Operator models contained in this manual conform to UL325 standard for use in Class I, II, III, and IV applications.

USA & Canada (800) 421-1587 & (800) 392-0123
(760) 438-7000 - Toll Free FAX (800) 468-1340
www.nortekcontrol.com
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**WARNING**

*ONLY QUALIFIED TECHNICIANS SHOULD WORK ON LINEAR SWING GATE OPERATORS*

**WARNING**

*CONTROLS INTENDED FOR USER ACTIVATION MUST BE LOCATED AT LEAST SIX FEET (6’) AWAY FROM ANY MOVING PART OF THE GATE AND WHERE THE USER IS PREVENTED FROM REACHING OVER, UNDER, AROUND OR THROUGH THE GATE TO OPERATE THE CONTROLS. OUTDOOR OR EASILY ACCESSIBLE CONTROLS SHALL HAVE A SECURITY FEATURE TO PREVENT UNAUTHORIZED USE.*
Pre-installation Information

Before You Begin...

Before unpacking, inspect the carton for exterior damage. If you find damage, advise the delivery carrier of a potential claim. Inspect your package carefully. You can check your accessory box parts with the enclosed packing slip for your convenience. Claims for shortages will be honored for only 30 days from the date of shipment.

Before installing the operator, read this manual completely to ensure all requirements for proper installation are present. Verify that the voltage to be used matches the voltage of the operator. If you have any questions about the requirements for proper installation of this gate operator contact technical support at 800-421-1587

Always Check the Gate’s Action

It’s very important before installing the gate operator to make sure the gate’s swing is free and level throughout the entire swing path. If the gate does not seem to operate properly, it may affect the operator performance or greatly shorten the life of the unit. The gate should also be designed so that airflow is ample to prevent wind resistance and drag.

Gate Operator Classifications

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

- **Class I Residential Vehicular Gate Operator**
  A vehicular gate operator intended for use in a home or for one to four single family dwellings with a common garage or parking area associated with these dwellings.

- **Class II Commercial / General Access Vehicular Gate Operator**
  A vehicular gate operator intended for use in a commercial location or building such as a multi-family housing unit of five or more single family units, hotel, retail store or other building servicing the general public.

- **Class III Industrial / Limited Access Vehicular Gate Operator**
  A vehicular gate operator intended for use in an industrial location or building such as a factory or loading dock area or other location not intended to service the general public.

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

Approved Obstruction Detection Devices

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

- **Contact Edges**
  Miller Edge Models: MGO20, MGR20, MGS20

- **Wireless Contact Adapter**
  GTO Models: SGEKAC, SGEKDC, SGET, SGER

- **Obstruction Input Expansion**
  Miller Edge Model: MIM-62

- **Photoeyes**
  Omron Model: E3K-R10K4-NR
  Miller Edge Models: RG-K-R, PG-K-R50
  EMX Models: IRB-MON, IRB-RET

Safety Information and Warnings

The following formats are used for safety notes in these instructions.

- **CAUTION**
  This type of warning note is used to indicate the possibility of damage to the gate or gate operator.

- **WARNING**
  This type of warning note is used to indicate possible mechanical hazards that may cause serious injuries or death.

- **WARNING**
  This type of warning note is used to indicate possible electrical shock hazards that may cause serious injuries or death.

Regulatory Warnings

Read the following before beginning to install this swing gate operator:

**IMPORTANT INSTALLATION SAFETY INSTRUCTIONS**

**WARNING**

TO REDUCE THE RISK OF SEVERE INJURY OR DEATH TO PERSONS,
REVIEW THESE INSTALLATION SAFETY STEPS BEFORE PROCEEDING

1. READ AND FOLLOW ALL INSTALLATION INSTRUCTIONS.
2. Read the yellow “Safety Instructions” brochure enclosed with the packet of information. If any pages are missing or are unreadable, or you do not have the safety instructions, please call Linear at 1-800-421-1587 to request additional copies.
3. ALL ELECTRICAL CONNECTIONS TO THE POWER SUPPLY MUST BE MADE BY A LICENSED ELECTRICIAN AND MUST OBSERVE ALL NATIONAL AND LOCAL ELECTRICAL CODES.
4. A separate power-disconnect switch should be located near the operator so that primary power can be turned off when necessary.
5. Install the enclosed warning signs on both sides of the gate. A minimum of two (2) WARNING SIGNS shall be installed, one on each side of the gate where easily visible.
6. Never reach between, through or around the fence to operate the gate.
7. Never connect a button station within reach of the gate or on the side of the gate operator.
8. Do not adjust the operator controller’s current sensing feature too high. It should be adjusted high enough to keep the gate from falsely triggering the sensing, but no higher than necessary for the gate to operate. DO NOT DEFEAT THE PURPOSE OF THIS FUNCTION!
9. You must install all required safety equipment.
10. UL325 Compliance requires the use of contact edges or photoelectric controls on all automatic or remotely-controlled gate operators.
11. The operator is intended for installation only on gates used for vehicles. Pedestrians must be supplied with a separate access opening. The pedestrian access opening shall be designed to promote pedestrian usage. Locate the gate such that persons will not come into contact with the vehicular gate during the entire path of travel of the vehicular gate.
Wiring Specifications

Refer to the following steps for details on power and accessory wiring for the operator.

**WARN**

ALL AC ELECTRICAL CONNECTIONS TO THE POWER SOURCE AND THE OPERATOR MUST BE MADE BY A LICENSED ELECTRICIAN AND MUST OBSERVE ALL NATIONAL AND LOCAL ELECTRICAL CODES.

USE COPPER WIRE ONLY!

**AC Power Wiring**

1. Find the listing on this page corresponding to the model, voltage and horsepower rating of your operator.
2. The distance shown in the table is measured in feet from the operator to the power source. **DO NOT EXCEED THE MAXIMUM DISTANCE.** These calculations have been based on standard 115 V and 230 V supplies with a 10% drop allowable. If your supply is under the standard rating, the runs listed may be longer than what your application will handle, and you should not run wire too near the maximum distance for the gauge of wire you are using.
3. When large-gauge wire is used, a separate junction box (not supplied) may be needed for the operator power connection.
4. Wire length calculations are based on the National Electrical Code, Article 430 and have been carefully determined based on motor inrush, brake solenoids, and operator requirements.
5. Connect power in accordance with local codes. The green ground wire must be properly connected.
6. Wire insulation must be suitable to the application.
7. Electrical outlets are supplied in all 115 VAC models for convenience with occasional use or low power consumption devices only. If you choose to run dedicated equipment from these devices, it will decrease the distance for maximum length and the charts will no longer be accurate.

**DC Control and Accessory Wiring**

1. All control devices are now 24 VDC, which can be run up to 2000 feet with 14 AWG wire.
2. Control wiring must be run in a separate conduit from power wiring. Running them together may cause interference and faulty signals in some accessories.
3. A three-wire shielded conductor cable is required to connect two operators together for dual operation. You must use Belden 8760 Twisted Pair Shielded Cable (or equivalent) only – P/N 2500-1982, per foot. See Page 21 for details of this connection. **Note:** The shield wire should be connected in both the operators.

### MODEL SWG SINGLE PHASE POWER WIRING

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### MODEL SWG THREE PHASE POWER WIRING

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Mounting Pad Installation

The gate operator mounts bolted to posts secured in concrete footings. The posts support the operator and prevent it from moving during operation.

Gate Preparation

Before installing the gate operator, make sure the gate's swing is free and level throughout the entire swing path. If the gate does not seem to operate properly, it may affect the operator performance or greatly shorten the life of the unit. The gate should be designed so that airflow is ample to prevent wind resistance and drag.

Mounting Specifications

Use two 3 - 3-1/2” OD galvanized posts and secure with concrete footings as shown, length to be determined by local codes, frost line depth and soil conditions.

Attach the operator with the U-bolts, side plates and hardware provided. Four 3/16” side plates go on the outside top and bottom, two 3/16” side plates go on the inside top, and two 1/2” side plates go on the inside bottom (see the illustration at right). The operator should be positioned at a level to allow the arm to be installed at mid-height on the gate. “H” dimension can vary depending on gate construction. Make sure the posts do not protrude above the operator cabinet.

✓ NOTE: Maximum gate opening angle is approximately 95 degrees, depending on gate width. If larger opening angle is required, non-standard positioning of the operator and modified articulating arms may be required. Contact the factory for technical information, pricing, and availability.

WARNING

The gate operator is intended for installation only on gates used for vehicles. Pedestrians must be supplied with a separate access opening. The pedestrian access opening shall be designed to promote pedestrian usage. Locate the gate such that persons will not come into contact with the vehicular gate during the entire path of travel of the vehicular gate.

WARNING

The gate must be installed in a location so that enough clearance is supplied between the gate and adjacent structures when opening and closing to reduce the risk of entrapment. Swing gates shall not open into public areas.

