1 = Show frequency 2 = Show call level 0-7 3 = Set Frequency	Controls the HY-5A Free Exit detector.	HY-5A
33	ILD 0 (RUN MODE) IN OBS LOOP SET	**0 = Run mode** 1 = Show frequency 2 = Show call level 0-7 3 = Set Frequency	Controls the HY-5A Inside Obstruction Loop detector.	HY-5A
34	OLD 0 (RUN MODE) OUT OBS LOOP SET	**0 = Run mode** 1 = Show frequency 2 = Show call level 0-7 3 = Set Frequency	Controls the HY-5A Outside Obstruction Loop detector.	HY-5A
35	CLD 0 (RUN MODE) CENTER LOOP SET	**0 = Run mode** 1 = Show frequency 2 = Show call level 0-7 3 = Set frequency	Controls the HY-5A Center Loop (Shadow) detector.	HY-5A

Table 3-2. Smart DC Controller - Installer Menu Functions

Smart DC Controller

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

1. **Review the connections on the Smart DC Controller**
2. **Perform a Preliminary Test of the components**
3. **Connect Vehicle Detectors**
4. **Connect Accessory Devices**
    - **Entrapment Sensor Connections**
    - **Access Controls**
    - **Manual Push-button Station**
    - **User Relays**

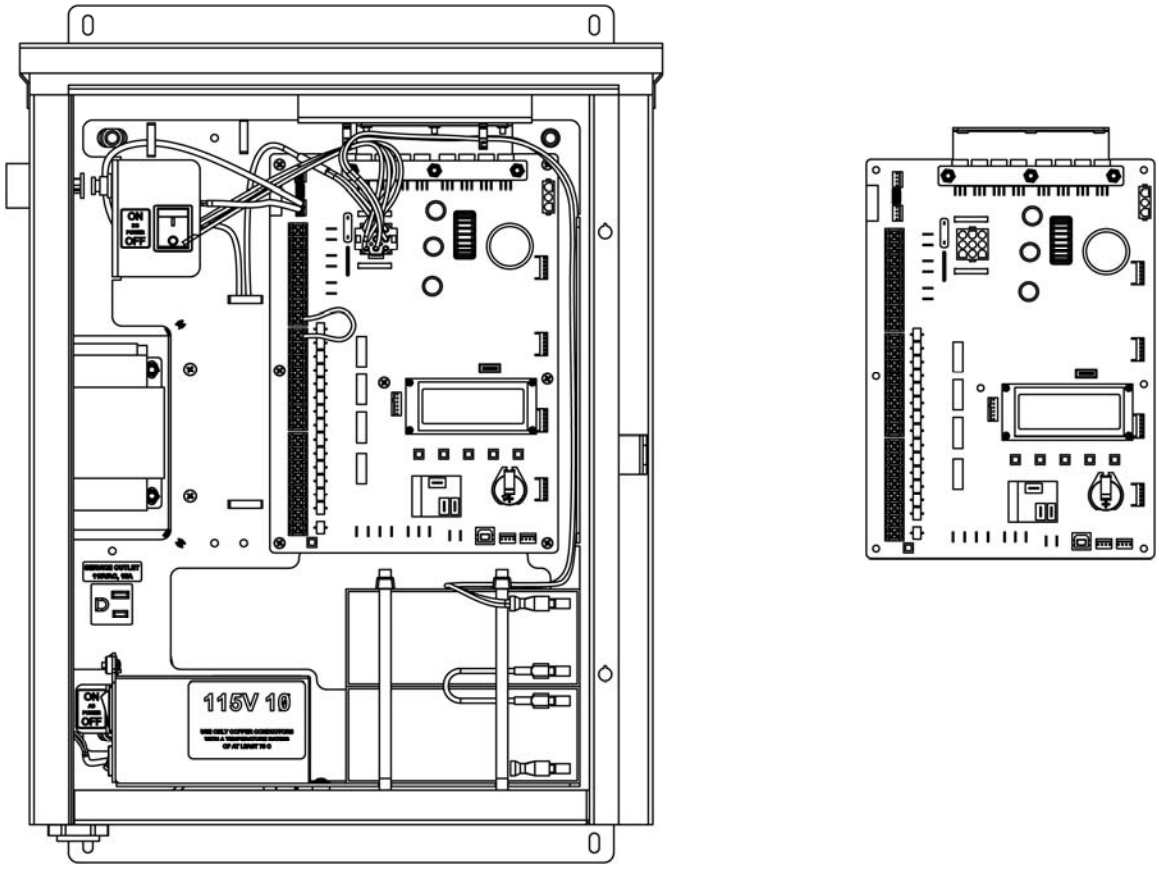


Figure 4-1.

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 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 Smart DC Controller Troubleshooting.

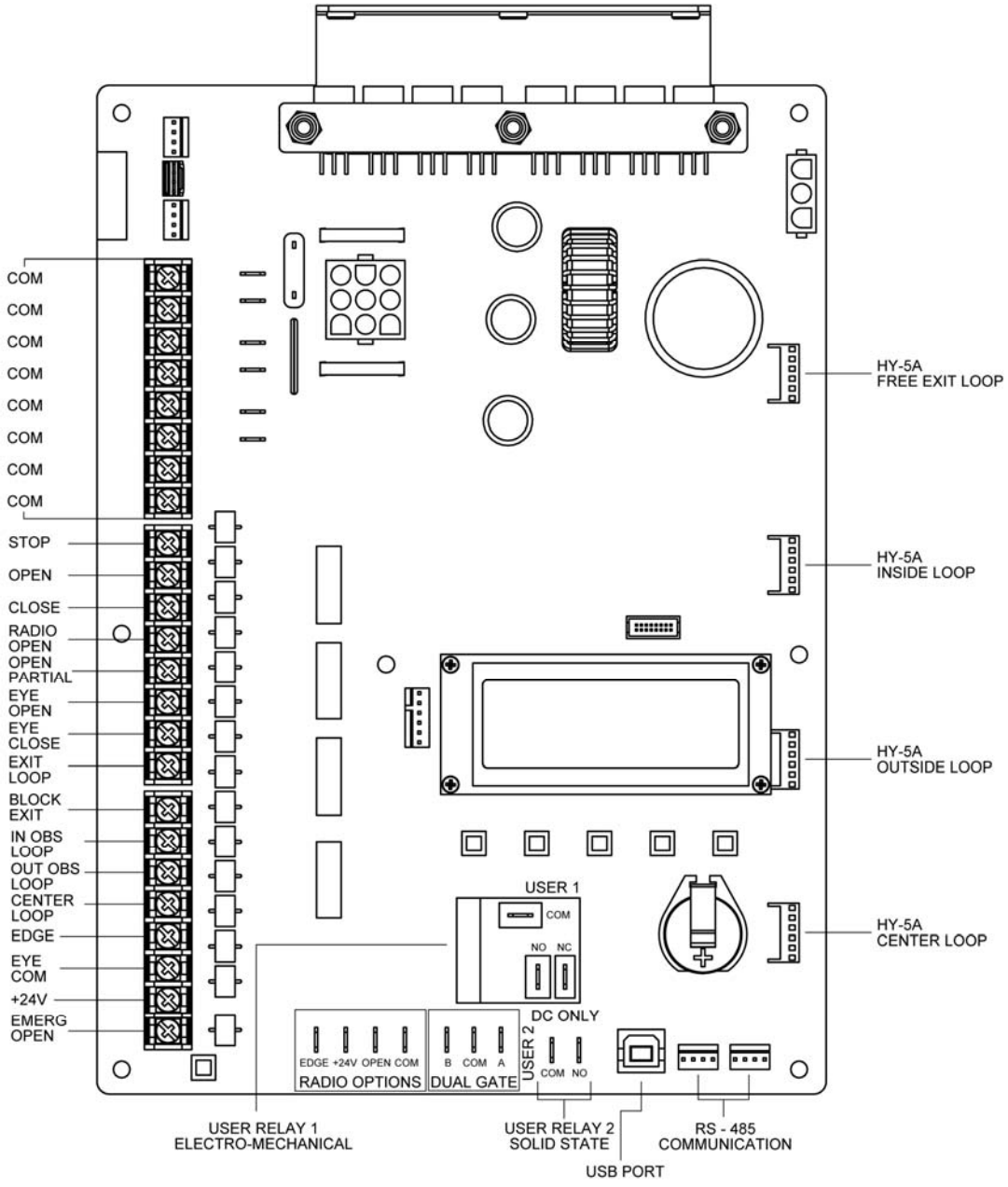


Figure 4-2. Smart DC Controller Board

Preliminary Testing

All the control device inputs listed in Table 4-1 are shown as a single input. The second wire is connected to a Common Terminal Bus (1 - 8) on the Smart DC Controller board. The Fire Department Open input is an exception and requires a +24 Volt input as well as activation in the Installer Menu. For convenience a +24V terminal is located next to the EMERG OPEN terminal. Refer to Figure 4-2.

Table 4-1. Smart DC Controller Board Inputs

Terminal No.	Input Name	Use
1- 8	Common Terminal	All user inputs are energized when connected to common except Emergency Open.
9	Stop * push button	Normally Closed (N.C.). input. Jumper to Common if not being used.
10	Open * push Button	Normally Open (N.O.) input. Not for radio or remote access controls.
11	Close push button	N.O. input. Connection for a close push-button.
12	Remote Open and Radio Control	N.O. input. For radio / remote open device - Program to also Close using Smart DC Installer Menu.
13	Partial Open	Not used in swing gate operators.
14	Photo Eye Open direction	N.O. input. Connection for Photo Eye Open direction. Can be changed to a supervised Normally Closed (N.C.) contact through the Installer Menu.
15	Photo Eye Close direction	N.O. input. Connection for Photo Eye Close direction. Can be changed to a supervised Normally Closed (N.C.) contact through the Installer Menu.
16	Free Exit Vehicle Detector	N.O. input. Connection for free exit vehicle detector.
17	Block Free Exit vehicle detector or Close Timer	N.O. input. Free Exit is only disabled if Close Limit Switch is tripped. 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.
18	Inside Obstruction Vehicle Detector	N.O. input. Inside reversing loop.
19	Outside Obstruction Vehicle Detector	N.O. input. Outside reversing loop.
20	Center Loop (Shadow) Vehicle Detector	N.O. input. Shadow function used for Swing gates only.
21	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.
22	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. Use these terminals to preserve battery power.
23	+24V DC	Convenient 24VDC power for photo eyes or the Emergency Open input.
24	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.
*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.		

Vehicle Detector Installation Options

The Smart DC Controller provides a feature-rich interface to four different vehicle detector inputs.

NOTE

Standard box type 11 pin (24 Volt DC or 24 Volt AC) vehicle detectors may be connected in the traditional manner as described in Installing Standard 11-Pin Box Type Vehicle Detectors.

HySecurity's custom HY-5A mini-detector module (Figure 4-3) plugs directly into the Smart DC Controller Board making field installation much faster plus providing a large performance benefit. The 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.**
- **Very low power draw, which is important for maximum UPS capability during a power failure.**
- **Cross-talk between multiple loops is impossible.**
- **Best operating frequency for each loop is automatically selected.**
- **Loop frequency and call strength can be reported on the Smart DC Controller display.**
- **Loop malfunctions are reported and stored by the Smart DC Controller.**
- **Most detector or loop faults that can occur are reported and presented on the Smart DC Controller display.**

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

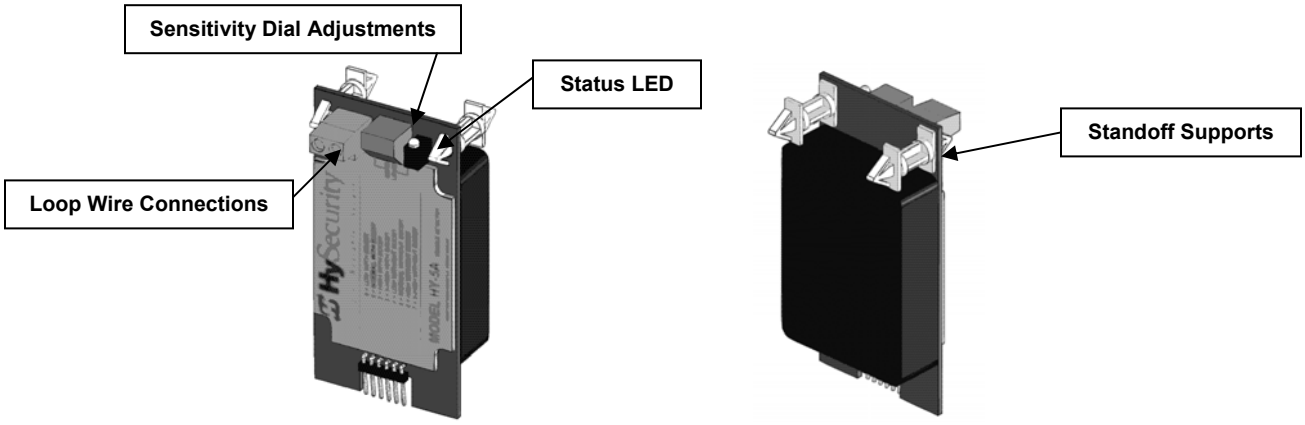


Figure 4-3. HY-5A Vehicle Detector Module

There are four vehicle detector inputs available on the Smart DC Controller as well as via the direct plug in modules. The vehicle detector input functions are as follows:

- **Free Exit Loop Detector - This opens a fully closed gate.**
- **Outside Obstruction Loop Detector (Out Obs Loop) - This is for the outside reversing loop.**
- **Inside Obstruction Loop Detector (In Obs Loop) - This is for the inside reversing loop.**
- **Center Loop Detector - This is also known as a Shadow Loop and is used for swing gates only to prevent a gate from starting open or closed when a vehicle is in the path of the gate.**

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 loop cannot be connected to any one detector because the sensitivity becomes inadequate.