Figure 2. Mounting Pad Specifications

23” SPACE REQUIRED BEHIND OPERATOR FOR ARM CLEARANCE WHILE OPENING

IF NON-STANDARD MOUNTING IS NECESSARY, CONSULT THE FACTORY

Figure 1. Side Plate Installation

OPERATOR ACCESS DOOR MUST FACE AWAY FROM DRIVEWAY

23” SPACE REQUIRED BEHIND OPERATOR FOR ARM CLEARANCE WHILE OPENING

IF NON-STANDARD MOUNTING IS NECESSARY, CONSULT THE FACTORY

Figure 2. Mounting Pad Specifications

OPERATOR ACCESS DOOR MUST FACE AWAY FROM DRIVEWAY
**Operator Preparation**

**Vent Plug Installation**

In order to keep gear oil from spilling out during shipping, gear reducers used in gate operators have either a solid plug, or a sealed vent plug, installed at the factory.

For operators with a solid plug, replace the solid plug with the vent plug provided (see Figure 3).

With the vent plug installed, remove the vent plug’s breather pin to allow the gear box to vent (see Figure 3).

**Gate Arm Installation**

The gate arm connects the operator to the gate. The arm supplied can be used in left-hand or right-hand installations.

✓ **NOTE:** The item numbers shown in these illustrations are for reference only. For the actual part numbers, refer to the parts lists in the rear of this manual.

**Crank Extension Installation**

See Figure 4. Place the crank extension (2) on the operator crank (1) as shown. Slide a black spacer (3) into the crank and hold it while sliding a 1/2-13 x 1-3/4” hex head bolt (4) through the extension and crank. Assemble with a 1/2” flat washer and locknut and tighten. Slide the clevis pin (5) and a 1/2” flat washer through the crank and the extension. Slide another 1/2” flat washer over the end of the pin and lock it with either a disconnect pull pin or with an optional pad lock through the pin.

**Overtravel Stop Installation**

See Figure 5. Slide a 1/2” lock washer and flat washer onto the 1/2-13 x 2 1/2” hex head bolt (10). Add a nylon washer (8), then slide the bolt through the crank extension (2) and hold it in place Next, insert the yellow-plated pivot spacer (11) into the crank extension, add a nylon washer (8) and place the offset spacer (7) on top of the nylon washer. Add a nylon washer (8) to the top of the offset spacer (7) and add the silver zinc-finish overtravel stop spacer (18). Slide the overtravel stop bracket (9) over the silver zinc-finish spacer and add the last nylon washer (8) above the bracket. Carefully screw the bolt assembly into the aluminum gate clamp (6) until the lock washer has been fully compressed. The overtravel stop and crank extension should float freely, without binding, when it is fully assembled. Tighten set screw (19) to further lock hex bolt (10) in place.

✓ **NOTE:** Illustrations shown on this page are for right-hand application. For left-hand, overtravel stop (9) should be on the opposite side.

---

**Figure 3. Vent Plug Installation**

**Figure 4. Crank Extension Installation**

**Figure 5. Overtravel Stop Installation**
Gate Arm Installation (Cont.)

Gate Plate Installation
See Figure 6. Angle iron (not supplied) (13) should be welded to the gate prior to this step. Attach the gate plate (12) to the angle iron using 3/8 bolts, flat washers, lock washers and hex nuts (15). Slide a 1/2-13 x 1 1/4” bolt, 1/2” lock washer, 1/2” flat washer (14), and a black spacer (3) through the gate plate. Place a nylon washer (8) over the opening in the gate plate. Thread the bolt into the hole in the gate clamp (6) and tighten carefully. Do not overtighten! Tighten set screw (19) to further lock hex bolt (14) in place.

Choosing Good Harmonics
Good harmonics are necessary to minimize wear and tear on the operator. The gate will have smoother starts and stops when the arm is installed with good harmonics. The gate will have smooth starts and stops when the gate arm folds over itself when the gate is fully open. Avoid setting up the gate arm where the crank arm is parallel to the gate leaf when the gate is open.

Pipe Link Installation
See Figure 7. Slide the pipe link (16) through the arm assembly as shown. Place the 5/16” square bolts in the gate clamps (17) and tighten carefully. Do not overtighten!

Setting the Arm Lengths
Most installations will use the standard dimensions specified. If non-standard mounting is required, contact the factory for information.
Operator Setup

Controller Access
The Controller is protected by a plastic dust cover. To remove the dust cover, loosen the cover’s wing-screw and lift the cover off (see Figure 8).

WARNING
ALL AC ELECTRICAL CONNECTIONS TO THE POWER SOURCE AND THE OPERATOR MUST BE MADE BY A LICENSED ELECTRICIAN AND MUST OBSERVE ALL NATIONAL AND LOCAL ELECTRICAL CODES

AC Power Connection
All Linear gate operators are supplied with a power disconnect switch to turn on and off the power available to the operator. Following wiring specifications on Page 2, incoming power should be brought into the operator and connected to the labeled pigtails from the disconnect box. A wiring connections print can also be found on the label inside the cover of the operator.

Proper thermal protection is supplied with the operator. The motor contains a thermal overload protector to guard from overheating the motor due to overload or high-frequency operation. This overload protector will reset automatically after the motor cools down.

Earth Ground
Install a ground rod and connect it to the operator’s frame in every gate operator installation. A good earth ground is necessary to allow the Controller’s built-in surge and lightning protection circuitry to work effectively. The physical bolting of the operator to the mounting posts is not sufficient for a good earth ground.

✓ NOTE: Do not splice the ground wire. Use a single piece of solid copper 12 AWG wire between the ground rod and the operator.
1. Install an 8-foot long copper ground rod next to the operator mounting pad within three feet of the operator.
2. Use a clamp to connect a solid copper 12 AWG ground wire to the ground rod.
3. Route the ground wire to the operator.
4. Connect the ground wire to the operator’s frame.

Limit Cam Rough Adjustment
The limit cams are not preset at the factory and must be adjusted for the length and opening angle of the gate the operator is installed on. The limit switches are activated by two rotating limit cams which are attached to the drive shaft (see Figure 10). The Controller is factory set for right hand installations. The top cam is for OPEN and the bottom cam is for CLOSE. The cams flip their definition in left hand installations (see left-right hand programming on Page 12).

1. With the gate connected to the gate operator in a mid-travel position, the power disconnect switch turned OFF, and the torque limiter set loose enough to slip freely, manually move the gate to its fully open position.
2. Once the gate is in the fully open position, set the OPEN limit cam so that it has just triggered the LSO-1 switch.
3. Manually move the gate to its fully closed position, set the CLOSE limit cam so that it has just triggered the LSC-1 switch.
Operator Setup (cont.)

Limit Nuts Rough Adjustment (Cont.)
After finishing the initial limit cam adjustments, reposition the gate to approximately the center of travel. At this time, adjust the torque limiter as explained below. Turn the power disconnect switch ON, stand clear of any moving parts and press the OPEN button. Observe the gate as it runs through a complete cycle in both directions, and adjust the limits again if necessary. If the operator stops during travel, you may need to adjust the open or close current sensor adjustment or the maximum run timer (see Page 13).

Torque Limiter Adjustment
✓ NOTE: The open and close current sensing may need to be adjusted before performing the following two steps. See Page 13.

Before adjusting the torque limiter, make sure the gate is in good working condition. With the gate disconnected from the gate arm, one person should be able to move the gate by hand. Be certain the gate moves freely and without binding throughout its travel.

Torque limiters are set light at the factory. They must be adjusted during installation, preferably after limit cams have been manually set. With the gate arm and gate attached, adjust the torque limiter tight enough to keep it from slipping during normal operation. The inherent entrapment protection (current sensing) feature must activate prior to any slipping of the torque limiter. See Page 13 for current sense setting.

To adjust the torque limiter in model SWG:
1. Bend the locking tabs away from the adjustment nut.
2. Cycle the gate open and closed while observing the torque limiter action. TURN THE OPERATOR POWER DISCONNECT SWITCH OFF BEFORE MAKING ANY ADJUSTMENTS.
   - To increase the torque, turn the adjustment nut clockwise one flat, or 1/6 turn, at a time until desired output is obtained.
   - To reduce the torque, turn the adjustment nut counterclockwise one flat, or 1/6 turn, at a time until desired output is obtained.
3. When finished, bend the locking tabs up to lock the adjustment nut in place.

Limit Cam Fine Adjustment
After finishing the rough limit cam adjustments and torque limiter adjustment, reposition the gate to approximately the center of travel.

1. Turn the power disconnect switch ON.
2. Stand clear of any moving parts and press the OPEN button.
3. After the gate opens, press the CLOSE button.
4. Observe the gate in both directions as it runs through each complete cycle. Adjust the open or close limit cams again if necessary. If the gate stops during travel, you may need to adjust the Open or Close Current Setting or the Maximum Run Timer (see Pages 13-14).
Controller Features

Figure 12. Controller Features
## Indicator Descriptions

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>INDICATOR DEFINITION</th>
<th>INDICATION WHEN LIT DURING NORMAL OPERATION</th>
<th>INDICATION WHEN LIT DURING PROGRAMMING</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 VOLT INPUT POWER</td>
<td>LOW VOLTAGE AC POWER IS PRESENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 VOLT DC ACY POWER</td>
<td>LOW VOLTAGE DC POWER IS PRESENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPEN</td>
<td>OPEN SIGNAL PRESENT FROM THE INTERNAL RECEIVER OR AN EXTERNAL DEVICE CONNECTED TO THE OPEN INPUT TERMINAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLOSE</td>
<td>CLOSE SIGNAL IS PRESENT FROM A DEVICE CONNECTED TO THE CLOSE INPUT TERMINAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STOP</td>
<td>STOP INPUT TERMINAL IS OPEN AND NOT CONNECTED TO COMMON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROGRAM</td>
<td>CONTROLLER IS IN PROGRAMMING MODE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REVERSE</td>
<td>SIGNAL FROM REVERSING DEVICE IS PRESENT</td>
<td></td>
<td>SET REVERSE DELAY TIME</td>
</tr>
<tr>
<td>LOCKOUT</td>
<td>CONTROLS AND OPERATOR ARE LOCKED OUT BECAUSE OF EXISTING TROUBLE CONDITION</td>
<td></td>
<td>SET RUN ALARM AND PRE-START ALARM</td>
</tr>
<tr>
<td>RADIO</td>
<td>BUILT-IN RECEIVER IS DETECTING A RADIO SIGNAL FROM A REMOTE CONTROL</td>
<td></td>
<td>TRANSMITTERS CAN BE ENTERED INTO MEMORY (UP TO 40 TRANSMITTERS)</td>
</tr>
<tr>
<td>OPEN CURRENT</td>
<td>MOTOR CURRENT HAS EXCEEDED THE OPEN CURRENT SETTING WHILE OPENING</td>
<td></td>
<td>SET MAXIMUM OPEN CURRENT</td>
</tr>
<tr>
<td>OPEN OBSTR</td>
<td>OPEN OBSTRUCTION TERMINAL CONNECTED TO COMMON BY BEAM OR SAFETY EDGE, OR SIGNAL FROM MGT OBSTRUCTION TRANSMITTER</td>
<td></td>
<td>SET MGT #2 FUNCTION</td>
</tr>
<tr>
<td>OPEN RELAY</td>
<td>OPEN RELAY IS ACTIVATED</td>
<td></td>
<td>SET LEFT-HAND RIGHT-HAND OPERATION</td>
</tr>
<tr>
<td>OPEN LIMIT</td>
<td>OPEN LIMIT SWITCH IS ACTIVATED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLOSE CURRENT</td>
<td>MOTOR CURRENT HAS EXCEEDED THE CLOSE CURRENT SETTING WHILE CLOSING</td>
<td></td>
<td>SET MAXIMUM CLOSE CURRENT</td>
</tr>
<tr>
<td>CLOSE OBSTR</td>
<td>CLOSE OBSTRUCTION TERMINAL CONNECTED TO COMMON BY BEAM OR SAFETY EDGE, OR SIGNAL FROM MGT OBSTRUCTION TRANSMITTER</td>
<td></td>
<td>SET MGT #1 FUNCTION</td>
</tr>
<tr>
<td>CLOSE RELAY</td>
<td>CLOSE RELAY IS ACTIVATED</td>
<td></td>
<td>SET AUTO-CLOSE TIME</td>
</tr>
<tr>
<td>CLOSE LIMIT</td>
<td>CLOSE LIMIT SWITCH IS ACTIVATED</td>
<td></td>
<td>SET MOTOR TYPE</td>
</tr>
<tr>
<td>SINGLE</td>
<td>SINGLE TERMINAL CONNECTED TO COMMON BY AN EXTERNAL PUSHBUTTON OR RADIO</td>
<td></td>
<td>SET SINGLE BUTTON INPUT FUNCTION</td>
</tr>
<tr>
<td>MAX RUN</td>
<td>MAXIMUM RUN TIMER HAS BEEN EXCEEDED</td>
<td></td>
<td>SET MAXIMUM RUN TIME</td>
</tr>
<tr>
<td>COMM LINK</td>
<td>DUAL OPERATOR CONNECTION DETECTED, BLINKS IF CONNECTION HAS FAILED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAINT ALERT</td>
<td>MAINTENANCE IS REQUIRED ON OPERATOR</td>
<td></td>
<td>SET MAINTENANCE ALERT CYCLE COUNT</td>
</tr>
</tbody>
</table>

## Apex Function Display Indications

- "RL" LEFT OR RIGHT HAND OPERATION
- "PM" SINGLE OR DUAL GATE
- "AC" AUTO CLOSE TIMER
- "RP" RUN ALARM PRE-START ALARM
- "DC" MAXIMUM OPEN CURRENT
- "CC" MAXIMUM CLOSE CURRENT
- "AD" ADVANCED PROGRAMMING
- "OO" OPEN OBSTRUCTION INPUT ACTIVE
- "MM" MGT MONITORING FUNCTION
- "RT" MAXIMUM RUN TIMER
- "SB" SINGLE BUTTON INPUT SETUP
- "SM" STAGGER MODE
- "ST" STAGGER TIME
- "AR" AUXILIARY RELAY MODE
- "RD" REVERSE DELAY TIME
- "BD" BRAKE DELAY TIME
- "CO" CLOSE OBSTRUCTION INPUT ACTIVE
- "CP" CONSTANT PRESSURE MODE
- "SP" SHADOW LOOP OPEN INHIBIT
- "CT" RESET CYCLE COUNT
- "MA" MAINTENANCE ALERT TRIGGER
- "MT" MID-TRAVEL STOP POSITION
- "AT" ANTI-TAILGATE ENABLE
- "RA" RADIO ENABLE
- "RO" REMOTE OPEN OBSTRUCTION ACTIVE
- "TL" LEARN TRANSMITTERS
- "TD" DELETE TRANSMITTERS
- "ML" LEARN MGT TRANSMITTERS
- "MD" ERASE MGT TRANSMITTERS
- "MO" MOTOR TYPE SELECTION
- "CL" RESET TO FACTORY DEFAULTS
- "OT" OBSTRUCTION DETECTION TYPE, b1, b2
- "RC" REMOTE CLOSE OBSTRUCTION ACTIVE
# Terminal Descriptions