Connecting HY-5A Vehicle Detectors

Install the HY-5A Vehicle Detector modules, one at a time, according to the following procedure:

1. **Turn off both AC and DC power switches.**
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 Smart DC Controller board. 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 control box.**
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-5A detector. Tighten the terminal screws securely.**
5. **To enable the detector, turn on power. The detector will immediately tune if it is connected to loops. Make sure no cars or other metal objects are over the loops.**
6. **Repeat Steps 1 through 5 for each HY-5A detector.**
7. **If the detector module is unplugged after it is enabled, a communications alert (ALERT 10) will be triggered; if the fault continues an error message, ERROR 3 “Detector Failed” is displayed.**

NOTE

If there is any detector fault, the gate system functions as if the detector is triggered.

8. **Pressing the RESET button:**
   - **Clears any errors**
   - **Tunes the detectors on connected loops**
   - **Un-installs any detectors that have been removed**
9. **The Smart DC Controller automatically governs frequency selection for all HY-5A detector modules. This simplifies installation and guarantees that there is no cross-talk between multiple**

loops. The frequency can also be manually selected; if this is required, refer to the Table 3-2 "Smart DC Controller - Installer Menu Functions" on page 49.

10. **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.

If required, adjust the sensitivity using the rotary switch which has the following eight settings:

- **0 = Low with boost (See NOTE.)**
- **1 = Normal with boost (See NOTE.)**
- **2 = Medium with boost (See NOTE.)**
- **3 = High with boost (See NOTE.)**
- **4 = Low without boost**
- **5 = Normal without boost**
- **6 = Medium without boost**
- **7 = 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.

11. **Vehicle detector functions are configurable through the Installer Menu as described in Table 4-2.**

Table 4-2. Vehicle Detector - Configurable Functions

		Installer Menu Setting Options (Bold - Default)
Display	**Meaning**	
OR 1	Outside Obstruction loop detector function	0 = Pause closing only **1 = Enable reversing to open**
IR 1	Inside Obstruction loop detector function	0 = Pause closing only **1 = Enable reversing to open**
HD 1	Center Loop detector function	0 = Hold open only **1 = Hold open and Hold closed**

DL 1	Vehicle detector logic	**1 = Standard** (Close Timer does not begin counting until all loops have cleared) 2 = Quick close (Close Timer can count to zero, even while loops are active, so the gate will close as soon as the loops are clear)

12. **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.**

Installing Standard 11-Pin Box Type Vehicle Detectors

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

1. **If there is sufficient space, install the sockets in the control box; if not, then install them in a separate external housing. Figure 4-4 is for general reference only.**

NOTE

Carefully consider your peripheral connections. Any peripheral device required for safe gate operation should be attached 24VDC in case of an AC power outage. Additionally, box detectors with relays require five times more power than HY-5A detectors, therefore UPS battery life will be extended if using HY-5A detectors.

2. **Connect 24 Volt power to the detector. Connect Pin No. 1 to a 24VAC or 24VDC terminal and Pin No. 2 to common.**

3. **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.**

4. **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. See Figure 4-4. The only wires that are separate are the output wire to the Smart DC Controller and the detector loop input wires.**

NOTE

Always keep the detector loop wires well twisted at all places 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. Refer to Installing Vehicle Detectors and Loops.

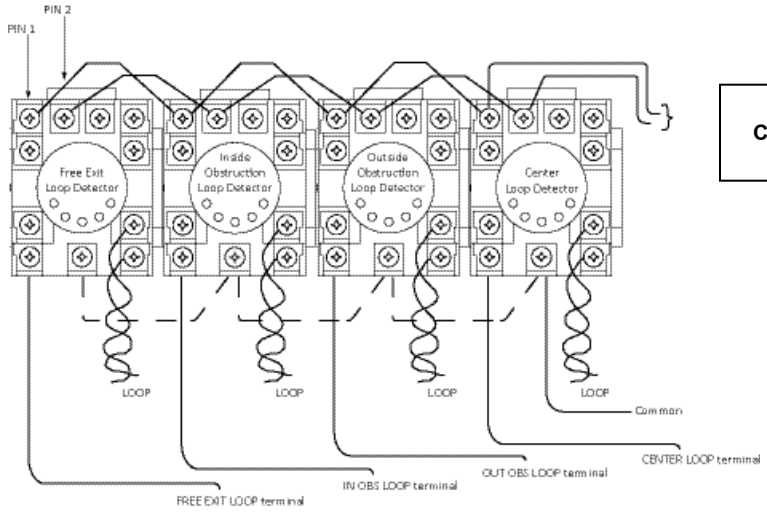


Figure 4-4. Standard 11-Pin Box Type Vehicle Detector

Vehicle Detector Configuration and Quick Close Mode Selection

The Standard Quick Close modes are selectable in the Installer Menu. Refer to Table 3-2.

The two selectable modes are described as follows:

Mode 1 (Default)

An input from either the Free Exit, Outside Obstruction Loop, Inside Obstruction Loop or the Center Loop will hold the gate open, reset the close timer, and block all close inputs.

Mode 2

Same function as Mode 1, except the close timer can count to zero even with the Free Exit, Outside Obstruction Loop, Inside Obstruction Loop or the Center Loop detector inputs active. If the close timer has counted to zero, the gate will close when all detector inputs are clear.

Connecting Accessory Devices

All accessories require a minimum of two connections on the Smart DC controller:

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

Devices, such as gate edge sensors and photoelectric beams, must be installed to protect against entrapment. These secondary entrapment protection devices are required so the gate installation is in compliance with UL 325 Safety Standards. Figure 4-5 illustrates how to connect different sensor devices to the Smart DC Controller.

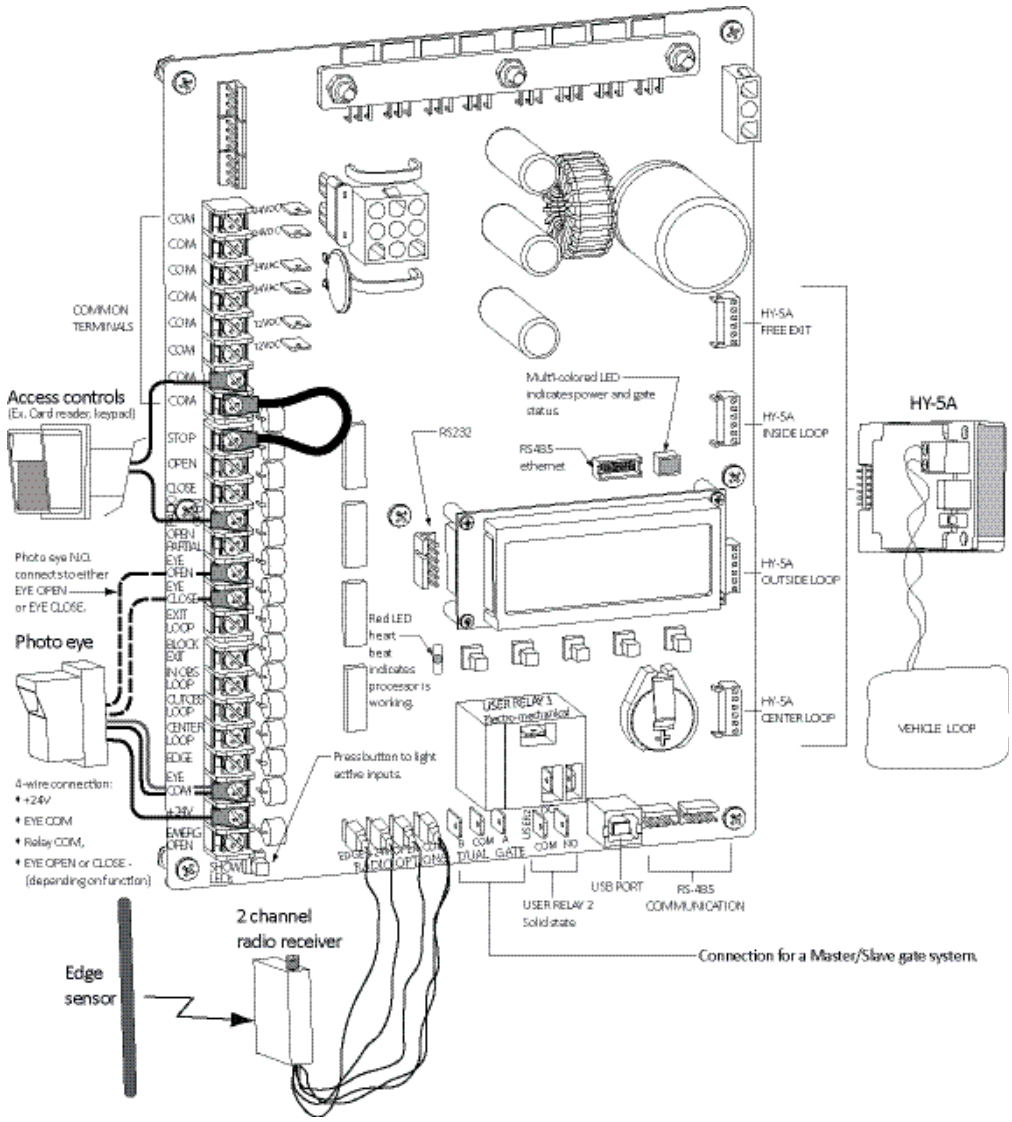


Figure 4-5. Entrapment Sensors & Accessory Connections

Manual Push-button Station

A manual push-button station controls the gate system and opens, stops, and closes the gate. It is most often used by a guard in a 24-hour guard station. An example of the push-button station connections on FoldSmart is shown in Figure 4-6.

CAUTION

Make sure the manual push-button station in within site of the gate, a distance (six foot, 1.8m minimum) away from the gate's moving parts, and out of reach of children.

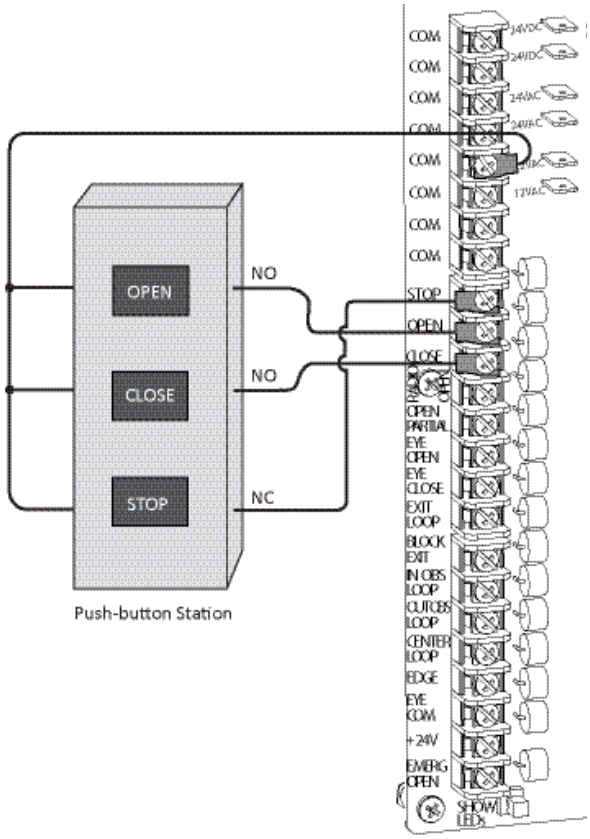


Figure 4-6. Manual Push-button Station Connection

User Relays - Programming Procedure

The Smart DC Controller is able to interface with many types of external devices through the use of two user-programmable output relays. All of the user relay functions identified and described in Table 4-3 are accessible in the Installer Menu.

NOTE

The User Relays will operate normally to less than 18VDC. The USER 2 RELAY is rated for DC only up to 48V and does not have an N.C. (normally closed) connection.

Use the Smart DC Controller buttons to program the user relays according to the following steps:

1. **Select the relay you wish to use.**

2. **Enter the appropriate function using the associated number listed in the table.**

Table 4-3. User-Programmable User Relays - Function Options

No.	Name	Description
1	Close limit output	Creates an interlock signal to another operator's interlock input, or simply to indicate that the gate is secure. The relay is released when the fully-closed limit switch is tripped. The relay is energized when the fully-closed limit is released. (Any open command energizes the relay.)
2	Close limit pulse output	Used in a sequenced system to command a second machine to close. Generates a brief pulsed output that occurs when the close limit is triggered.
3	Open limit output	Indicates a full-open position. This output becomes active when an open-limit is triggered and releases when the open-limit is released.
4	Open limit pulse output	Trips a sequenced barrier arm gate operator to open. Generates a brief pulsed-output when the open-limit is triggered. An additional pulse is also generated with any new open command even when the gate is already fully-opened.
5	Warn before/during operate output	Controls an external warning device. This output operates at the same time as the internal warn before operate buzzer.
6	Gate Lock output	Controls external solenoid locks or magnetic locks. In both directions of travel, this output is activated about 7/10^{ths} of a second before the operator starts moving the gate and remains active while moving as well as for a few seconds after stopping.
7	Gate forced open output	Activated if the gate is forced off the closed limit switch and operator is not able to restore the gate to full closed within four seconds. This alarm resets itself in 30 seconds. Note: FA - FORCE OPEN ALERT must be set to 1 in the User Menu.
8	Gate open too long output	Activates when the gate is open longer than a user-selected period of time. Adjustable from 0 delay to 135 seconds delay in 15-second time increments. Note: TL - OPEN TIME ALERT adjustments can be made in the Installer Menu.
9	Safety Mode Alert output	Activated when system is in the Safety Mode or the Entrapment Mode. Safety Mode occurs upon an impact with an obstruction. Entrapment Mode means the gate is stopped and occurs if the internal inherent sensor triggers while the system is in the Safety Mode.
10	Entrapment Mode Alert output	Activated only when system is in the Entrapment Mode.
11	Unauthorized Vehicle Entry output	Activated when a second vehicle enters from the outside without a valid input from an access control device. This output releases when an access control input signals open or the gate reaches the close limit position.
12	Outside Obstruction Vehicle Detector output	Interlocks an entry device to prevent pedestrian use. This output is active whenever the Outside Obstruction Loop Detector is tripped.