<table>
<thead>
<tr>
<th>TERMINAL</th>
<th>GROUP</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC N</td>
<td>24 VOLT INPUT</td>
<td>FACTORY CONNECTED TO 24 VAC FROM TRANSFORMER OR 24 VDC FROM CONTINUOUS DUTY DC SUPPLY.</td>
</tr>
<tr>
<td>AC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC -</td>
<td>ACCESSORY POWER</td>
<td>PROVIDES 24 VOLT DC POWER FOR ACCESSORIES (.5A MAX)</td>
</tr>
<tr>
<td>DC +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESET</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMMON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>COMM LINK</td>
<td>FOR 3-WIRE NETWORK CONNECTION TO SECOND OPERATOR IN DUAL GATE INSTALLATIONS.</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMMON</td>
<td>SINGLE BUTTON INPUT</td>
<td>CONNECT TO NORMALLY OPEN SWITCH FOR SINGLE BUTTON OPERATION. ALTERNATES BETWEEN OPEN-CLOSE OR OPEN-STOP-CLOSE DEPENDING ON PROGRAMMING.</td>
</tr>
<tr>
<td>COMMON</td>
<td>FIRE BOX INPUT</td>
<td>CONNECT TO NORMALLY OPEN SWITCH IN FIRE BOX FOR FIRE DEPARTMENT ACCESS.</td>
</tr>
<tr>
<td>OPEN</td>
<td>OPEN INPUT</td>
<td>CONNECT TO 3-BUTTON STATION FOR OPEN-CLOSE-STOP CONTROL. A CONSTANT OPEN INPUT WILL OVERRIDE THE MID-TRAVEL STOP AND HALT THE AUTO CLOSE TIMER UNTIL RELEASED.</td>
</tr>
<tr>
<td>CLOSE</td>
<td>3-BUTTON STATION INPUT</td>
<td>CONNECT TO 3-BUTTON STATION FOR OPEN-CLOSE-STOP CONTROL. A CONSTANT OPEN INPUT WILL OVERRIDE THE MID-TRAVEL STOP AND HALT THE AUTO CLOSE TIMER UNTIL RELEASED.</td>
</tr>
<tr>
<td>STOP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COM</td>
<td>MONITORED</td>
<td>CONNECT TO APPROVED OBSTRUCTION DETECTION DEVICES (GATE EDGE, PHOTO BEAM) TO DETECT AN OBSTRUCTION DURING OPENING. WHILE GATE IS MOVING, ANY OPEN OBSTRUCTION SIGNAL WILL CAUSE THE GATE TO STOP, REVERSE A SHORT DISTANCE, AND THEN STOP AGAIN. AT THIS TIME THE AUTO CLOSE TIMER IS DISABLED, AND A RENEWED INPUT WILL BE REQUIRED TO START THE GATE AGAIN. SHOULD THE GATE BE RESTARTED AND THE OBSTACLE SIGNAL OCCUR AGAIN PRIOR TO REACHING A LIMIT, THE GATE WILL STOP AGAIN, LOCKOUT, AND SOUND THE CONTINUOUS TONE ALARM.</td>
</tr>
<tr>
<td>O-OBS</td>
<td>MONITORED OPEN OBSTRUCTION INPUT</td>
<td>CONNECT TO APPROVED OBSTRUCTION DETECTION DEVICES (KEYPAD, CARD READER, KEYSWITCH, TELEPHONE ENTRY SYSTEM) TO OPEN THE GATE. A CONSTANT OPEN INPUT WILL OVERRIDE THE MID-TRAVEL STOP AND HALT THE AUTO CLOSE TIMER UNTIL RELEASED.</td>
</tr>
<tr>
<td>C-OBS</td>
<td>MONITORED CLOSE OBSTRUCTION INPUT</td>
<td>CONNECT TO APPROVED OBSTRUCTION DETECTION DEVICES (GATE EDGE, PHOTO BEAM) TO DETECT AN OBSTRUCTION DURING CLOSING. WHILE GATE IS MOVING, ANY CLOSE OBSTRUCTION SIGNAL WILL CAUSE THE GATE TO STOP, THEN REVERSE AND TRAVEL TO THE FULL OPEN POSITION. SHOULD A OPEN OBSTRUCTION INPUT OR AN OPEN DIRECTION INHERENT ENTRAPMENT CONDITION OCCUR PRIOR TO THE GATE REACHING THE OPEN LIMIT, THE OPERATOR WILL LOCKOUT AND SOUND THE CONTINUOUS TONE ALARM. IF THE AUTO CLOSE TIMER IS SET, WHEN THE CLOSE OBSTRUCTION INPUT IS CLEARED, THE GATE WILL CLOSE WHEN THE AUTO CLOSE TIMER EXPIRES.</td>
</tr>
<tr>
<td>COM</td>
<td>REVERSE</td>
<td>CONNECT TO NORMALLY OPEN DEVICES TO CAUSE A REVERSAL WHEN THE GATE IS TRAVELING CLOSED. THE GATE WILL REVERSE TO THE FULL OPEN POSITION.</td>
</tr>
<tr>
<td>REV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPEN LOOP</td>
<td>OPEN LOOP</td>
<td>CONNECT TO OPEN LOOP/FREE EXIT LOOP. THE GATE WILL OPEN WHEN THE LOOP IS TRIGGERED, AND REMAIN OPEN AS LONG AS THE LOOP IS TRIGGERED. REQUIRES LOOP DETECTOR.</td>
</tr>
<tr>
<td>REVERSE LOOP</td>
<td>REVERSE LOOP</td>
<td>CONNECT TO REVERSE LOOP, TRIGGERING THE LOOP WILL CAUSE A REVERSAL WHEN THE GATE IS TRAVELING CLOSED. THE GATE WILL REVERSE TO THE FULL OPEN POSITION. REQUIRES LOOP DETECTOR.</td>
</tr>
<tr>
<td>SHADOW/RESET LOOP</td>
<td>SHADOW/RESET LOOP</td>
<td>CONNECT TO SHADOW/RESET LOOP TO KEEP THE GATE IN ITS FULLY OPEN POSITION AS LONG AS THE SIGNAL IS PRESENT. USED TO KEEP GATE OPEN WHILE VEHICLE IS PASSING THROUGH. REQUIRES LOOP DETECTOR.</td>
</tr>
<tr>
<td>-</td>
<td>ALARM</td>
<td>FACTORY CONNECTED TO THE ALARM BEEPER.</td>
</tr>
<tr>
<td>+</td>
<td>AUX RELAY</td>
<td>FOR CONNECTION TO AUXILIARY DEVICES (MAGNETIC LOCK, SOLENOID LOCK, STROBE LIGHT) FOR ACTIVATION (OR DEACTIVATION) DURING GATE OPERATION.</td>
</tr>
<tr>
<td>N.O.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+</td>
<td>24 VOLT SOLAR PANEL</td>
<td>NOT USED WITH THIS MODEL OPERATOR.</td>
</tr>
<tr>
<td>-</td>
<td>24 VOLT BATTERY</td>
<td>NOT USED WITH THIS MODEL OPERATOR.</td>
</tr>
</tbody>
</table>
Figure 13. Operator Accessory Connections

- 3-BUTTON STATION
- TELEPHONE ENTRY
- PHOTOEYE FOR REVERSE
- KEYPAD
- PHOTOEYE FOR CLOSE OBSTRUCTION (B1)
- PHOTOEYE FOR OPEN OBSTRUCTION (B1)
- SOLENOID LOCK
- MAGLOCK
- GATE EDGE SENSOR FOR REVERSE (B2)
- SINGLE-CHANNEL RADIO RECEIVER
- FIRE ACCESS SWITCH
- KEYSWITCH
- WARNING STROBE OR AUDIBLE SOUNDER
- WIRELESS GATE EDGE SENSOR

- OPEN
- CLOSE
- COMMON
- STOP
- COMMON
- OPEN
- COMMON
- FIRE DEPT
- DC –
- DC +
- N.O. COM
- N.C.
- N.C.
- N.C.
- N.C.
- N.O. COM
- N.C.
- N.C.
- N.O. COM
- N.C.
- N.O. COM
- N.C.
- N.O. COM
- N.C.
- ACCY
- POWER
- ACCY
- POWER
- ACCY
- POWER
- ACCY
- POWER
- ACCY
- POWER
- ACCY
- POWER
- ACCY
- POWER
- ACCY
- POWER
- MGT TRANSMITTER

For detailed connections, refer to the operator accessory connections diagram.
Basic Controller Programming

Programming Overview
The Controller can be programmed with various options for the operator. The programming fields are defined as “functions” that have “options”. To make setup easier for the installer, the Controller’s programming is divided into two groups: basic and advanced. The basic programming group contains the functions commonly used in most swing gate installations. The advanced programming group contains functions less commonly used (i.e. dual gate stagger delay, maximum run timer, etc.).

Entering Programming Mode
Enter programming mode by pressing the UP and DOWN buttons together for one second. While in programming mode the PROGRAM indicator will light.

Exiting Programming Mode
Exit programming mode at any time by pressing the UP and DOWN buttons together. The Controller will automatically exit programming mode after three minutes of inactivity.

Programming Keystrokes
(Typical Programming Method)
While in programming mode, press the UP or DOWN buttons to scroll through the programming functions. When the desired function is displayed press the ENTER button to display the currently set option for the function. When an option is displayed, the decimal points are lit.

To change the option, press and hold the ENTER button for 1 second. To indicate that an option is ready to be changed, the display will flash. While the display is flashing, press the UP or DOWN button to display the other options available for that function.

When the desired option is displayed, press the ENTER button to store it into memory. To select another function, press ENTER, UP, or DOWN.

Left or Right Hand Operation
The factory default is for right hand operation (operator on right side of the driveway when viewed from the inside of the gate). For left hand installations, program the Controller for left hand operation.

Dual Gate Enable
The factory default is for single gate operation. For dual gate operation, wire the two gate controllers together through the COMM LINK terminals (see Page 21) and enable dual gate operation with this programming step.

✓ NOTE: The Mid-travel Stop feature is disabled when dual gate operation is enabled for paired units.

Auto Close Timer
The factory default turns off the Auto Close Timer. The timer can be set from 1 to 59 seconds and from 1 to 9 minutes. When the Auto Close Timer is set, after opening, the gate will wait for the length of the Auto Close Timer then close automatically.
Basic Controller Programming (Cont.)

**Run Alarm and Pre-start Alarm**
The factory default is Run Alarm on and a 3-second Pre-start Alarm. The operator’s beeper will sound 3 seconds before the operator starts. The options are:
- Run Alarm Off and Pre-start Alarm Off
- Run Alarm On and Pre-start Alarm Off
- Run Alarm On and Pre-start Alarm On for 1-9 Seconds

**Maximum Open Direction Current Setting**
To detect obstacles or mechanical problems with the gate, the operator monitors its motor current. If the open current load increases by more than the programmed maximum load range number, the operator will stop, reverse a short distance, then stop again. The Auto Close Timer will be disabled, and another open request will be required to start the operator again. If after restart, the overload or an open obstacle happens again before the open limit is reached, the operator will lockout and sound the alarm.

The maximum load range number may be adjusted by pressing and holding the “enter” button until the previously set number flashes. Using the + and - buttons, set the programmed range number so that a minimal force (50-75 lbs.) will activate a reversal should an obstruction occur, but high enough to keep the gate moving under normal conditions without interruption.

**Maximum Close Direction Current Setting**
To detect obstacles or mechanical problems with the gate, the operator monitors its motor current. If the close current load increases by more than the programmed maximum load range number, the operator will stop, reverse, and travel to the full open position. Should a open obstruction input or an open direction inherent entrapment condition occur prior to the gate reaching the open limit, the operator will lockout and sound the continuous tone alarm. Another close request will be required to start the operator again. If after restart, the overload or a close obstacle happens again before the close limit is reached, the operator will lockout and sound the alarm. If the auto close timer is set, when the close obstruction input is cleared, the gate will close when the auto close timer expires.

The maximum load range number may be adjusted by pressing and holding the “enter” button until the previously set number flashes. Using the + and - buttons, set the programmed range number so that a minimal force (50-75 lbs.) will activate a reversal should an obstruction occur, but high enough to keep the gate moving under normal conditions without interruption.
**Obstruction detection type – b1, b2**

B1 is a non-contact sensor such as a photo eye. B2 is a contact sensor such as an edge. This setting affects behavior in the closed direction obstruction detection. If a B2 detector is used, the operator will only allow an input 2 times to continue automatic closing until a closed limit switch is successfully made. The first input while closing will reverse the operator to full open and resume auto close timer behavior if selected. The second input will cause the operator to reverse slightly and lockout.