Table 4-3. User-Programmable User Relays - Function Options (Continued)

No.	Name	Description
13	Loitering Alert	Indicates a vehicle or loitering on the Outside Obstruction Loop. Adjustable from 0 delay to 135 seconds delay in 15-second time intervals. Note: LT - LOITERING ALERT adjustments can be made in the Installer Menu.
14	Gate nearing full travel output	Activated when the gate is three feet from full travel in both the open and close directions. This output is used to reduce the sensitivity of a proximity sensor near the ends of gate travel.
15	Gate Failure output	Activated to report occurrence of a problem. Indicates the system is in an Error Mode, Fault Mode or Entrapment Mode. If active, the gate is disabled.
16	Motor Running output	Active when the motor is running and the gate is in motion.
17	AC Power Failure output	This relay is normally energized and drops with loss of AC power.
18	DC Power Failure output	Activated when the battery power is very low, but the output ceases when the battery is dead. The relay is triggered when the battery is less than 20 Volts.
19	Flasher Relay	Controls flashing lights that pulse once per second. The relay is constantly activating except when the open limit switch is triggered.
20	Free Exit Loop Vehicle Detector output	Active whenever the Exit Loop is tripped.
21	Inside Obstruction Vehicle Detector output	Activated when the Inside Obstruction Vehicle Detector is tripped.
22	Reset/Shadow Loop Detector output	Activated when the Center (Shadow) loop detector is tripped.
23	External Latching Gate Lock output	Not functional in the FoldSmart operator.
24	Gate at Partial Open Position	Not functional in the FoldSmart operator.
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. Connect wiring to Relay 2, and then program the Installer Menu item Relay 2 Logic by entering the number 25 in its data field.

Gate Systems

Configuring two operators to be a Master and Slave pair is easy with the Smart DC Controller. There is 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 master and slave operators.

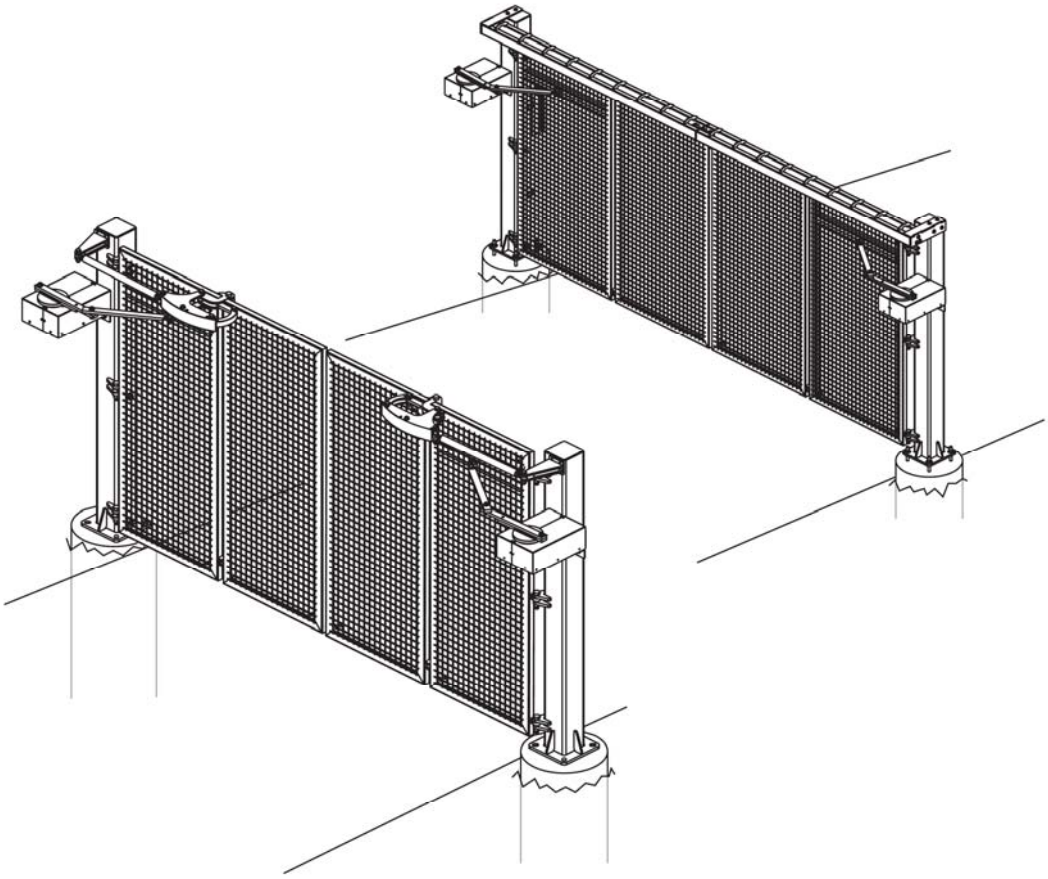


Figure 5-1.

Power Requirements

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

- **An electrical conduit for interconnecting wires must span between the two operators. The master-slave communication wires and any low voltage control wires must be installed in a conduit that is separate from the high voltage power wires. Refer to Figure 5-2.**
- **Complete the installation of both operators as separate machines and verify that their basic functions are correct as solo operators before interconnecting them.**
- **External control inputs, vehicle detectors and entrapment protection sensors may be connected to either gate operator without regard to preference.**
- **Be sure both operators are running the same software version. The software version is available on the display by pressing the RESET button on the operator. The software version appears beneath the word WALLACE INTL. Keep the most current software**

loaded. It is available at www.wallaceintl.com. Make it part of your maintenance routine to check for software upgrades on a regular basis.

- **Both operators can be connected to the same 20A circuit breaker in the main panel. The wire size affects operator performance. Use the following chart as a guideline to size wire for the given distance from the power source to BOTH operators.**

Table 5-1. Wire Length Chart

AC Power - Dual Operators	14 gauge wire	12 gauge wire	10 gauge wire
115V	305 ft (95 meters)	500 ft (150 meters)	775 ft (240 meters)
230V	1220 ft (370 meters)	1950 ft (590 meters)	3100 ft (940 meters)

Master and Slave Wiring Connections

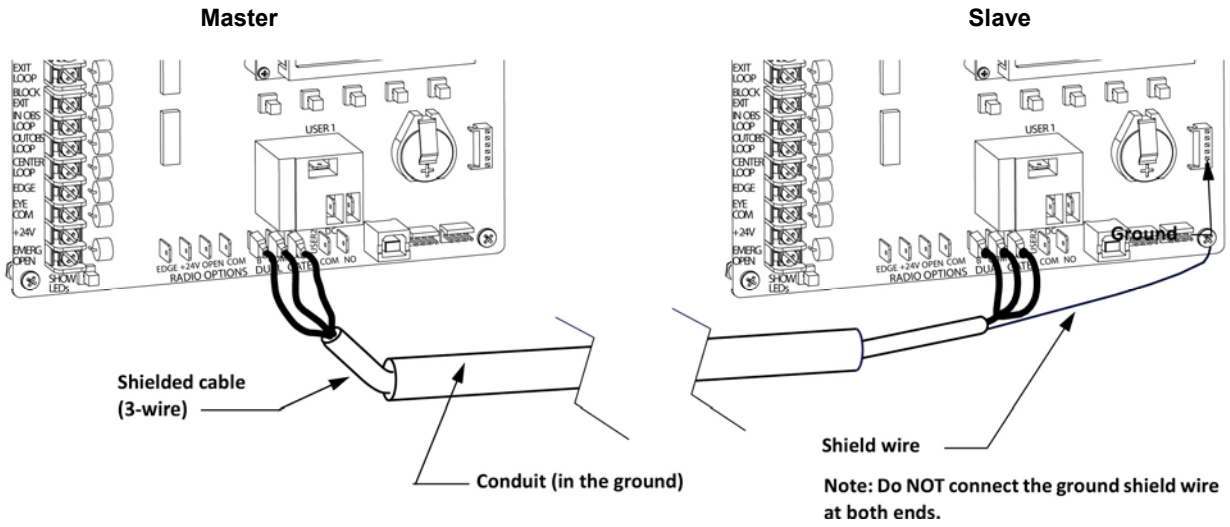


Figure 5-2.

1. **As shown in Figure 5-2, connect a shielded communications cable to the DUAL GATE inputs in each unit. The inputs are located near the base of the Smart DC Controller. Be sure to connect the wires in pairs to the same terminal ports (A-A, B-B, and COM to COM) on both units. See Master Slave Connections on SDC Boards Table 5-2.**

Table 5-2. Master Slave Connections on SDC Boards

Slave	Master
A	A
Com	Com
B	B
*Shield wire to Ground	* Only ground to one unit. Do NOT attach the shield wire to both units.

2. **Attach a ring terminal to the shield wire and connect it to the Smart DC Controller's convenient ground screw. Refer to Figure 5-2.**

NOTE

Connect the ground shield wire to only one operator, not both.

Master and Slave Menu Setup

Determine which unit will be set up as the Master. The other unit will be set up as the Slave. It doesn't matter which unit is which, but you must identify the Master and Slave operators by taking the following steps: start by configuring the MASTER unit.

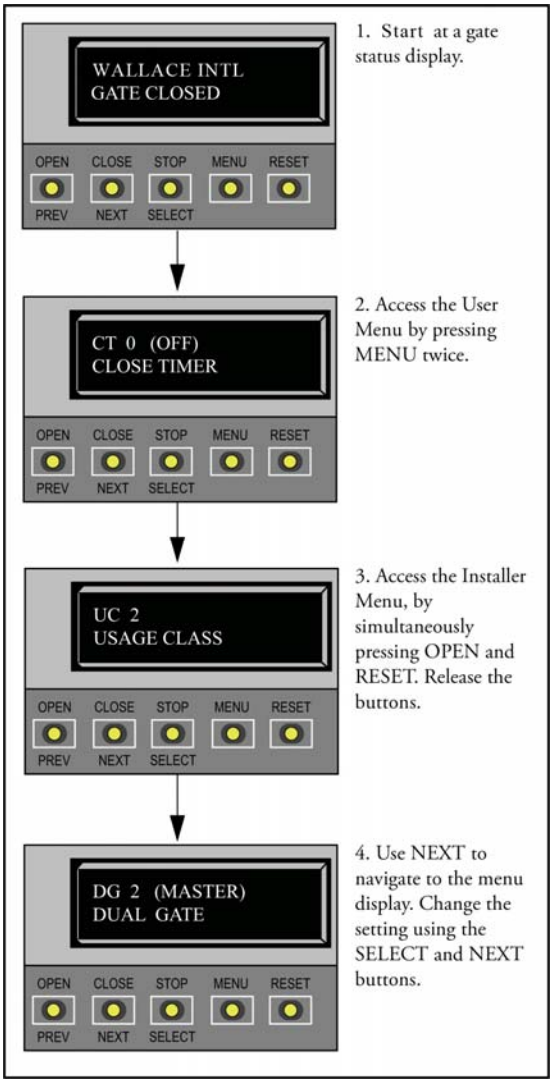
1. **At a gate status display, press the MENU button twice. This accesses the User Menu and the CLOSE TIMER display appears.**
2. **Simultaneously, press the OPEN and RESET buttons to enter the Installer Menu. Release the buttons and the USAGE CLASS display appears which is the first item in the Installer Menu.**
3. **Press NEXT until the DUAL GATE display appears. The factory default setting is 0.**
4. **Use the SELECT and NEXT buttons to navigate and change the setting to 2 MASTER.**
5. **To exit the Installer Menu, press the MENU button. A gate status appears in the display indicating you have returned to Run Mode.**

For proper operation, you must set the other gate operator as SLAVE.

6. **Move to the other FoldSmart operator.**
7. **Using the buttons on the Smart DC Controller, access the DUAL GATE display through the Installer Menu.**
8. **Perform the same steps, 1 through 5, but address the operator as SLAVE, setting 1.**

When the FoldSmart operator has been designated as the master and the other as slave, the dual-gate operators will be in constant communication, most often, in a peer-to-peer relationship. For example,

9. **Any control input that is attached to the slave unit will be recognized by the master once the Installer Menu is properly configured in both units.**
10. **A diagnostics log is maintained in each unit, but both units run and store the errors codes and diagnostics pertinent to each other.**



11. **The master unit controls the close timer even if the timer is set in the slave unit. If a close timer is set in both units, the master unit overrides the slave setting.**

NOTE

If the dual-gate communication stops for whatever reason, (communication wire severed or the power switch is turned off in one unit), both operators cease to function and an ERR4 (Master/Slave Communication Error) appears in the display.