✓ **NOTE:** Jumper wire must be cut and DIP switches set to position 5 for the functions below to be active.

**Open Obstruction input active – On, Off**

If a swing gate has no entrapment areas this may be selected as off. This must be on for slide gates.

**Close obstruction input active – On, Off**

Single gates require this to be on. Paired gates can have this off if the other gate has it turned on.

✓ **NOTE:** The following parameters will only be displayed if Paired Mode is selected ON. The operators must be bot set as paired mode, powered up, and have the communication cable in place to complete this correctly. Obstruction inputs active selection for both operators must all be made from one side. Settings will be automatically transferred to the operator you are not in front of. Do not try to set individually

**Remote open obstruction active – On, Off**

This is used to select if the other operator has the Open Obstruction input active.

**Remote Close obstruction active – On, Off**

In paired mode it is only required to have 1 close device per pair of operators if the only entrapment zone is where the gates meet.
Advanced Controller Programming

**Entering Advanced Programming Mode**
To access and program the Advanced Programming functions, for each programming session, Advanced Programming must be enabled.

After exiting programming, the Advanced Programming functions will be available on the programming display during the next programming session unless the operator has run 50 or more cycles. After that, Advanced Programming must be enabled again.

**Maximum Run Time**
The factory default for the Maximum Run Time (MRT) is 99 seconds. When the operator starts, a timer will begin counting. If an open or close limit is not reached or an obstacle or reversing input is not received before the timer expires, the operator will stop, the unit locks out and the alarm sounds. The timer can be set from 10 to 99 seconds, but should be left at 99 in most applications. Setting it too close to the actual run time may cause the time to expire with changing ambient temperature, gate conditions, etc…

If AC is present and an open or close limit is not reached or an obstacle or reversing input is not received before this timer exceeds MRT, the operator will stop, the unit locks out and the alarm sounds.

**Single Button Input Setup**
This function is used for selecting the operation for single button controls and radio receivers.

The factory default sets the SINGLE input terminal so successive inputs will cycle the operator in OPEN-STOP-CLOSE-STOP order.

Alternately, the SINGLE input can be set to cause the gate to OPEN unless the gate is fully open. If the gate is fully open, the input will cause the gate to CLOSE.

**Stagger Mode**
This function is used in dual gate installations only. The factory default sets the Stagger Mode to OFF. In dual gate installations the two operators communicate through the 3-wire COMM LINK interface. When using the Stagger Mode, set one operator for delayed opening and the other operator for delayed closing. The Stagger Time programming function (see below) sets the length of the delay.

✓ **NOTE:** This function will only be displayed if dual gate operation is selected.

**Stagger Delay Time**
This function is used in dual gate installations only. The factory default sets the Stagger Time to 0 seconds (OFF). The Stagger Time sets the delay for the Stagger Mode. The Stagger Delay Time can be set from 1-99 seconds.

✓ **NOTE:** This function will only be displayed if dual gate operation is selected.
Advanced Controller Programming (Cont.)

Auxiliary Relay Mode
The Auxiliary Relay has normally open and normally closed contacts. The factory setting disables the Auxiliary Relay. The relay can be set for:

- **Maglock:** To deactivate a magnetic or solenoid gate lock, the relay will energize during any pending or actual gate motion (open only).
- **M4:** To deactivate a magnetic or solenoid gate lock, the relay will energize during any pending or actual gate motion (open only). 3 seconds after the gate starts to move, the relay will de-energize. This option is used for higher current solenoid locks.
- **Ticket Dispenser:** The relay will energize while the gate is moving in the open direction and at the full open limit, or in an entrapment condition.
- **Strobe:** To activate a warning strobe light, the relay will energize during any pending or actual gate motion (either open or close).
- **Alarm:** The relay will energize if the gate is manually forced open from the full closed position.

Reverse Delay Time
The factory default sets the Reverse Delay to 1 second. The operator will wait the length of the delay before reversing direction. This feature will not change the reversal time when the operator is responding to an entrapment condition from an obstruction input or inherent entrapment protection sensor. The Reverse Delay can be set from 1 to 9 seconds. Heaver gates require a longer delay to allow time for the gate to stop.

Brake Delay Time
This function is displayed, but only used in operators with mechanical brakes. The Model SWG does not have a mechanical brake.

The factory default sets the Brake Delay to no delay (0 seconds). Heavy gates may require delayed braking to allow the gate to slow down before stopping it. The operator can be set to wait the length of the delay after running before applying the brake. The Brake Delay can be set from 0 to 3 seconds.

Constant Pressure Mode
The factory default allows momentary pressure on a control station’s OPEN or CLOSE button to cycle the operator. The controller can be set to require constant pressure on the OPEN, CLOSE, or both buttons to run the operator.

✓ **NOTE:** If a button is set for constant pressure, and it is released before the operator reaches the open or close limit, the operator will stop the gate at its current position.

✓ **NOTE:** If CP is set, monitored obstruction input is not required for selected direction of travel.

Shadow Loop Open Prevention
If the shadow loop is triggered, it always prevents the gate from closing if the Auto Close Timer activates or a CLOSE command is given while the gate is at the full open position.

The controller can also be set to prevent the gate from opening if the shadow loop is triggered while the gate is at the close limit position. This prevents a swing gate from opening into a vehicle if it’s parked near the gate on the inside.
**Advanced Controller Programming (Cont.)**

**Reset Cycle Count**
The Controller counts the number of times the operator has been cycled full open and close. The cycle count can be displayed. The display will scroll the cycle count number, flashing two digits at a time from left to right.

To reset the Cycle Count, press and hold the ENTER button for 2 seconds while the Cycle Count is displayed.

If the Maintenance Alert has been triggered, resetting the Cycle Count will also reset the Maintenance Alert indicator.

**Maintenance Alert Trigger**
The Controller has a MAINT ALERT indicator that can be programmed to light when the number of activations exceeds a set number of cycles.

The factory default sets the Maintenance Alert Trigger to 10,000 cycles. The Maintenance Alert Trigger can be programmed for 5, 10, 15, or 25 thousand cycles.

The Maintenance Cycle Count can be reset independently from the operator’s absolute Cycle Count.

**Mid-travel Stop Position**
The Controller can be programmed so the gate will stop at a mid-travel point instead of fully opening. This can be useful in installations where a large gate, that takes a long time to open and close fully, only needs to be opened partway to allow traffic to pass.

The factory default sets the Controller for full open operation. Alternately, the Controller can be programmed to open for 1 to 99 seconds then stop, before reaching the open limit.

When a Mid-travel Stop Position time has been programmed, the gate will still fully open if the Fire Department input is triggered, if the OPEN button is held down beyond the Mid-travel Stop Position, or a close obstruction or reverse loop input is triggered.

✓ **NOTE:** The Mid-travel Stop feature is disabled when dual gate operation is enabled for paired units.

**Anti-tailgate Enable**
The factory default sets the Anti-tailgate Enable to OFF. With this setting, during a gate cycle, after the shadow loop has been triggered by the vehicle and then has cleared after the vehicle passes, the Auto Close Timer or a CLOSE command is required to begin closing the gate.

If the Anti-tailgate Enable is set to ON, the gate will close immediately as soon as the shadow loop has cleared. Any subsequent shadow loop triggers while the gate is closing will stop the gate. When the shadow loop clears, the gate will continue closing.

**Radio Enable**
The Controller contains a built-in MegaCode® radio receiver to allow activation from up to 40 access control transmitters and two Model MGT (gate edge) transmitters. The factory default enables the internal radio receiver. Alternately, the internal receiver can be disabled.

**Antenna Installation**
The Controller is supplied with a local whip antenna installed. If using a remote antenna, remove the whip antenna and connect coax cable from the antenna to the ANTENNA connector.
Advanced Controller Programming (Cont.)

Radio Transmitter Learn
The Controller’s built-in MegaCode® radio receiver can store the IDs of up to 40 transmitters. Refer to the figure for the steps required to learn transmitters.
✓ NOTE: This function will NOT be displayed if the transmitter memory is full, or if the radio receiver is disabled.

Radio Transmitter Delete
Transmitters can be deleted from the Controller’s memory either individually, or all at the same time. Refer to the figure for the steps required to delete transmitters.
✓ NOTE: This function will NOT be displayed if no transmitters are stored in memory, or if the radio receiver is disabled.

MGT Obstacle Transmitter Learn
The Controller supports one or two Model MGT Obstacle Transmitters. The transmitters can be programmed to function as Open Obstruction, Close Obstruction, Reverse, or Stop. Refer to the figure for the steps required to learn MGT transmitters.
✓ NOTE: This function will NOT be displayed if two MGT transmitters are already stored in memory, or if the radio receiver is disabled.

MGT Obstacle Transmitter Delete
MGT transmitters can be deleted from the Controller’s memory either individually, or all at the same time. Refer to the figure for the steps required to delete MGT transmitters.
✓ NOTE: This function will NOT be displayed if no MGT transmitters are stored in memory, or if the radio receiver is disabled.