Reference

This section of the manual provides information which may be useful when installing FoldSmart operators. It includes how to:

- **Connect a Radio Receiver for Remote Open**
- **Install a Gate Locking Mechanism**
- **Setting User Relay Functions**
- **Install Vehicle Detectors and Loops**
- **Install Photoelectric Sensors**
- **Install Gate Edge Sensors**
- **Troubleshoot error codes, faults, and hardware issues**
- **Diagnose vehicle detector and loop faults**
- **Review General Maintenance procedures**

Connecting a Radio Receiver for Remote Open

Take the following steps to mount a commercial style 24VDC radio receiver (external antenna type):

1. **Route the wires to the area marked RADIO OPTIONS. Only three wire connections are needed because the common wire and one radio output wire are connected together. Figure 6-1 shows additional wires from a two channel receiver.**
2. **Make sure to observe polarity and crimp together the black radio common wire and one of the radio output wires using a ¼-inch spade connector.**
3. **Fasten the two crimped wires to the COM terminal.**
4. **Connect the red wire to the +24V spade and connect the other radio output contact wire to the spade marked OPEN.**

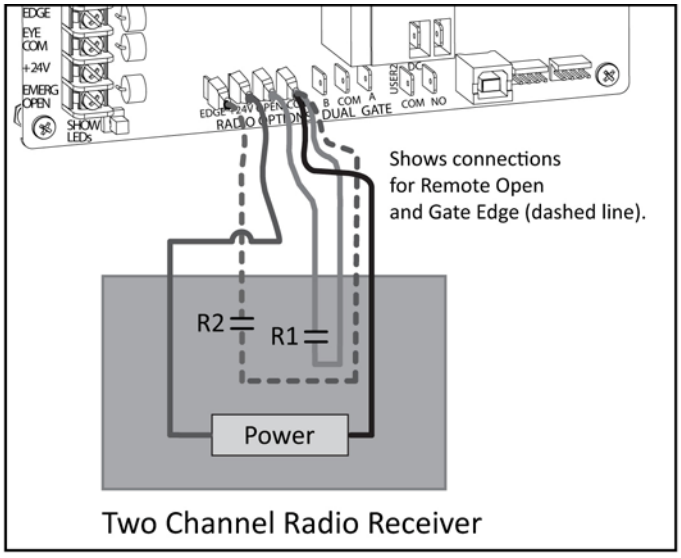


Figure 6-1.

This terminal is the same as the input terminal labelled RADIO OPEN along the left edge of the Smart DC Controller.

5. **Mount an external antenna onto the top of a fixed fence post near the operator.**

6. **Connect the antenna into the socket on the radio receiver.**

7. **Set the "DIP" switches in the receiver to match the same code used in the transmitter (if applicable).**

NOTE

If an edge sensor transmitter is also used to reverse the gate, be certain to use a two channel commercial receiver. The edge and hand held transmitters must have their codes set to match the receiver or they will not function.

Installing a MagLock or Solenoid Lock

To provide additional gate security, a maglock or a solenoid lock can be used and connected to the Smart DC Controller. The Smart DC Controller releases the gate prior to initiating gate movement. Before installing the lock, be sure to:

- **Determine the electrical power requirements of your lock (maglock or solenoid lock). Electronic board and peripheral connections differ between high voltage and lower voltage gate systems.**
- **Determine the current required. The 24VDC, 24VAC, or 12VDC terminals supply up to 1 ampere. If the peripherals attached to the terminals need more than 1 amp, a separate power supply is required.**

Installing a Lock for 12VDC or 24VDC Systems

To install a lock for 12VDC or 24VDC systems, take the following steps:

1. **Connect a wire between COM on USER 1 RELAY and a COM terminal on the electronics board. See Figure 6-2.**
2. **Connect the power lead from the lock to the appropriate power spade (+24VDC or +12VDC)**
3. **Connect the common wire from the lock to NC on USER 1 RELAY.**

Connect to NO on USER 1 RELAY if installing a Solenoid lock.

4. **Set the User Relay function in the Installer Menu to RL1 - 6. Refer to Setting the User Relay Function in the Installer Menu.**

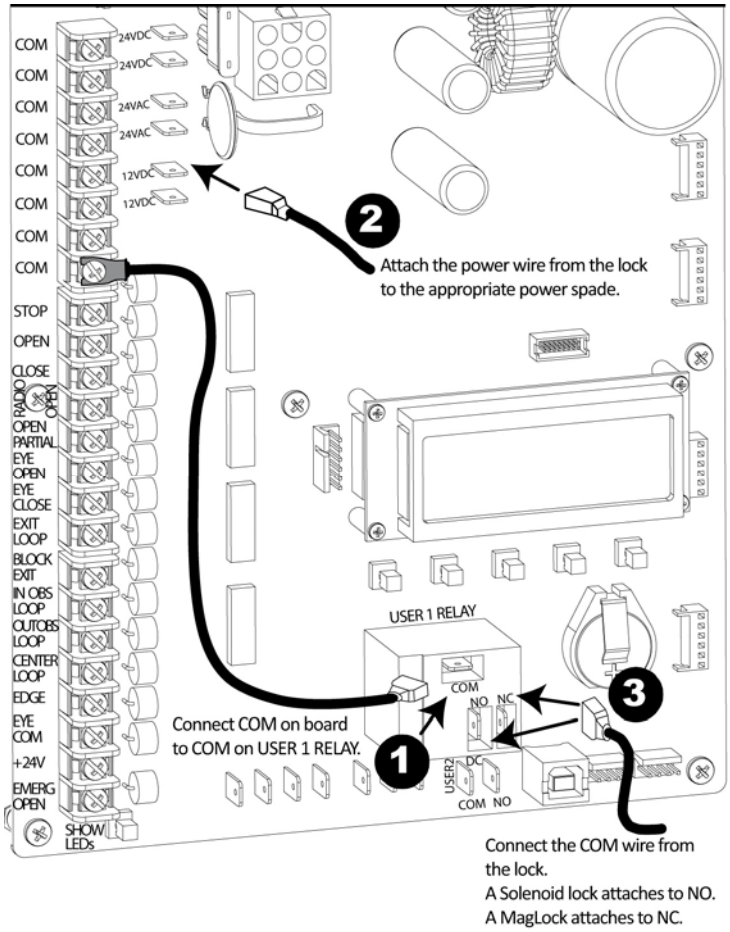


Figure 6-2.

Installing a Lock on 24VAC Systems

To install a lock for 24VAC systems, take the following steps:

1. **Connect a wire from COM on USER 1 RELAY and one 24VAC power spade. See Figure 6-3**
2. **Connect a power lead from the lock to the remaining 24 VAC power spade.**
3. **Connect the remaining power lead from the lock to the NC terminal on USER 1 RELAY.**

Connect to NO on USER 1 RELAY if installing a Solenoid lock.

4. **Set the User Relay function in the Installer Menu to RL1 - 6. Refer to Setting the User Relay Function in the Installer Menu.**

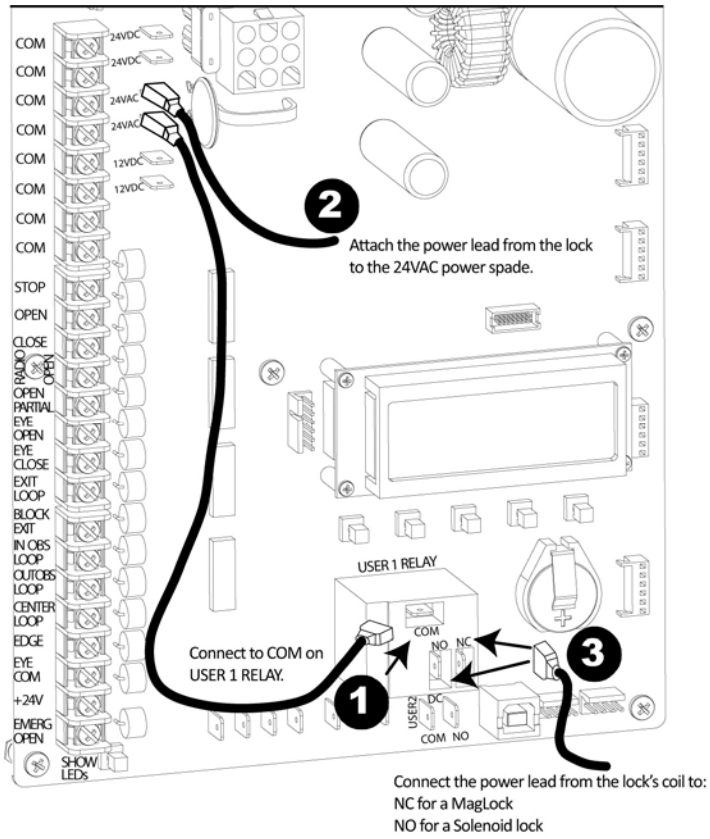


Figure 6-3.

Installing a Lock for High Voltage Systems

To install a lock on higher voltage systems (115V or 230V), take the following steps:

1. **Connect one lead of the power supply to one lead of the lock's coil. See Figure 6-4.**
2. **Connect the other lead of the lock's coil to NO on USER 1 RELAY.**

Connect to NC on USER 1 RELAY if installing a maglock.

3. **Connect the COM on USER 1 RELAY to the second lead wire in the power supply (115V or 230V).**

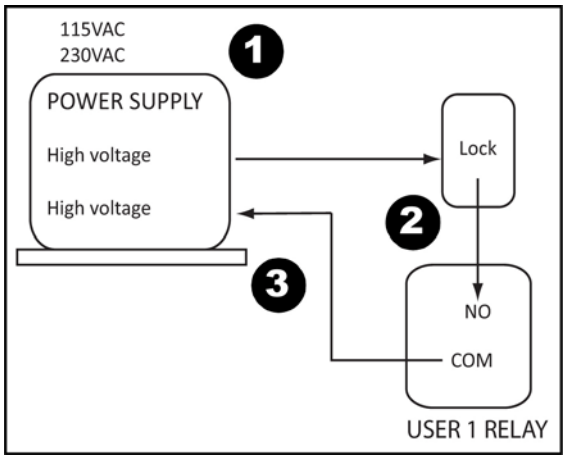
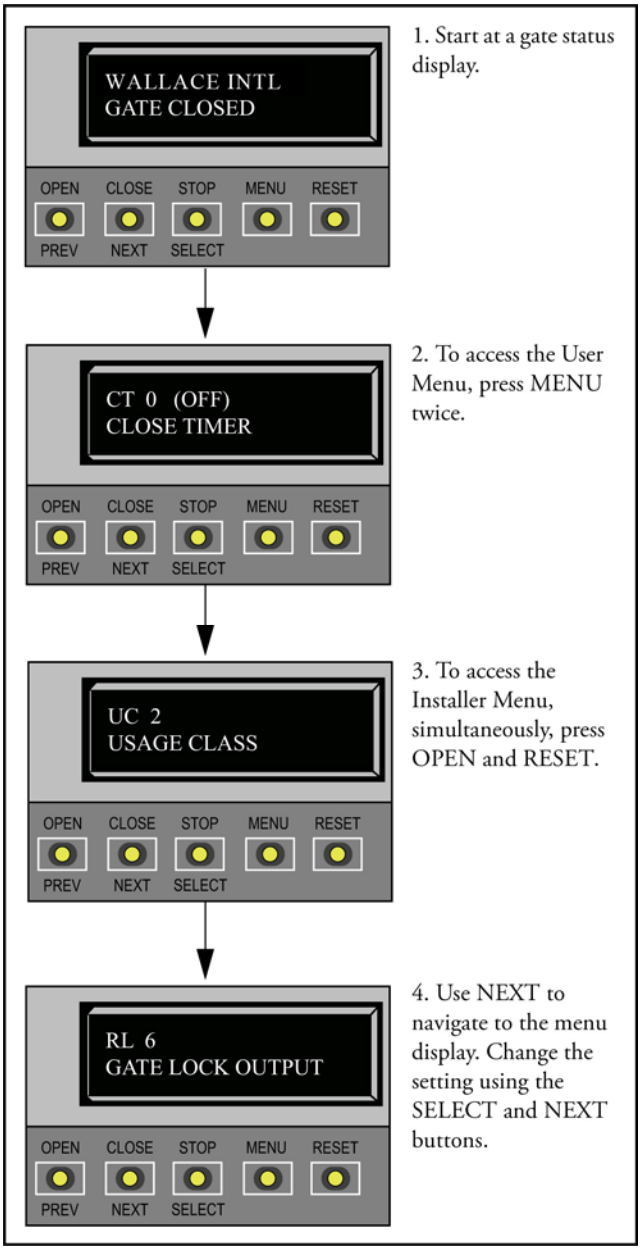


Figure 6-4.

4. **Set the User Relay function in the Installer Menu to RL1 - 6. Refer to Setting the User Relay Function in the Installer Menu.**

Setting the User Relay Function in the Installer Menu

1. **Enter the Installer Menu and set the User 1 Relay to Function 6 - GATE LOCK OUTPUT.**



Installing Vehicle Detectors and Loops

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

Loop Configurations:
Configurations differ depending on the application.

Rules to Follow for Security Gate Applications:
The side of the loop closest to the gate must be located at least 4 ft (122cm) from the line of travel.

1. **The shortest side of the loop should be between 6 and 8 feet (1.8 x 2.4m) in length. The longest side of the loop should be between 6 and 20 feet (1.8 x 6.1m) in length. For applications that need to span a wide area, use several smaller loops. Do not connect more than 200 square feet (18.6sq. m) of loop area to a single detector.**

2. **In applications with multiple loops, keep each loop at least 6 feet (1.8m) apart. This avoids “cross talk”. It is possible to have loops closer together by selecting different frequencies. An advantage of using model HY-5A detectors is that problematic “cross talk” is not possible.**

3. **For greater sensitivity and less chance of false calls caused by the motion of the gate, it is better to use multiple smaller loops, connected in a series circuit, to one detector instead of a single large loop.**

4. **To avoid interference, keep loops at least 2-inches (5cm) above any reinforcing steel. Do not route loop wires with, or in close proximity to, any other conductors, including other loop leads, unless shielded lead-in cable is used. Never route high voltage circuits in PVC conduit near a loop.**

5. **Loop and lead-in wire should be one continuous piece. Avoid splices, if possible. If a splice is necessary for any reason, “pot” the splice in epoxy or use heat shrink to ensure that the quality of the splice covering is the same as the original wire jacket.**

6. **Use only 14, 16, or 18 gauge stranded wire with a direct burial jacket. Cross linked polyethylene insulation types, such as XLPE or XHHW, will last much longer and are less prone to damage during installation than conventional insulation types. Preformed loops can be used before road surfacing or under pavers.**

7. **Twist loose tails of lead-in wires tightly, approximately ten times per foot. See Figure 6-5.**

8. **Follow this guide for the correct number of turns in the loop;**

    - **12 to 20 sq. ft = 5 turns 20 to 60 sq. ft. = 4 turns 60 to 240 sq. ft. = 3 turns**
    - **3.7 to 6.1sq. m = 5 turns, 6.1 to 18.3sq. m = 4 turns, 18.3 to 73.1sq. m = 3 turns**

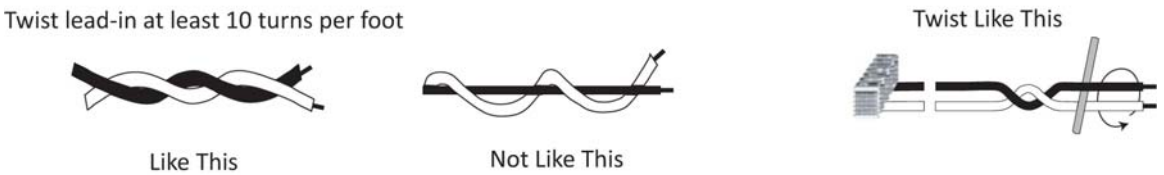


Figure 6-5.

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

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

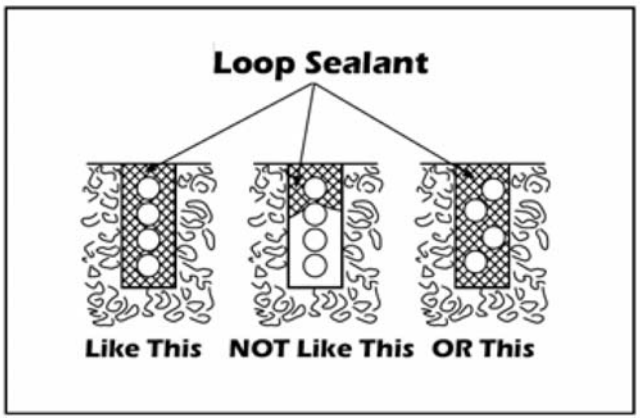


Figure 6-6.

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

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

1. **Test the resistance of the loop and lead-in wire. It should not exceed 4 Ohms.**

2. **Test the resistance between the loop and earth ground with a 500V Megohm meter. It should be 100 Megohms or more. Loops may function at 10 Megohms or less but will not be reliable (e.g. when the ground is wet from rainfall). Low resistance indicates broken or moisture saturated insulation. This is common if inappropriate wire insulation has been used.**

Schematics for FoldSmart Loop Layout are shown in Figure 6-7 and Figure 6-8.

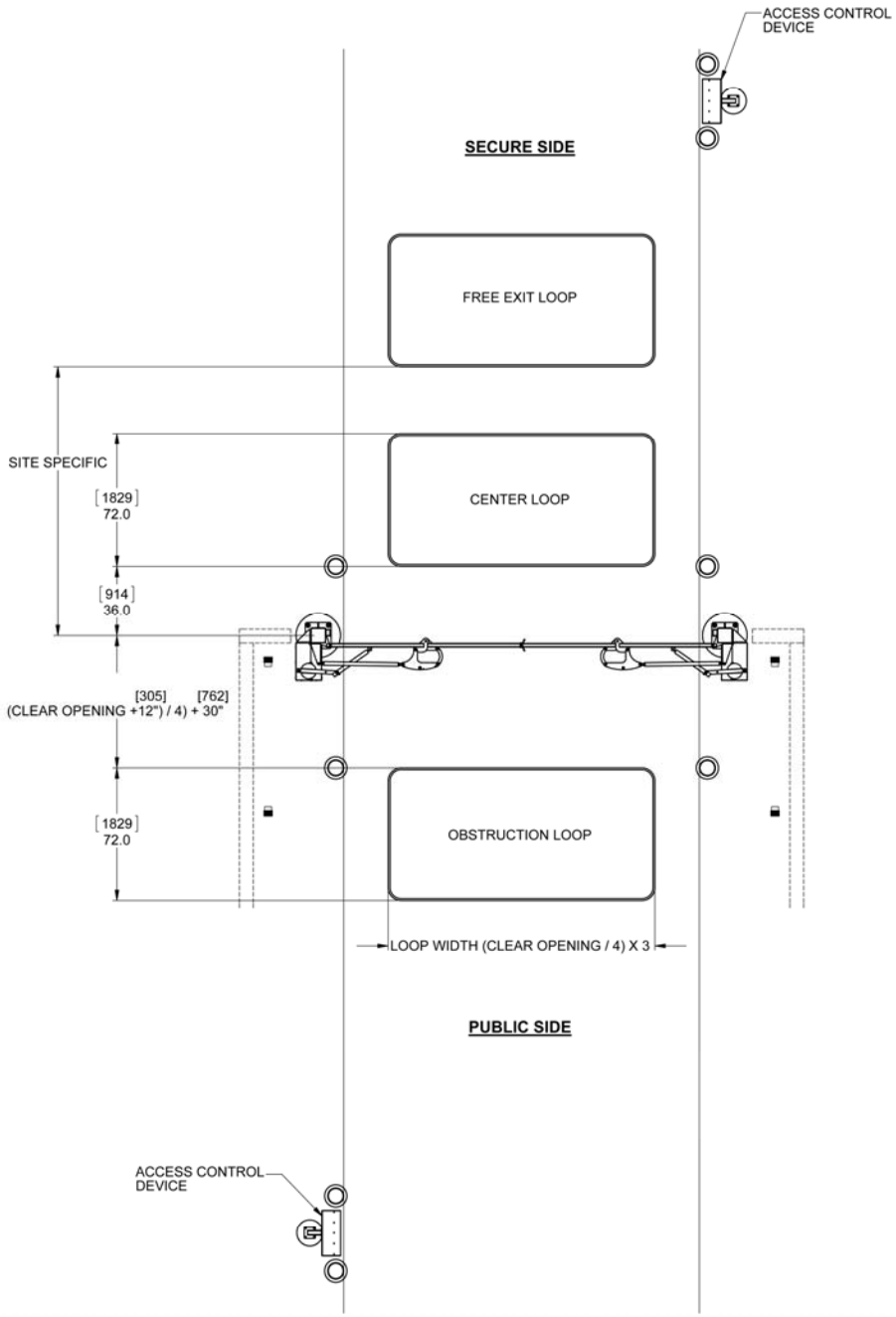

ACCESS CONTROL DEVICE
SECURE SIDE
FREE EXIT LOOP
SITE SPECIFIC
[1829] 72.0
CENTER LOOP
[914] 36.0
[305] [762]
(CLEAR OPENING +12") / 4) + 30"
[1829] 72.0
OBSTRUCTION LOOP
LOOP WIDTH (CLEAR OPENING / 4) X 3
PUBLIC SIDE
ACCESS CONTROL DEVICE

Figure 6-7.

Installing Photoelectric Sensors For Secondary Entrapment Protection Only

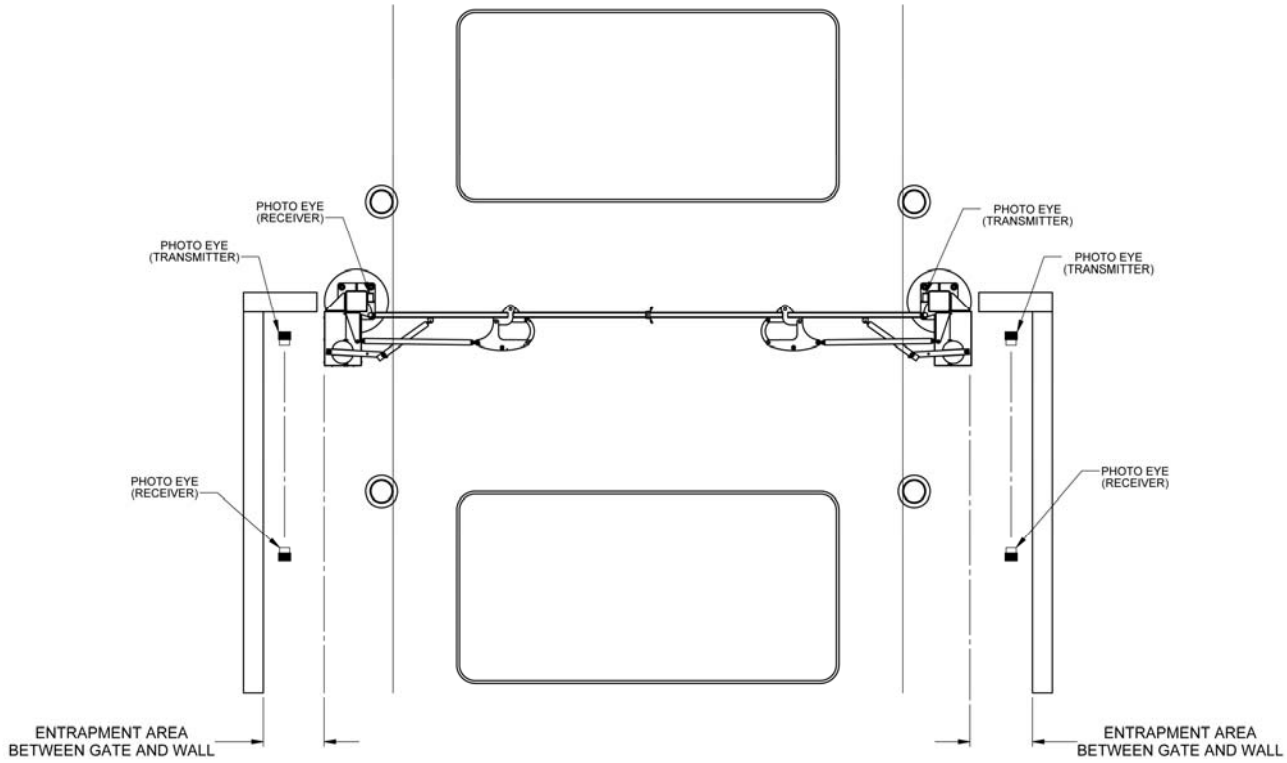


Figure 6-9.

Refer to Figure 6-9 to help plan the most appropriate placement for the photo eyes being installed as secondary entrapment protection devices. If no other secondary external entrapment protection devices (like edge sensors) are installed, then at least two photoelectric sensors are required to guard the gate in each direction of travel. If the photo eyes are tripped, the operator will temporarily stop the gate.

Consult a photoelectric sensor manual for wiring details. Make all electrical connections to Smart DC Controller as shown in Figure 6-10.

Operation Notes:

- **A photo eye trip does not reverse gate.**
- **The Smart DC Controller software is factory set to stop upon photo eye trip.**
- **Software is configurable to stop and reverse two seconds upon photo eye trip.**
- **If the photo eye is cleared within five seconds, the gate will proceed in the direction of travel.**

There are two common types of photoelectric sensors, thru-beam and retro-reflective, and each has its advantages.

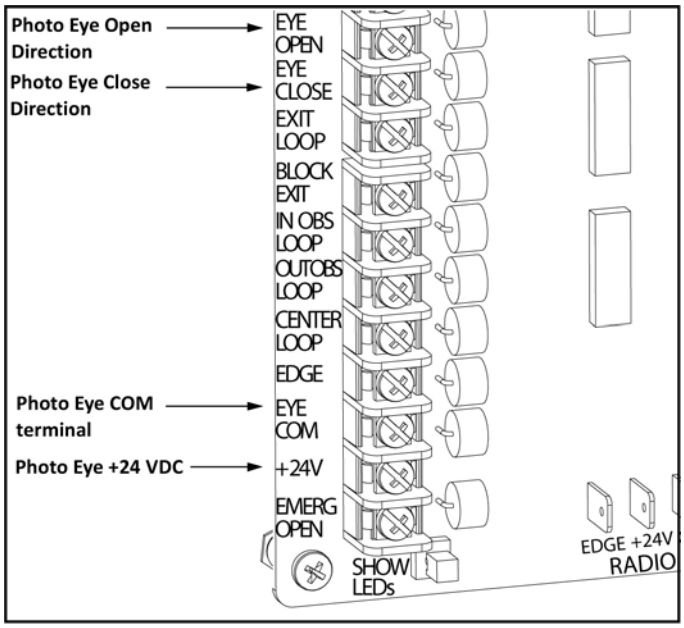


Figure 6-10. Connections for Entrapment Protection Only.

NOTE

EYE COM & +24V is the recommended way to connect standard photo eyes to Smart DC Controller.

Other options include:

- **Photo eye ON continuously: COM & +24VDC or +24VAC (if the photo eye uses 24VAC).**
- **Photo eye ON continuously with anti-fog feature:**
- **COM & +24VAC (connecting to DC will negatively affect battery charging).**
- **Photo eye and peripherals draw more than 1A off one power supply: Requires a separate power supply connected to the service outlet.**

- **A thru-beam sensor is generally more powerful and able to function reliably with dirty optics and in poor weather.**
- **A retro-reflective sensor does not require the installation and extra wiring of a separate emitter and receiver as is required in a thru-beam system, but retro-reflective eyes are generally more problematic in poor weather. Avoid using retro-reflective devices across outdoor distances greater than 24 feet (7.3m) because of performance and reliability issues.**

Mount thru-beam type photo eyes approximately 15" to 30" (38cm to 76cm) above the ground and as close to the gate as possible. A minimum of two photo eyes are required, one photo eye to guard the open direction and the other for the close direction of travel, unless gate edges for entrapment protection are installed. Mount the emitters and the receivers just beyond the travel of the gate in both the full open and full closed positions of travel. The installation locations described above are intended for pedestrian detection. If photo eyes are to be

used for vehicular detection, install a low elevation photo eye for cars and another photo eye at a height of about 55" (140cm) to detect semi-trucks.