MGT Monitoring Function
ON monitor’s battery and connection of MGT transmitter. 2 missed signals result in alarm beeping.
✓ NOTE: Not used for UL 325 6th edition monitored input.
**Motor Type Selection**

The factory sets the default for the Controller to match the type of motor in the operator. If required, change the motor selection option to a different type of motor used in the operator. The options available are:

- AC Motor Only
- DC Motor Only with Mechanical Braking
- DC Motor with Electronic Soft Start/Stop
- 3 Phase AC Motor
- AC Motor with DC Motor Backup with Mechanical Braking
- AC Motor with DC Motor Backup with Electronic Soft Start/Stop

**Reset Controller to Factory Defaults**

The Controller can be reset with this function. **ALL PROGRAMMED DATA WILL BE LOST**, and the factory defaults will be loaded. This function will not erase radio transmitters, current sense values, or motor type. Transmitters must be deleted with the two functions above.

---

**Maximum Settings By Gate Type**

<table>
<thead>
<tr>
<th>DIP Switch Setting</th>
<th>Monitoring Required</th>
<th>Monitoring Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – Swing/Slide</td>
<td>OPEN CLOSE</td>
<td>OPEN CLOSE</td>
</tr>
<tr>
<td>1 – Standard Barrier</td>
<td>No No No No</td>
<td>No No No No</td>
</tr>
<tr>
<td>2 – Slow Barrier</td>
<td>No No No No</td>
<td>No No No No</td>
</tr>
<tr>
<td>3 – Variable Barrier</td>
<td>Yes Yes Yes No</td>
<td>Yes Yes Yes No</td>
</tr>
<tr>
<td>4 – Not Used</td>
<td>Yes Yes Yes No</td>
<td>Yes Yes Yes No</td>
</tr>
<tr>
<td>5 – Swing Override</td>
<td>No Yes No No</td>
<td>No Yes No No</td>
</tr>
</tbody>
</table>

**Monitoring Required**

- Single (Gate 1) Host
- Paired (Gate 2)

**NOTE:** Jumper wire must be cut for Settings 1-5.
One or more contact sensors shall be located on the inside and outside leading edge of a swing gate. Additionally, if the bottom edge of a swing gate is greater than six inches (152 mm) above the ground at any point in its arc of travel, one or more contact sensors shall be located on the bottom edge. A hardwired contact sensor shall be located and its wiring arranged so that the communication between the sensor and the gate operator is not subjected to mechanical damage. A wireless contact sensor such as one that transmits radio frequency (RF) signals to the gate operator for entrapment protection functions shall be located where the transmission of the signals are not obstructed or impeded by building structures, natural landscaping or similar obstruction. A wireless contact sensor shall function under the intended end-use conditions.

**WARNING**

Separate pedestrian gate required.

Wire edges shown as reversing devices only. Mount gate edge transmitters in such a way that their signal cannot be blocked by structures or obstacles.
Refer to connection illustrations for details.

This drawing is intended to draw attention to possible locations for the installation of contact or non-contact obstruction sensing devices. Care must be taken to position photoeyes such that nuisance tripping is minimized.
Dual Gate Installations

Two operators can be used in dual gate installations. The operators communicate with each other through the 3-wire **COMM LINK** terminals.

When one operator activates, the **COMM LINK** connection signals the other operator to activate. Each operator functions independently, controlling its gate and monitoring its inputs and accessories.

A three-wire shielded conductor cable is required to connect two operators together for dual operation. Use Belden 8760 Twisted Pair Shielded Cable (or equivalent) only – P/N 2500-1982, per foot.

✓ **NOTE:** The shield wire should be connected **COMM LINK** terminal “C” in both operators.

Three of the programming functions available are only used for dual gate installations:

- **Dual Gate Enable**
  Dual Gate Enable must be set for all dual gate installations.

- **Stagger Mode**
  The Stagger Mode function determines if the operator has a delayed open or a delayed close. In dual swing gate installations, typically one operator is programmed for delayed open, and the other operator is programmed for delayed close.

- **Stagger Delay Time**
  The Stagger Time sets the length of the delay for the Stagger Mode.

See Pages 12 & 14 for details on these three dual gate programming functions.

Set the following parameters in each gate operator individually in a single gate mode before connecting the network cable and operating in dual gate mode.

1. Open and Close Limit settings
2. Open and Closed direction inherent entrapment protection (OC & CC)

After these parameters have been set, and each operator has been tested independently and is functioning correctly in single gate mode, then set BOTH operators to dual gate (dg) in the Paired Mode setup step under Basic Programming steps.

Optional In-Cabinet Heater

The operator can be ordered with an optional cold weather package that includes an in-cabinet heater to keep the drive train and electronics warm in cold environments.

In-cabinet heaters can also be ordered separately and should be wired to the operator as shown in Figure 15 Contact Technical Services for heater wiring information for a specific voltage and phase of operator.
Gate Operation

**Open Button**
Opens the gate. If the Controller is programmed to stop opening the gate at mid-travel, a constant press of the OPEN button will override the Mid-travel Stop and completely open the gate. If the Auto Close Timer is set, it will be suspended until the OPEN button is released.

**Close Button**
Closes the gate if the gate is open. Also closes the gate if the gate is in the process of opening.

**Stop Button**
Stops the gate from opening or closing at any time.

**Single Input**
Opens the gate if it’s closed and closes the gate if it’s open (open-close programming option). Activating the input while the gate is moving will reverse the gate.

Can be programmed to stop the gate while the gate is moving (open-stop-close programming option).

**Fire Department Input**
Fully opens the gate when the input is activated. Overrides the Mid-travel Stop and Auto Close Timer (if either is programmed for the gate). The gate will lockout in the open position without sounding the alarm. Press the STOP button to release the lockout.

**Open Input**
Functions the same as the OPEN button.

**Open Obstruction**
While the gate is opening, any open obstruction signal will cause the gate to stop, reverse a short distance, and then stop again. The Auto Close Timer will be disabled, and a renewed input will be required to start the gate again. Should the gate be restarted and the obstacle signal occur again prior to reaching a limit, the gate will stop again, lockout, and sound the emergency alarm.

**Close Obstruction**
While the gate is closing, any close obstruction signal will cause the gate to stop, reverse, and travel to the full open position. Should a open obstruction input or an open direction inherent entrapment condition occur prior to the gate reaching the open limit, the operator will lockout and sound the continuous tone alarm. Another close request will be required to start the operator again. If after restart, the overload or a close obstacle happens again before the close limit is reached, the operator will lockout and sound the alarm. If the auto close timer is set, when the close obstruction input is cleared, the gate will close when the auto close timer expires.

**Reverse Input**
If the reverse input is triggered while the gate is closing, the gate will reverse to the full open position. If the Auto Close Timer is set, when the reverse input is cleared, the gate will close when the Auto Close Timer expires.

**Open Loop**
Functions the same as the OPEN button.

**Reverse Loop**
Functions the same as the reverse input.

**Shadow/Reset Loop**
Holds the gate fully open or fully closed while triggered. If open, the gate closes immediately when cleared if Anti-tailgate is enabled.

**Operation Indications**
During normal operation, the Controller's displays will indicate current operating conditions and status.

**Power-up Display**
When the Controller powers up, dashes will show on the display, then the firmware version number, then the gate type (SL for slide and swing gates).

Exiting programming restarts the Controller. The power-up display will show upon the restart.

**Idle Condition**
While the Controller is idling, waiting for a command, the display will show circulating dashes.

**Last Gate Position/Condition**
When the gate moves or stops, the display will show the status for up to one minute.

- Stop is displayed as St
- Full Close is displayed as FC
- Full Open is displayed as FO
- Entrapment is displayed as En

**Pre-start Delay**
During the pre-start delay, the display will countdown the number of seconds remaining before the operator starts.

**Reverse Delay**
If the gate travel direction is reversed from a user activation or reversing device, and a reverse delay is set, the display will count down the delay time in seconds before the operator restarts.

**Run Timer**
While the gate is opening or closing, the number of seconds running time is displayed.
Error Indications

During abnormal operation, the Controller’s displays and beeper will indicate the error condition that has occurred.

Entrapment

If an entrapment condition occurs detected by two repeated open or close obstruction triggers, the Controller will lock the operator out. The beeper will sound constantly and the gate will not operate. To reset the Controller press the STOP button or press the RESET button on the operator’s cover.

COMM LINK Connection Failure

In dual gate installations, if there is a connection failure between the two operators, the COMM LINK indicator will blink once a second. During this condition the gate will not operate, except if triggered by the FIRE DEPT input, which functions normally.

MGT Obstacle Transmitter Trouble

If any MGT transmitters are used with the operator, their supervision feature will alert the Controller if there is any trouble with the transmitter. MGT transmitters send hourly status reports and will send low battery reports when the transmitter has a low battery. The MGT transmitters also have a tamper detection switch that will trigger when their case is opened.

When the Controller detects a low transmitter battery, a tamper signal, or missing transmitter status reports, the gate will still operate normally, but the beeper will change as follows:

• The Pre-start Alarm will beep twice as fast.
• The Run Alarm will beep twice as fast and continue for five minutes after the gate stops.
• The sounder will “chirp” every five seconds when the gate is idle.

Correct the trouble (close case, replace battery, or replace transmitter) to clear the obstacle transmitter trouble indications.