NOTE

If photo eyes are to be used for vehicle detection and logically function the same as a vehicle detector, connect the common wires to the COM terminals on the left side of the board and wire the NO output contact to the appropriate vehicle detector input: EXIT LOOP, IN OBS LOOP, and OUT OBS LOOP.

If the photo eye has an internal switch for setting Light Operate vs. Dark Operate, select Light Operate. 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. This is because, 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.

Three wires to the receiver and two wires to the emitter are all that is required.

- **Depending on how the photo eyes are to be wired, +24VAC, +24VDC, or +12VDC power is provided via spades located just to the right of the COM terminal strip near the left side of the board.**
- **The receiver and emitter common wires are connected to the EYE COM terminal at the bottom, left of the Smart DC Controller. (See NOTE.)**
- **The photo eye NO or NC output wires connect to the Smart DC Controller at the EYE CLOSE terminal if the photo eye spans the road, or at the EYE OPEN terminal if the photo eye spans the area between an open gate and a wall or other structure. (See NOTE).**

Supervised Connection:

NOTE

This connection REQUIRES that both the Eye Open and Eye Closed inputs be connected to photoelectric eyes.

If two photo eyes are being installed and both have true NC output (one that is NC when the photo eye is powered, aligned and set for Light Operate), then a supervised connection is recommended. A supervised connection will signal a system Fault and prevent gate operation if either the open or close photo eye connection ever becomes an open circuit or a short circuit. The Installer Menu item PC - Photo Eye Output must be changed from a 0 to a 1 to enable this feature.

Photo Eye Function:

A tripped photo eye will prevent the gate from starting in either direction if the gate is stationary. If tripped while in motion, the standard function is to stop 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 two second reversal of travel.

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 photo eyes. The best way to assure true centering of the beam is with some trial testing where the emitter is shifted to move the beam left and right and up and down until the range of the invisible cone of the infrared beam is known. Photo eyes usually provide alignment aid LED's for this setup, but they can be hard to see. Wallace International has provided a unique feature that turns power on to the photo eyes and causes our buzzer to chirp when the photo eyes enter and exit alignment. See Table 3-1 "Smart DC Controller - User Menu Functions" to enable this feature. Set the menu item PE - PHOTO EYE ALIGN from a 0 to a 1. The buzzer chirps

once when the emitter and photo eye receiver are not aligned. When the emitter and receiver are aligned, the buzzer chirps twice. If they go out of alignment again, the buzzer will chirp once. This “alignment mode” will automatically reset to 0 the next time the Close Limit Switch is triggered or the RESET key is pressed.

Notes about retro-reflective systems:
Correct installation and alignment of a retro-reflective photo eye and its reflector is important for trouble free performance. Any system operating at a range greater than 16 feet is more prone to false triggering due to dirty optics, condensation or poor weather. If care is taken in the initial mounting and alignment of the 3-inch reflector, the chance of problems is greatly reduced. Use only through beam photo eyes for a distances greater than 24 feet because the function of a retro-reflective photo eye will be too unreliable.

Taking steps to protect the photo eye and the reflector from being exposed to fog and being absolutely certain the photo eye is perfectly aligned will greatly reduce any false triggering of the system. The ideal mounting of a retro-reflective photo eye is inside an enclosure.

The ideal reflector mounting suspends it inside a 12-inch long piece of 3-inch PVC conduit. Cut the opening of the PVC conduit at a 45-degree angle to act as a drip shield. Hold the reflector against the backside of the PVC conduit by attaching a 3-inch male connector. Do not cement the connector. This would prevent the reflector from being reached for future cleaning. To create a mounting base, attach a 3-inch aluminum flange (electric meter hub) to the connector. This whole package can be mounted to any flat surface.

Locate the reflector in the center of the invisible beam of infrared light to achieve the most sensitive alignment. The beam center is determined by the following test: while holding the reflector in your hand, slowly raise it until the beam is no longer returned and the photo eye trips. Mark this maximum height. Now lower your hand and determine the lower limit of the infrared beam by watching for the trip point. Mark this position as well. Repeat the same procedure for left and right at the center elevation of the beam, as determined by the previous test. Once the four limits have been determined, either mount the reflector in the center of the area outlined or realign the eye for the position of the reflector. If the photo eye is realigned, be sure to perform the centering test again to verify that the reflector is truly in the center.

Smart DC Controller Troubleshooting

This section is available to help you troubleshoot any problems that may occur with the FoldSmart operator. It provides information about the Smart DC Controller display codes.

The Smart DC Controller system includes many self diagnostics. Specific messages appear on the LCD and the Audio Alert buzzer sounds distinctive chirps. Any alerts, faults or errors are also logged into memory and date/time stamped. For diagnostic purposes these messages can be retrieved with optional S.T.A.R.T. software available from Wallace International. Refer to Smart Touch Analyze and Retrieve Tool (S.T.A.R.T.).

The following Table 6-1 provides solutions to the error codes, faults, and alerts that may appear on the Smart DC Controller display.

Display Condition	Description Alert, Error or Fault	Possible Causes	Solutions
SAFE MODE	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. Gate binding, wind, a faulty edge sensor, or worn motor brushes can cause a false alert.	1. Remove the obstruction. 2. Adjust the IES sensitivity. 3. Correct the gate hardware. 4. Correct faulty edge sensor. 5. Check for worn motor brushes and replace, if necessary.
ENTRAPMENT MODE	Entrapment Mode Alert	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 from a push-button control - Pressing the RESET button below the display With any one of these inputs, the operator will return to Safe Mode. Gate binding or wind can cause a false alert.	1. Remove the obstruction. 2. Adjust the IES sensitivity. 3. Correct the gate hardware.
NO AC POWER	No AC Input Power Advisory only.	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. Turn AC power switch on or connect power to the operator. 2. Reset the operator circuit breaker or connect power to AC switch. 3. Reset circuit breaker at electrical panel. 4. Have a licensed electrician check the wiring.
LOW 24VDC	Low 24VDC UPS Batteries Advisory only.	Occurs when the battery voltage has dropped to less than 22 Volts. At this level, the batteries are 80% depleted. Normal function until 21Volts.	1. No AC Power. See above item. 2. Wiring / Connector problem - check all connections. Clean or repair as required. 3. Check battery condition. 4. Smart DC Controller charger failure - check charger voltage and replace Smart DC Controller. 5. Transformer failure - replace Transformer.

Table 6.1. Smart DC Controller - Troubleshooting

Display	Description	Possible Causes	Solutions
Condition	**Alert, Error or Fault**		
DEAD BATTERY	Extremely low UPS batteries – no automatic operation - batteries below 21 Volts.	Occurs when the battery voltage has dropped to less than 21 Volts. At this level, the batteries are 90% depleted. The gate will automatically open or close depending upon the setting chosen. Refer to *Setting AC Power Loss Gate Function*. No additional automatic function is possible, but limited push button control is available to 18 Volts.	1. No AC Power. See above item. 2. Wiring / Connector problem - check all connections. Clean or repair as required. 3. Check battery condition. 4. Smart DC Controller charger failure - check charger voltage and replace Smart DC Controller. 5. Transformer failure - replace Transformer.
HYSECURITY BAD POWER	Critically low 24V supply power. This message can occur only on initial start up if power is critically low.	DC power is below 14V – no control functions will be allowed at all.	1. No AC Power. See above item. 2. Wiring / Connector problem - check all connections. Clean or repair as required. 3. Check battery condition.
No display, LED blinking	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. - Bad Smart DC Controller. - Bad transformer.	1. No AC power. See item above. 2. Wiring/Connector problem - check all connections. Clean or repair as needed. 3. Check battery condition. 4. Smart DC Controller charger failure - check charger voltage and replace Smart DC Controller. 5. Transformer failure - replace transformer.
HYSECURITY LOADER	The Smart DC Controller cannot locate the system software or software is being loaded into the Smart DC Controller.	There is no software loaded on the Smart DC Controller or software is being loaded.	Load the latest software version (H5.XX) using S.T.A.R.T. with a download cable (preferably USB) or wait for software to finish loading.
ALERT 1 FORCE OPEN	Gate forced open.	The gate has been forced off its closed limit and is being prevented from re-closing. Must be enabled in User Menu.	Will self-clear after an open or close input.
ALERT 2 DRIFT CLOSED	Gate drifted closed.	The gate has been forced off its open limit and is being prevented from re-opening. Must be enabled in User Menu.	Will self-clear after an open or close input.
ALERT 3 EXCESS DRIFT	Not used		
ALERT 4 MOTOR OVERLOAD	Thermal overload alert. When the alert is triggered, the gate can only "fully open" until the alert is cleared.	Motor drive heat sink exceeds 210°F. The alert will temporarily disable the operator, but will automatically reset itself when it cools down.	Check gate hardware, weight/length of gate. Alert automatically clears when the temperature drops below threshold.

Table 6.1. Smart DC Controller - Troubleshooting

Display	Description	Possible Causes	Solutions
Condition	**Alert, Error or Fault**		
ALERT 5 BOTH LIM ACTIVE	Both limit switches are on at the same time.	1. Stuck limit switch. 2. Short in wiring. 3. Debris in limit plate area.	1. Check limit switches and replace as required. 2. Check limit switch wiring, correct as required. 3. Remove debris from limit area.
ALERT 6 LIM NOT RELEASED	The limit did not release when the operator was commanded to move.	1. Quick disconnect bolt missing. 2. Broken drive belt. 3. Stuck Limit Switch. 4. Broken Limit Plate. 5. Debris in limit plate area.	1. Ensure quick disconnect bolt is in place and tight. 2. Check and replace drive belt. 3. Check limit switches and replace as required. 4. Check Limit Plate and replace as required. 5. Remove debris from limit area.
ALERT 7 FREQ SHIFT FAULT	The HY-5A has detected a frequency change outside the normal range.	Likely causes are poor integrity of loops or metallic objects within range. This message will also indicate which detector the alert applies to: Exit Loop (ELD), Inside Obstruction Loop (IOLD), Outside Obstruction Loop (OOLD), or Center Loop (CLD).	The loop lead in wires and roadway should be checked for problems or replaced.
ALERT 8 LOOP SHORTED	The HY-5A has detected a loop shorted to ground.	Caused by inadequate insulation of loop wires.	The loop lead in wires and roadway should be checked for problems or replaced.
ALERT 9 LOOP OPEN	The HY-5A has detected a lack of continuity in the loop wire.	Caused by broken loop wire or wire has come unplugged from detector.	The loop and lead in wires should be checked for problems or replaced.
ALERT 10 12C BUS ERROR	The Smart DC Controller has detected a communication error with a HY-5A vehicle detector.	Caused by removal of HY-5A or lack of integrity of the socket connection. This message will also indicate which detector the alert applies to: Exit Loop (ELD), Inside Obstruction Loop (IOLD), Outside Obstruction Loop (OOLD), or Center Loop (CLD).	Remove and re-install the HY-5A and press RESET. Replace the HY-5A, if necessary.
ALERT 11 DETECTOR FAULT	The Smart DC Controller has detected a problem within an HY-5A vehicle detector.	Caused by a fault within the HY-5A. This message will also indicate which detector the alert applies to: Exit Loop (ELD), Inside Obstruction Loop (IOLD), Outside Obstruction Loop (OOLD), or Center Loop (CLD).	Remove and re-install the HY-5A and press RESET. Replace the HY-5A, if necessary.
ALERT 12 ON TOO LONG	The Smart DC Controller has an active loop input (HY-5A or box detector output) for more than 5 minutes.	Caused when the Smart DC Controller sees an active loop for more than 5 minutes. The "active" loop can be actual or false. This message will also indicate which detector the alert applies to: Exit Loop (ELD), Inside Obstruction Loop (IOLD), Outside Obstruction Loop (OOLD), or Center Loop (CLD).	Check traffic patterns at the site. The loop and lead in wires should be checked for problems or replaced.

Table 6.1. Smart DC Controller - Troubleshooting

Display	Description	Possible Causes	Solutions
Condition	**Alert, Error or Fault**		
ALERT 13 STIFF GATE	The Smart DC Controller has detected a gate that, over time, has taken more power to move than it used to.	Caused by degrading gate hardware. This alert appears in the history log. It does not have any effect with regard to opening or closing the gate.	Check and correct gate hardware as required.
ALERT 14 STUCK GATE	The Smart DC Controller has detected that it cannot move the gate at all.	Caused by broken gate hardware or ice/snow buildup.	Check and correct gate hardware as required.
ALERT 15 NO PICKLE	Not used		
ALERT 16 COM BUS ERROR	The Smart DC Controller has detected an internal communications error.	Several possible causes: - Excessive electrical noise. - Lack of earth grounding. - Internal problem on Smart DC Controller.	1. Determine and remedy the source of electrical noise. 2. Install a ground rod. Refer to Chapter 1. 3. Replace the Smart DC Controller.
ALERT 17 BAD COIN BATTERY	The small battery on the Smart DC Controller is loose or needs replacing.	The coin battery is loose or dead.	1. Verify that the battery is properly seated. 2. Replace coin battery. 3. Restore power. 4. Press RESET button.
ALERT 18 CHANGE BATTERY	The Smart DC Controller has detected that the 24VDC UPS batteries need to be replaced.	Batteries are not taking a charge properly.	The buzzer will chirp every minute until the UPS batteries are replaced.
ALERT 19 FALSE SLOWDOWN	Not used		
ALERT 20 LI BLOCK OPEN	Not used		
ALERT 21	Not used		
ALERT 22 INTLOCK FAILURE	Interlock/Sequential Gate communication lost	Appears when the RS-485 communication connection is lost for more than 5s 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 auto clears when communication between the two operators is restored. 2. If the operator on site is a solo gate operator and the display code ALERT 22 appears, access the Installer Menu. Verify the Installer Menu items: DG (Dual Gate) and SG (Sequential Gate) are both set to zero.