Maximum Run Time Exceeded

If the Maximum Run Time is exceeded, the Controller stops the operator the same as if a double obstacle has occurred in an entrapment condition. The entrapment alarm sounds constantly, and is cleared by pressing the STOP button or the RESET button on the cover. After the STOP or RESET button is pressed, because the Maximum Run Time has been exceeded, the sounder will beep twice every five seconds. The next operation of the gate will clear the indication.
Troubleshooting

Contacting Technical Support
For technical questions regarding Linear gate operators, contact the Technical Services Department at:
1-800-543-1236 from 8:00 AM to 7:00 PM Eastern time

Operator fails to start
A. If the operator has been running a large number of cycles, the motor may have become too hot and tripped its thermal overload breaker. Allow the motor to cool down and the thermal overload breaker will reset automatically.
B. Make sure you have power at the master distribution panel and that the power has not been turned off.

Motor operates, but gate does not move
A. In operators with torque limiters and friction pad clutches, check for signs of slipping. You can mark the sprocket and clutch with a yellow or white grease pen and watch for the lines to move apart if slipping is taking place. Adjust the torque limiter tighter if this is the problem.
B. Check for broken chain or worn belts.
C. Check all setscrews on pulleys and sprockets and tighten them if necessary, and check for keys which may have fallen loose from keyways.

Motor sounds like it is working harder than normal
A. Make sure the gate is moving freely and without binding throughout its entire travel.
B. Check the drive chain for obstructions (if the operator has one).
C. If the operator has an internal brake mechanism, make sure it is releasing.

Limit switch getting out of time
A. Check the setscrews in limit cams for tightness. Replace if necessary.

Gate stopping part way open or closed (but no visible obstruction)
A. The Controller may have received a false obstruction input triggered by current sensing set too low. Make sure the gate moves freely through its entire travel before adjusting the current sensing.
B. The Maximum Run Timer may have counted down and expired. This can be caused by having the timer set too low, if a chain or belt is broken, or if a sprocket or pulley is slipping. When the timer expires, the gate stops and the beeper will sound.
C. An obstruction signal from an accessory wired to the obstruction input may have triggered falsely. Check the control board for lit indicators for any of the following inputs: safety, shadow/reset, open obstruction, close obstruction, stop, etc. If any are lit when the operator should be running, remove all devices hooked to that function and hook them up one at a time and try to run the operator until the problem device is found. Refer to Page 9 for details on the control board indicators.

Gate staying open with automatic system
A. If there are vehicle detectors used with the operator, one of the loops or loop detectors may be sending a false signal or needs to be reset. Observe the indicators on the loop detector. Unplug the detector and try running the operator.
B. An opening or reversing device may be stuck or malfunctioning. Try disconnecting these devices and hook them back up one at a time and try running the operator until the malfunctioning device is found.
C. Make sure the close limit switch isn’t activated. If it is, the operator will think the gate is already closed.

How to Order Replacement Parts
Use the part numbers listed on the following pages.
Contact your local Linear dealer or distributor to order parts.

1. Supply the model number and serial number of your operator.
2. Specify the quantity of pieces needed and order by part number and name of part.
3. State whether to ship by freight, truck, parcel post, UPS or air express.
4. State whether transportation charges are to be prepaid or collect.
5. Specify name and address of person or company to whom parts are to be shipped.
6. Specify name and address of person or company to whom invoice is to be sent.
**Preventative Maintenance**

**WARNING**

Always disconnect power from operator before servicing. Keep clear of gate during operation.

**General**

Linear gate operators are designed for many years of trouble-free operation and, under recommended operating conditions, will require only minimal maintenance. To ensure that a unit is ready for operation at all times, and to preclude serious damage or failure, inspect the unit systematically. Proper adjustments and lubrication should be made as recommended.

**Lubrication**

- **Bearings** — For models which have pillow block style bearings with grease fittings, lubricate at least twice a year with a lithium complex based, petroleum oil NLGI 2 rated grease. Oilite and precision sealed bearings do not require additional lubrication.

- **Motor** — Motors have sealed ball bearings and do not require further lubrication. If bearing noise develops after several years of operation, bearings should be replaced by a motor repair company, or the motor should be replaced if necessary.

- **Swing Gate Arm** — Check all bolts for proper tension and tighten if necessary. Make sure the arm folds overextends itself slightly against the overtravel stop to reduce the chance that the gate can be backdriven open. Adjust the close limit slightly if additional travel is required. Lightly lubricate all pivot points with a light machine oil.

**6-Month Preventative Maintenance**

1. For operators which utilize torque limiting clutches, check for proper tightness. If there appears to be dust from wear on the pads, inspect the pads and replace if necessary. If the clutch cannot be adjusted tightly enough to move the gate without slipping, the pads must be replaced.

2. For operators with V-belts, inspect for wear and replace as necessary. Check for proper tension and adjust if required. Check all pulley setscrews for tightness and tighten if necessary.

3. For operators with internal chain drives, inspect chain and sprockets for wear and replace if necessary. Check for proper tension and alignment, and adjust if required. Check all hub sprocket setscrews and tighten if required.

4. Check limit switches and limit actuators (cams, limit nuts, etc.) for wear and replace as required. In rotary limit switch assemblies, wipe the limit shaft clean and apply a light coating of dry lubricant.

5. For operators with magnetic brakes, check for proper adjustment. Brake disc must run free when the brake is engaged. For brake assemblies other than C-face style, the brake should be adjusted so that the solenoid plunger throw is between 3/8" to 1/2". Too much throw will damage the solenoid. If the solenoid emits a loud buzzing sound when the motor is run, the brake must be adjusted.

6. In operators which have a disconnect handle, inspect disconnect handle for proper function and lubricate if necessary. Use a lithium based grease on all moving parts.

7. Inspect all nuts and bolts for proper tightness and tighten as necessary.

8. Check all reversing devices for proper function. Inspect all contact edges for wear and replace if required. Check photoeyes for proper alignment and function.

9. Check current sensing for proper adjustment when finished with inspection and maintenance.

10. Inspect the installation area. Are all the warning signs intact and visible? If they are missing or need replaced, contact Linear. Be sure there are no control stations mounted within reach of the gate. Review safety literature with the customer and advise them to remove any such stations found.

**FCC Notice**

This device complies with FCC Rules Part 15 and Industry Canada Rules & Regulations. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

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For all gate operators, you must inspect the gate for proper operation. The gate should move easily without binding through its entire travel. If the gate does bind, adjust or fix as required. Failure to keep the gate in good working condition will have adverse effects on the operator.
<table>
<thead>
<tr>
<th>REF. #</th>
<th>PART #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2110-067-BT</td>
<td>Enclosure Assembly without Door</td>
</tr>
<tr>
<td>2</td>
<td>2100-164</td>
<td>Mounting Plate</td>
</tr>
<tr>
<td>17</td>
<td>2100-708</td>
<td>Main Frame Mounting Bracket</td>
</tr>
<tr>
<td>25</td>
<td>2100-1414</td>
<td>Reducer Spacer Plate</td>
</tr>
<tr>
<td>3</td>
<td>2110-566</td>
<td>Output Shaft Welded Assembly: 1-1/8&quot; bore with 40-B-48 Sprocket</td>
</tr>
<tr>
<td></td>
<td>2120-361-BT</td>
<td>Complete Enclosure Assembly with Door</td>
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<tr>
<td></td>
<td>2120-362-BT</td>
<td>Enclosure Door and Lock Assembly</td>
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<tr>
<td></td>
<td>2300-716</td>
<td>Stop/Reset Button Cover</td>
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<tr>
<td>2</td>
<td>2110-136-BT</td>
<td>Crank</td>
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<td>27</td>
<td>2200-016</td>
<td>Moisture Seal</td>
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<td>2100-1344</td>
<td>Moisture Seal Spacer</td>
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<td>2200-224</td>
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<td>2200-264</td>
<td>Pillow Block Bearing, 1-1/8&quot;</td>
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<td>2110-144</td>
<td>Limit Cam</td>
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<td>16</td>
<td>2110-130</td>
<td>Intermediate Shaft Assembly</td>
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<td>2100-688</td>
<td>Intermediate Shaft</td>
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<td>Sprocket, 40-B-9, 3/4&quot; bore</td>
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<td>2400-520</td>
<td>E-Ring, 3/4&quot;</td>
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<td>2200-097</td>
<td>Gear Reducer, 60:1</td>
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<td>9</td>
<td>2200-084</td>
<td>Sprocket, 40-B-13, 1&quot; bore</td>
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<tr>
<td></td>
<td>2100-206</td>
<td>#40 Chain, 30 Links</td>
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<tr>
<td></td>
<td>2200-467</td>
<td>#40 Chain, 22-1/2&quot;</td>
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<tr>
<td></td>
<td>2200-006</td>
<td>#40 Master Link</td>
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<tr>
<td></td>
<td>2400-254</td>
<td>Key, 3/16&quot; x 3/16&quot; x 3&quot;</td>
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<td></td>
<td>2400-201</td>
<td>Key, 1/4&quot; x 1/4&quot; x 1-1/2&quot;</td>
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<tr>
<td>28</td>
<td>2500-764</td>
<td>Limit Switch</td>
</tr>
<tr>
<td>29</td>
<td>2100-586</td>
<td>Limit Bracket</td>
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<tr>
<td>30</td>
<td>2510-248</td>
<td>Stop/Reset Button and Bracket Assembly</td>
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<td>2100-1760</td>
<td>Stop/Reset Button Mounting Bracket</td>
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<tr>
<td></td>
<td>2500-1495</td>
<td>Stop/Reset Button</td>
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<tr>
<td>32</td>
<td>2100-1683</td>
<td>Left Mounting Bracket</td>
</tr>
<tr>
<td>33</td>
<td>2100-1773</td>
<td>Right Mounting Bracket with Shelf</td>
</tr>
<tr>
<td>10</td>
<td>2500-2307</td>
<td>1/2 HP, 115V, 1 Phase</td>
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<td>2500-2308</td>
<td>1/2 HP, 208/230V, 1 Phase</td>
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<td>3/4 HP, 115V, 1 Phase</td>
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<td>2500-2310</td>
<td>3/4 HP, 208/230V, 1 Phase</td>
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<td>2500-2311</td>
<td>1 HP, 115V, 1 Phase</td>
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<td>2500-2312</td>
<td>1 HP, 208/230V, 1 Phase</td>
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<td>1/2 HP, 208/230/460V, 3 Phase</td>
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<td>1 HP, 208/230/460V, 3 Phase</td>
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<td>10</td>
<td>2500-2336</td>
<td>Capacitor for 2500-2307 Motor</td>
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<td></td>
<td>2500-2217</td>
<td>Capacitor for 2500-2308 Motor</td>
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<td>2500-1930</td>
<td>Capacitor #2 for 2500-2309 Motor</td>
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<tr>
<td></td>
<td>2500-1931</td>
<td>Capacitor for 2500-2310 Motor</td>
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<tr>
<td></td>
<td>2500-2338</td>
<td>Capacitor for 2500-2311 Motor</td>
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<tr>
<td></td>
<td>2500-1932</td>
<td>Capacitor for 2500-2312 Motor</td>
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</table>
### Single Phase Controller Mechanical Parts List

<table>
<thead>
<tr>
<th>REF. #</th>
<th>PART #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>620-101293</td>
<td>Apex Module</td>
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<tr>
<td>2</td>
<td>2510-422</td>
<td>115V Power Box Assembly</td>
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<tr>
<td></td>
<td>2510-430</td>
<td>208/230V Power Box Assembly</td>
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<tr>
<td>3</td>
<td>2100-2143</td>
<td>Power Box Mounting Strap</td>
</tr>
<tr>
<td>4</td>
<td>2300-1025</td>
<td>Apex Plastic Cover</td>
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<tr>
<td>5</td>
<td>2510-423</td>
<td>Cover Knob Kit</td>
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<tr>
<td>6</td>
<td>2520-526</td>
<td>Complete Wiring Harness Assembly (not shown)</td>
</tr>
</tbody>
</table>
### THREE PHASE CONTROLLER MECHANICAL PARTS LIST

<table>
<thead>
<tr>
<th>REF. #</th>
<th>PART #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2520-530</td>
<td>Control Box Assembly (Complete) 208/230V</td>
</tr>
<tr>
<td>2</td>
<td>2520-531</td>
<td>Control Box Assembly (Complete) 460V</td>
</tr>
<tr>
<td>3</td>
<td>2100-2147</td>
<td>Control Box Assembly (Box only)</td>
</tr>
<tr>
<td>2</td>
<td>2100-2148</td>
<td>Cover</td>
</tr>
<tr>
<td>3</td>
<td>620-101293</td>
<td>Apex Module</td>
</tr>
<tr>
<td>4</td>
<td>2500-1980</td>
<td>Motor Board</td>
</tr>
<tr>
<td>5</td>
<td>2500-034</td>
<td>Power Switch</td>
</tr>
<tr>
<td>6</td>
<td>2500-791</td>
<td>Transformer 208/230V</td>
</tr>
<tr>
<td>7</td>
<td>2500-214</td>
<td>Transformer 460V</td>
</tr>
<tr>
<td>7</td>
<td>2500-2084</td>
<td>Contactor</td>
</tr>
<tr>
<td>8</td>
<td>2510-423</td>
<td>Cover Knob Kit</td>
</tr>
<tr>
<td>9</td>
<td>2300-1025</td>
<td>Apex Plastic Cover</td>
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<tr>
<td>REF. #</td>
<td>PART #</td>
<td>DESCRIPTION</td>
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<tr>
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<tr>
<td>2120-449-BT</td>
<td>Complete Arm Assembly</td>
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</tr>
<tr>
<td>1</td>
<td>2100-1913-BT</td>
<td>Crank (not included in arm assembly)</td>
</tr>
<tr>
<td>2</td>
<td>2100-1722-BT</td>
<td>Crank Extension</td>
</tr>
<tr>
<td>3</td>
<td>2100-1924-BT</td>
<td>Overtravel Stop</td>
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<tr>
<td>4</td>
<td>2100-1597</td>
<td>Gate Arm Clamp</td>
</tr>
<tr>
<td>5</td>
<td>2100-1733-BT</td>
<td>Gate Plate</td>
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<tr>
<td>6</td>
<td>2200-783</td>
<td>Spacer - black, 1/2” ID x 3/4” OD x 9/16” LTB</td>
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<tr>
<td>7</td>
<td>2400-378</td>
<td>Set Bolt, 5/16”-18 x 3/4”</td>
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<tr>
<td>8</td>
<td>2400-376</td>
<td>Flat Washer</td>
</tr>
<tr>
<td>9</td>
<td>2100-1547</td>
<td>Disconnect Pin</td>
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<tr>
<td>10</td>
<td>2400-351</td>
<td>Disconnect Hair Pin</td>
</tr>
<tr>
<td>2200-034</td>
<td>Disconnect Lock (optional)</td>
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<tr>
<td>11</td>
<td>2100-122-BT</td>
<td>Pipe Link, 1”</td>
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<tr>
<td>12</td>
<td>2400-380</td>
<td>HHCS, 1/2”-13 x 1-3/4”</td>
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<td>13</td>
<td>2400-418</td>
<td>Nylon Lock Nut, 1/2”</td>
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<tr>
<td>14</td>
<td>2300-238</td>
<td>Nylon Washer, 3/4” ID</td>
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<td>15</td>
<td>2400-433</td>
<td>Split Lock Washer, 1/2”</td>
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<tr>
<td>16</td>
<td>2400-434</td>
<td>HHCS, 1/2-13 x 1-1/4”</td>
</tr>
<tr>
<td>17</td>
<td>2400-482</td>
<td>HHCS, 1/2-13 x 2-1/2”</td>
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<tr>
<td>18</td>
<td>2100-1725</td>
<td>Spacer - yellow, 3/4” OD x 1/2” ID x 3/4” LTB</td>
</tr>
<tr>
<td>19</td>
<td>2100-1932-BC</td>
<td>Spacer - black, 1 1/4” OD x 1/2” ID x 1/2” LTB</td>
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<tr>
<td>20</td>
<td>2100-1320</td>
<td>Spacer - zinc-silver, 3/4” OD x 1/2” ID x 1/2” LTB</td>
</tr>
<tr>
<td>21</td>
<td>2400-309</td>
<td>Set Screw, 1/4” - 20 x 1/2”</td>
</tr>
</tbody>
</table>

**NOTE:** CRANK SHOWN FOR REFERENCE ONLY
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Gate Operator Installation Checklist

1. The gate has been checked to make sure it is level and moves freely in both directions.

2. Potential pinch areas have been guarded so as to be inaccessible OR have contact and/or non-contact obstruction sensing devices installed.

3. The installer has installed one or more approved obstruction detection devices, in compliance with UL325 requirements for this installation.

4. If pedestrian traffic is expected, a separate pedestrian gate has been installed, a minimum of seven feet from the gate. The customer has been informed that all pedestrian traffic must use the pedestrian gate.

5. Warning signs have been installed on each side of the gate in highly visible locations. The customer has been informed that these signs must remain at all times.

6. There are no controls installed on the gate operator, or within seven feet of the gate.

7. The installer has properly adjusted the obstruction sensing feature and has tested the gate to make sure that the gate stops and reverses a short distance with minimal resistance applied (40 lbs. on a swing gate at the end of the gate, 75 lbs. on a slide gate).

8. The installer has instructed the customer in the proper use of the gate operator and reviewed all of the operational functions, obstruction sensing devices, warning beeper and reset, etc.

9. The installer has instructed the customer in the proper use of the operator’s manual disconnect feature. The manual disconnect must never be used while the gate is in motion. The power switch must be turned off before using the manual disconnect and disengaging the operator.

10. The installer has reviewed all safety instructions with the customer, and has left the safety instructions and owner’s information sheets for their reference.

11. The installer has answered any questions the customer has regarding the operation of the gate operator and gate operator safety precautions.

12. The installer has explained to the customer that a regular maintenance schedule for both the gate and the gate operator is recommended.

By signing this installation checklist, I/we hereby certify that each item listed and checked above has been covered by the installer and is clearly understood by the customer.

Customer’s Signature __________________________ Date __________

Installer’s Signature __________________________ Date __________