Table 6.1. Smart DC Controller - Troubleshooting

Display	Description	Possible Causes	Solutions
Condition	**Alert, Error or Fault**		
FAULT 1 MOTOR RUN TIME	The Smart DC Controller has detected the motor is on longer than the maximum run time selected.	Several possible causes: - Quick disconnect bolt missing - Broken drive belt. - Broken Limit Plate. - Max Run Timer may need to be increased.	1. Ensure quick disconnect bolt is in place and tight. 2. Check and replace drive belt. 3. Check Limit Plate and replace, as required. 4. Increase Max Run Timer in the Installer Menu.
FAULT 2 PHOTO EYE	The photo eye is missing or not working.	This fault can only occur if the special supervised photo eye function is enabled in the Installer Menu. *See Installing Photoelectric Sensors For Secondary Entrapment Protection Only* for details.	Correct malfunctioning photo eye.
FAULT 3 VOLTAGE SAG	Not used	Caused by inadequate supply wire size.	Correct AC supply to use longer wires.
FAULT 4 GATE NO LOAD	The Smart DC Controller has detected there is no load on the operator. The gate is non-operational while this fault is triggered.	Several possible causes: - Linkage failure. - Quick disconnect bolt missing - Broken drive belt. - Motor wires disconnected.	1. Correct linkage. 2. Ensure quick disconnect bolt is in place and tight. 3. Replace drive belt. 4. Check DC motor wires. 5. Press RESET to clear fault.
FAULT 5 LIMIT FAILED	Not used		
FAULT 14 STUCK GATE	The Smart DC Controller has tried 3 times to overcome a stuck gate. The gate is non-operational while this fault is triggered.	Caused by broken gate hardware or ice/snow buildup.	1. Check and correct gate hardware as required. 2. Press RESET to clear fault.
ERROR 1 DIRECTION ERROR	The Smart DC Controller has detected that operator ran in the wrong direction.	Several possible causes: - Limit switch wiring. - Motor wiring. - Debris on limit plate	1. Check limit switch wiring and correct, as needed. 2. Check motor wiring and correct, as needed. 3. Remove debris from the limit switch area. 4. Press RESET to clear fault.
ERROR 3 HY-5A FAILED	The Smart DC Controller has detected a communication error with a HY-5A vehicle detector.	Caused by removal of HY-5A or lack of integrity of the socket connection. This message will also indicate which detector the alert applies to: Exit Loop (ELD), Inside Obstruction Loop (IOLD), Outside Obstruction Loop (OOLD), or Center Loop (CLD).	1. Press RESET. 2. Remove and re-install the HY-5A. 3. Replace the HY-5A, if needed.

Table 6.1. Smart DC Controller - Troubleshooting

Display Condition	Description Alert, Error or Fault	Possible Causes	Solutions
ERROR 4 MASTER-SLAVE COM	The Smart DC Controller has detected a communication error in the communication link between master and slave in a dual gate installation.	Several possible causes: - Master/Slave communication cable has not been installed correctly. See Chapter 5. - Master/Slave not configured properly through the Installer Menu. - Operator not properly earth grounded. - Master/Slave 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 Master and the other operator must be set as Slave. 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 both power switches are in the ON position. 6. Check the software version currently loaded in the operator by pressing RESET. Make sure both operators are running the same software version.
ERROR 5 No display	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.	Internal software /hardware error. Report any instance of this error.	1. Turn both switches off to reset software. 2. Update to latest software version using S.T.A.R.T. 3. Replace Smart DC Controller.
ERROR 6	Not used		
ERROR 7 MENU CHECKSUM	Software issue exists that may require factory reset.	Corrupt software or data.	Call Technical Support for assistance.
ERROR 8 RPM SENSOR	Not used		
ERROR 9 BATTERY DISCONNE	The Smart DC Controller detected there is no battery connected.	The batteries are disconnected, or a wiring fault exists. SwingSmart operators ship with a wire disconnected to prevent battery drain.	1. Ensure the red wire in the upper left corner of the electrical box is connected to the switch. 2. Correct any issues with battery wiring. 3. Check the 30 amp fuse on the circuit board.
ERROR 10 SLOWDOWN SWITCH	Not used		

Table 6.1. Smart DC Controller - Troubleshooting

Vehicle Detector and Loop Fault Diagnostics

If HY-5A vehicle detector modules are used, the Smart DC Controller has the ability to store and report detector and loop fault information for performance diagnostics.

If the Smart DC Controller senses a loop or detector problem:

- **The LCD display flashes the name of the affected detector or error and the appropriate alert code.**
- **The buzzer chirps continuously at regular intervals until the issue is resolved.**

Table 6-2. HY-5A vehicle Detector Faults and Errors

Alert or Error #	LCD Description	Advisory	Resolution
ALERT 7	FREQ SHIFT FAULT	HY-5A vehicle detector - Abnormal frequency change alert.	The alert indicates an unstable loop frequency. Check the loop and lead in wires for problems. Replace them, if necessary.
ALERT 8	LOOP SHORTENED	HY-5A vehicle detector - Loop is shorted.	The alert indicates that the loop and lead in wires are shorting out. Check the wires for problems. Replace them, if necessary.
ALERT 9	LOOP OPEN	HY-5A vehicle detector - Disconnected loop alert.	The alert indicates the loop wires are loose or disconnected. Check the wires for problems. Replace them, if necessary.
ALERT 10	I^2C BUS ERROR	HY-5A vehicle detector - Communications alert.	The alert indicates the detector is not communicating properly with the Smart DC Controller. The alert occurs if the detector is unplugged or the connection is unstable. If communication is not re-established within 30 seconds, the controller will reset and the message changes to ERROR 3.
ALERT 11	DETECTOR FAULT	HY-5A vehicle detector - Malfunction alert.	The display indicates the HY-5A detector malfunction. Check detector for problems. Replace it, if necessary.
ALERT 12	ON TOO LONG	Detector input triggered too long - More than five minutes.	The display indicates the HY-5A detector malfunction. The alert also works for any input connected to the terminal strip for standard box detectors. Check that a vehicle is not parked on the loop. Also, determine if the loop is stable. An unstable loop can hold the detector in a triggered state.
ERROR 3	DETECTOR FAILED	HY-5A vehicle detector - Communication failed. The Smart DC Controller will behave as if the detector is triggered, usually holding the gate fully open.	The alert indicates the detector is not communicating properly with the Smart DC Controller. The alert occurs if the detector is unplugged or the detector has failed. To replace the detector, press the RESET button to clear the error and re-seat the detector or install a new one.

Even if the loop problem self heals, historical data about detector/loop performance and a log of Alerts, Faults and Errors can be retrieved from the Smart DC Controller by downloading from the RS232 communications port or the USB port. HySecurity's free S.T.A.R.T. software, a PC computer, and a special download cable or USB cable are required to retrieve and read this data.

Frequency:
Knowing the exact frequency of a loop can be useful as a diagnostic tool, and verifying that the loop frequency is stable is also very valuable information. To view the actual loop frequency of a specific vehicle detector, go to the setting for that detector in the Installer Menu, switch the selection from 0 to 1, and press the Select button. The display will show the loop frequency. The frequency is usually between 20,000 to 80,000 Hertz.

Changing the Loop Frequency:
HY-5A detectors can never crosstalk. If for any reason, you want to manually change the loop frequency, change the Installer Menu option for the desired loop from 0 to 3, and then press the Select button. Each detector has a choice of four frequencies. Press the Select button when the desired frequency setting is found, and the controller will perform a reset and tune to the new frequency setting.

Call Strength Level:
Knowing the call strength of a detector is valuable because it provides information about how well the loop is actually “seeing” a specific vehicle. For example, it may be useful to check to see if the loop is easily detecting the middle of a high bed semi-truck. The strength of a detector call can be displayed in real time, on a scale of 0 to 7. As indicated in the table below, when the Installer Menu setting for a given detector is set to 2, and the Menu button is pressed, the LCD display will read Level 0 - 7 Call Level. If the call strength on the display appears as a level 4 or less, consider increasing the sensitivity level by adjusting the rotary switch on the HY-5A detector.

Table 6-3. HY-5A Vehicle Detector Call Level Display

Installer Menu	**LCD Description**	**Setting Options** (**Bold** = Factory Settings)
ELD 0	EXIT LOOP SET	**0 = Run mode** 1 = Show frequency 2 = Show call level 0-7 3 = Set Frequency
ILD 0	IN OBS LOOP SET	**0 = Run mode** 1 = Show frequency 2 = Show call level 0-7 3 = Set Frequency
OLD 0	OUT OBS LOOP SET	**0 = Run mode** 1 = Show frequency 2 = Show call level 0-7 3 = Set Frequency
CLD 0	CENTER LOOP SET	**0 = Run mode** 1 = Show frequency 2 = Show call level 0-7 3 = Set Frequency

FoldSmart Schematics

Figure 6-13 illustrate the schematics for FoldSmart Operator.

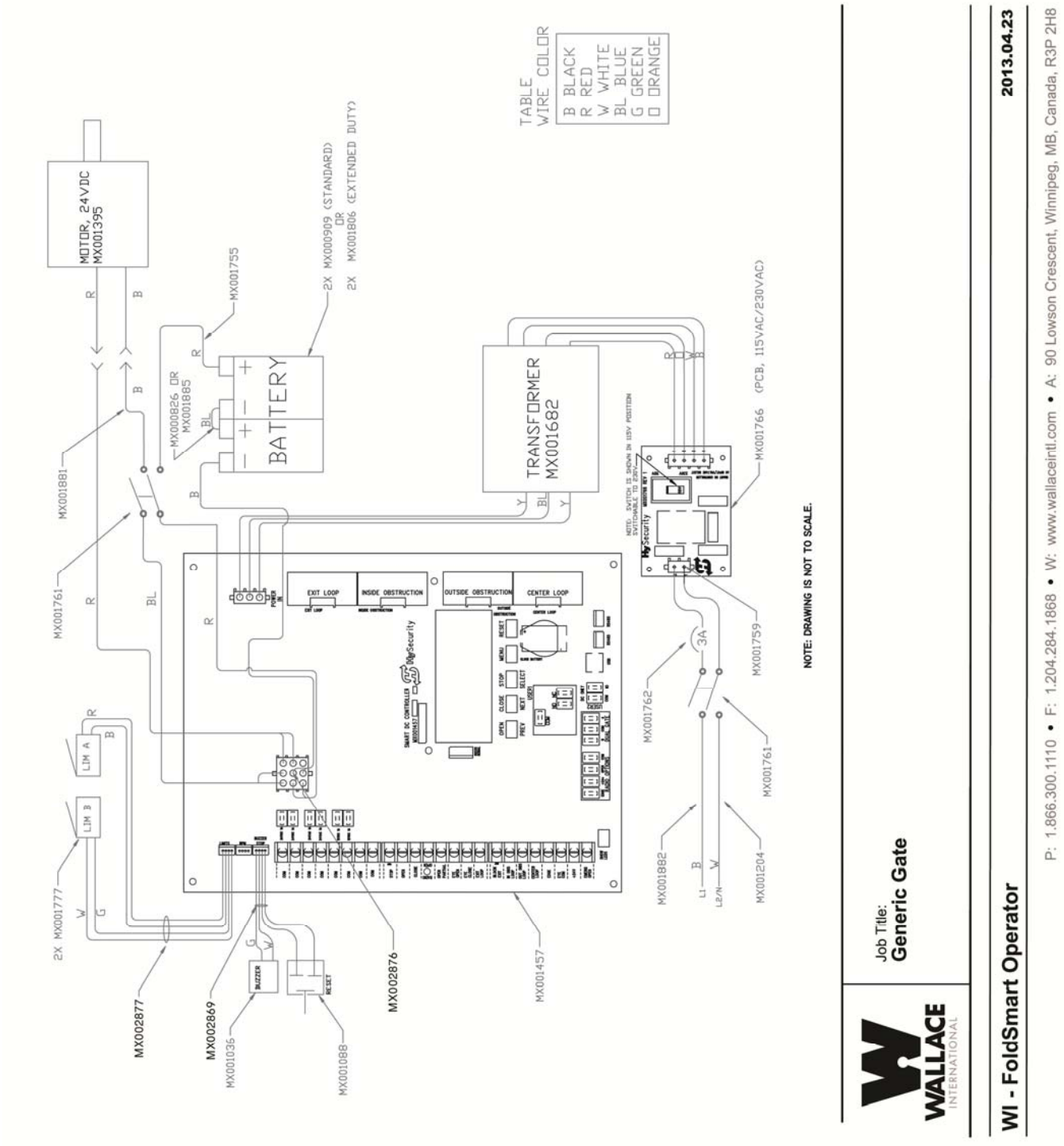


Figure 6-13. FoldSmart Operator Schematic

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 Wallace International gate system 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 FoldSmart operators. Either the USB port or the RS-232 serial port, found on the Smart DC Controller (see Figure 6-15), allows you to download system diagnostics and upload system configurations using the S.T.A.R.T. software. using the S.T.A.R.T. software. The free S.T.A.R.T. software is conveniently located on the HySecurity and Wallace International websites. Instructions for downloading S.T.A.R.T. are found on the website.

What You Need

- **Standard USB connection or HySecurity Serial RS-232 communication cable. Be sure to install the USB driver in your laptop, if you are using the HySecurity RS-232 to USB adapter.**
- **Laptop computer with Windows PC operating system (XP, Vista or 7)**
- **Minimum 128MB of RAM**
- **Minimum 5MB of hard drive disk space**
- **VGA graphics card (minimum resolution of 800 x 600)**

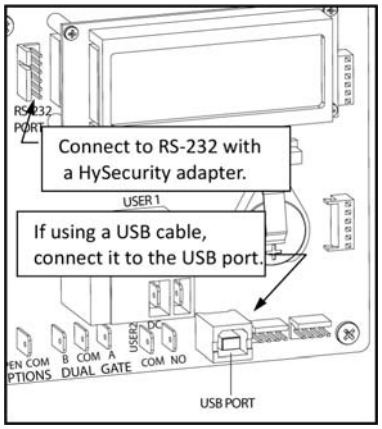


Figure 6-15.

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:

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 on I accept (bottom of the page).**
6. **Click RUN. A setup window appears.**

7. **If the operating system on your laptop is VISTA or Windows 7, you must first disable the "User Account Control Settings." Refer to the procedure in Setting User Account Controls, and then continue with step 9.**

8. **Follow the step-by-step instructions to complete the installation.**

9. **When the download is complete, log out of the HySecurity website. Shortcuts for the S.T.A.R.T. and Smart DC Controller History Logs appear on your laptop's desktop.**

Setting User Account Controls

Because of the security settings inherent in VISTA and Windows 7, you need to disable the "user account controls" in the operating system before uploading S.T.A.R.T. software onto your laptop. Take the following steps:

In Windows 7:
Go to Start Menu -> Control Panel -> User Accounts -> User Account -> Change User Account Control Settings "slide the slide bar to the lowest value (toward Never Notify), with description showing Never notify me -> Press Ok -> Reboot Computer.

In Vista:
Go to the Start Menu type "msconfig" and press Enter -> In System Configuration select the tools tab -> Scroll down till you find "Disable UAC" and single click it -> Press the Launch button -> Press the Apply button -> Press OK -> Reboot Computer.

Electrical Controls

CAUTION

Before servicing, turn off all power 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 Table 6-1 "Smart DC Controller - 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 and the service record of the operator, especially any work that has been done recently.

Mechanical Maintenance

CAUTION

Before checking the internal mechanisms of the operator, turn off all power switches.

The FoldSmart mechanical maintenance is not in depth or difficult, but should be performed on a routine basis.

Schedule regular maintenance and look for the following:

- **Assess that the 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. Refer to Drive Belt Tension and Alignment.**
- **Check for signs of rust. If any areas of rust are found, reduce the spread of corrosion by treating the areas with a rust inhibitor.**

- **Check the motor. DC motors contain carbon brushes which wear over time and must be replaced. Failure to replace the brushes will result in damage to the DC motor. Brushes should be inspected every year in high usage applications or every 100,000 cycles and replaced as needed.**
- **Replace worn-out batteries. Refer to DC Battery Replacement and Clock Battery Replacement.**

Software Maintenance

The software on the SDC board is constantly 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 before heading out for field maintenance.

Use S.T.A.R.T. software to download the latest software version to a PC laptop and upload it to the FoldSmart gate system in the field.

If the site includes a bi-parting gate system, make sure the software version used in the Master and Slave operators is identical.

Drive Belt Tension and Alignment

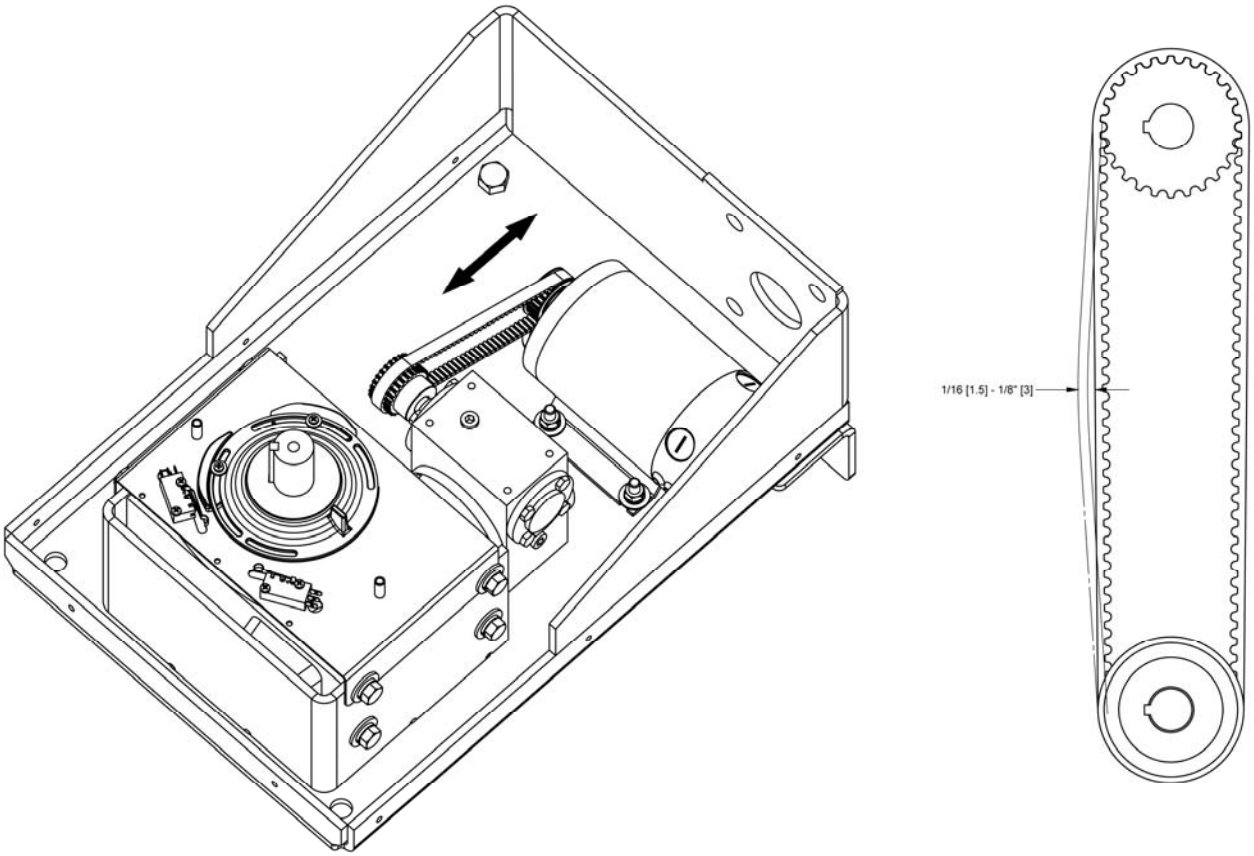


Figure 6-16

Proper drive belt tension is important for prolonging the life of the drive belt and maintaining the superior performance of the operator. To check the drive belt tension, take the following steps:

Remove the FoldSmart covers. Refer to Unpacking the Operator.

1. **Turn off the DC and AC power switches.**

2. **Check to make sure the pulley is aligned vertically.**

3. **With your finger, apply light outward pressure to the drive belt. If it is properly tensioned, it should only move about 1/16-inch to 1/8-inch (1.6 to 3.2mm). See Figure 6-16.**

4. **To replace or re-tension the drive belt. Loosen the two motor bracket bolts and move the bracket accordingly.**

DC Battery Replacement

Wallace International provides a one year warranty from the date of shipment for the all batteries supplied with the FoldSmart gate system.

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.**

NOTE

For detailed information about the AP AC LOSS configuration, refer to Setting AC Power Loss Gate Function.

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 (part number MX002008 or equivalent). The batteries supplied in the FoldSmart operator are state-of-the-art AGM batteries. Do NOT use flooded cell batteries as damage may occur to the unit.

To replace the batteries, take the following steps:

1. **Turn off the DC and AC power switches.**
2. **Unlock and open the control enclosure.**
3. **Cut the two black zip ties which secure the 8Ah batteries to the tray.**
4. **Disconnect the black and blue wires from the batteries.**

5. **Remove the first battery from the enclosure.**
6. **Disconnect the red and black wires from the second battery and remove it from the enclosure.**

To install the two new batteries, reverse the removal procedure.

1. **Connect the red wire to the bottom battery.**
2. **Connect the blue wire between the top and bottom batteries (black and red terminals).**
3. **Connect the black wire to the black terminal on the top battery (see Figure 6-17).**
4. **Ensure the batteries are secured properly.**

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. (See Figure 6-18.) Replace the battery about every five years (or as needed) with a DL 2025, DL 2032, or CR 2025, or CR 2032 battery.

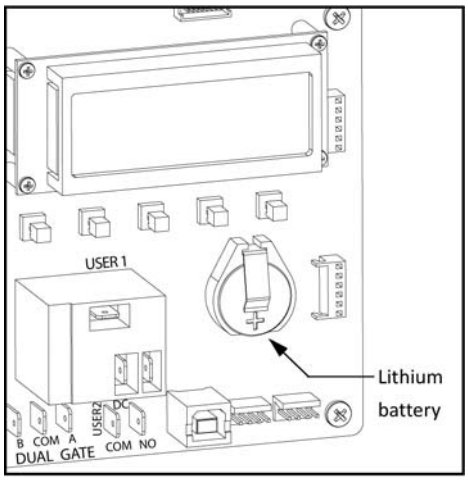


Figure 6-18.

LIMITED WARRANTY

1. Warranty.

Wallace International, Inc. ("Wallace International") 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. This warranty does not extend to items listed as "accessories" in Wallace International's price list, when those items carry another manufacturer's name plate and they are not a part of the base model. Wallace International disclaims all warranties for such accessory components, which carry only the original warranty, if any, of their original manufacturer. Wallace International hereby assigns its rights under such manufacturer warranties-to the extent that such rights are assignable-to Buyer.

The following additional durational warranties apply to Wallace International's products. The term of these additional warranties is determined by whether (1) the product is purchased through an authorized Wallace International distributor and (2) whether a timely and complete warranty registration is submitted to Wallace International. It is therefore important that you register your product with Wallace International within the 60 day period described below.

Five Year / Seven Year Warranty Items *(Registered Gate Operators Purchased from Authorized Distributors)*

For any gate operator product that is purchased from an authorized Wallace International distributor (this excludes product purchased through internet resellers or any distributor not authorized by Wallace International), if the online Warranty registration is completed at www.Wallace International.com/warranty within 60 days of the date of purchase by the dealer/installer or if the warranty registration form sent with every Wallace International gate operator is completely filled out and returned to Wallace International within the same 60-day period, the following Warranty terms will apply: Wallace International will warrant that the product will remain serviceable for the following periods:

Hydraulic Gate Operators: Five Years or 500,000 gate cycles (whichever occurs first) after the date of installation, or lectromechanical 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 Wallace International;

provided that the Five Year warranty period will not extend beyond Seven Years from the date that the product was shipped from Wallace International. This warranty does not apply to the components described below, which have the shorter warranty period indicated:

Hydraulic Gate Operator Drive Wheels: Two Years

Batteries used in all D.C. operators: One Year from date of shipment from Wallace International.

Items subject to normal wear including, but not limited to, chains, belts, idler wheels, sprockets, fuses and motor brushes: One Year from date of installation.

One Year Warranty Items *(Operators Not Purchased from an Authorized Distributor or Registered within 60 Days)*

For any gate operator product that is not purchased from an authorized Wallace International distributor or for which the online Warranty registration or warranty registration form sent with every Wallace International operator was not filled out completely or not returned to Wallace International within 60 days of the date of purchase by the dealer/installer, the following One-Year Warranty will apply to that product: Wallace International warrants that the product will remain serviceable for the following periods, which begin on the date that the product was shipped from Wallace International:

All Gate Operators: One Year or 100,000 gate cycles whichever comes first.

Hydraulic Gate Operator Drive Wheels: One Year

Replacement parts

Wallace International warrants that replacement parts (whether new or reconditioned) will remain serviceable for One Year from the date that the product was shipped from Wallace International.

Limitations and Exclusions Applicable to Each

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 Wallace International, in advance of the change (this exclusion does not apply to normal installation of approved accessories and/or protective devices or sensors).

THESE ARE THE ONLY WARRANTIES GIVEN BY WALLACE INTERNATIONAL AND ARE IN PLACE OF ALL OTHERS.

These warranties extend to Wallace International's Distributors, to the Dealer/Installer, and to the First User of the product following installation. They do not extend to subsequent purchasers. Dealer/Installers or First Users may receive a replacement Wallace International Warranty form by calling Wallace International at 800-321-9947.

Exclusion of Other Warranties.

The warranties contained in Section 1 are the exclusive warranties given by Wallace International and supersede any prior, contrary or additional representations, whether oral or written. Any prior or extrinsic representations or agreements are discharged or nullified. WALLACE INTERNATIONAL 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, AND ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE.

Buyer's Exclusive Remedies for Any Nonconformity.

If a Wallace International 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. Wallace International 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. Replacement goods will conform to this warranty for the unexpired duration of the warranty period for the original, nonconforming product. Wallace International reserves the right to supply used or reconditioned material for all warranty claims. This warranty does not cover or extend to any incidental expenses, including 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 following paragraph. THE REMEDY SELECTED BY WALLACE INTERNATIONAL IN ACCORDANCE WITH THIS PARAGRAPH SHALL BE THE EXCLUSIVE AND SOLE REMEDY OF BUYER FOR ANY BREACH OF WARRANTY. IN NO EVENT SHALL WALLACE INTERNATIONAL BE OBLIGATED TO INDEMNIFY BUYER FOR ANY BREACH OF WARRANTY.

For warranty coverage, you must follow the procedures described on Wallace International's form, "RMA Procedures." A current version of the form is available from Wallace International.

Exclusion of Consequential and Incidental Damages.

IN NO EVENT SHALL WALLACE INTERNATIONAL BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, 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 WALLACE INTERNATIONAL'S OWN NEGLIGENCE OR OTHER TORT. This exclusion applies regardless of whether such damages are sought for breach of warranty, breach of contract, negligence, or strict liability in tort or under any other legal theory. This exclusion does not apply to claims for bodily injury or death.

Severability.

If any provision of this warranty is found to be invalid or unenforceable, then the remainder shall have full force and effect, and the invalid provision shall be partially enforced to the maximum extent permitted by law to effectuate the purpose of the agreement.