**Installation Manual Table of Contents**
**for One Way, 90° and Bi-part Doors**
**11/14/06 – Rev 0**

## 1. Introduction

The Doors In Motion Automation System is designed for installation on pre-existing doors or new door installations. When activated, the doors will move at a speed of approximately 6 inches per second; however, door speed is adjustable. The system is a state-of-the-art, belt driven door and window automation system. The system is UL listed and UL tested.

The major mechanical components of the system include the motor assembly, drive belt and idler return pulley. The motor assembly incorporates a door position encoder, electro-magnetic clutch and electro-magnetic brake. The motor assembly is mounted just beyond one end of the final door panel or the door jamb on one side of the door. The return pulley is mounted on the side opposite from where the motor assembly is mounted. The drive belt is attached to the lead door(s) of the door system.

The major electrical components of the system include the automation panel, wall switches, and door obstruction sensors. Depending on the installation and user preference, other optional electrical components may include battery backup, secure keypad, wireless switch, remote control, touchscreen, fingerprint reader and MP3 player.

The door is opened or closed when a signal is sent to the automation panel. The signal can be from a multi-button wall switch, keypad, remote control, touchscreen, biometric fingerprint reader, or other device. When a signal is received, the door will begin to move and will continue to do so, until it reaches the fully opened or closed position, receives a “stop” signal, or the current limit is activated. The door can be stopped at any time by sending a “stop” signal to the automation panel. This can be done via a multi-button wall switch, keypad, or remote control. The door can be unlocked, for a period of 10 seconds, by depressing the unlock button on the multi-button wall switch. This deactivates the electro-magnetic brake and allows manual operation of the door. When the door is at any open position, the brake is not activated.

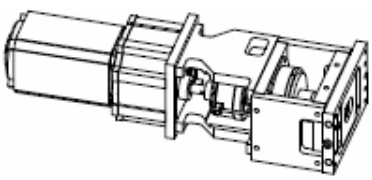
The following installation instructions are intended to provide the easiest and most complete methods for installing the Doors In Motion Automation System. **Before beginning installation, please read this entire Installation Manual**. A step-by-step process is provided with illustrations. Since most doors and windows are custom designed, minor variations may be required in the installation process.

## 2. Automation System Components

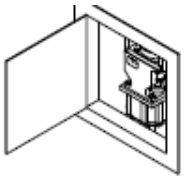
The following is a list of the typical components an Automation System may contain. The list of components varies based on user selected options and the nature of the installation. Illustrations of these components can be found on pages 4 and 5 of this Installation Manual.

2.1. Mechanical components
- 2.1.1. Motor assembly
- 2.1.2. Motor assembly access panel
- 2.1.3. Standard return pulley
- 2.1.4. In-line return pulley
- 2.1.5. Drive belt
- 2.1.6. Standard belt clamp assembly
- 2.1.7. Bi-part belt clamp assembly
- 2.1.8. Belt holder bracket
- 2.1.9. 1” door collector plate
- 2.1.10. 2” door collector design
- 2.1.11. Typical screws and other hardware

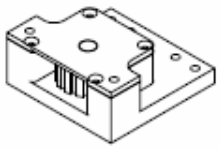
2.2. Electrical components
- 2.2.1. Automation panel
- 2.2.2. Battery backup panel (Optional)
- 2.2.3. Wall switch
- 2.2.4. Secure keypad (Optional)
- 2.2.5. Wireless switch (Optional)
- 2.2.6. Infrared sensor which consists of:
    - Sensor controller
    - Transmitter
    - Receiver
    - Support plate
- 2.2.7. Overhead motion sensor (Optional)
- 2.2.8. Wireless remote (Optional) which may consist of:
    - Remote control
    - Board mounted
    - Wall mounted
- 2.2.9. Touchscreen (Optional)
- 2.2.10. Fingerprint reader (Optional)
- 2.2.11. MP3 player (Optional)
- 2.2.12. Wiring and connectors
    - 2.2.12.1. 28-8 flat wire with RJ45 connectors
    - 2.2.12.2. 18-4 wire with automotive type connectors
    - 2.2.12.3. Plug & play motor board



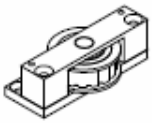
Motor Assembly



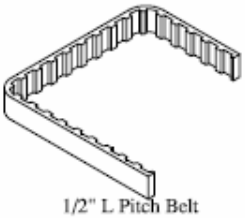
Motor Assembly Access Panel



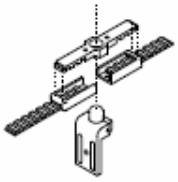
Standard Return Pulley



In-line Return Pulley

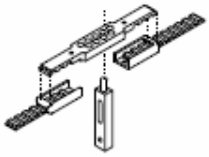


1/2" L Pitch Belt



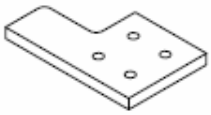
Standard Belt Clamp Assembly ( 5 pcs.)

Secure Keypad

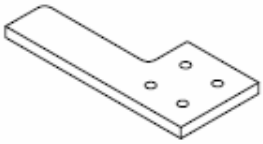


Bi-part Belt Clamp (4 pcs.)

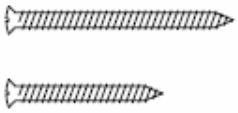
Belt Holder



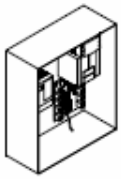
1" Collector Plate



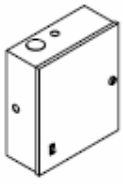
2" Collector Plate



Typical Screws and Hardware

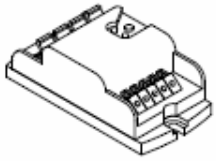


Automation Panel



Battery Backup

Wall Switch

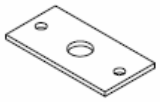


Infrared Sensor Controller

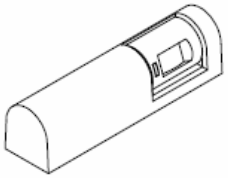
**Component Illustrations**

Infrared Projector (Gray Wire)

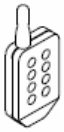
Infrared Receiver (Blue Wire)



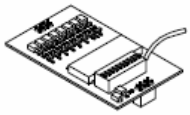
Infrared Sensor Support Plate



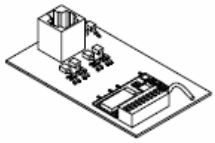
Overhead Motion Sensor



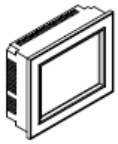
Wireless Remote



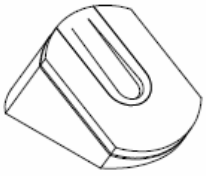
Wireless Remote Board – Can Mounted



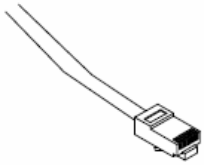
Wireless Remote Board - Wal Mounted



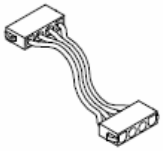
Touch Screen



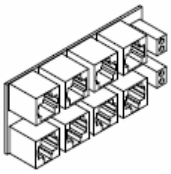
Fingerprint Reader



28-8 Flat Wire w/ RJ45 Connectors



18–4 Wire w/ Automotive Connectors



Plug & Play Motor Board

## Component Illustrations Continued

## 3. Typical tools, supplies and electrical aids

3.1. Hand tools

- Screwdrivers (Phillips and regular / small and large)
- Hammer
- Pliers
- Tape measure
- Utility knife
- 6” torpedo level
- Ladder
- Alden™ ratchet wrench set or 7/16” open end wrench
- Metal cutting scissors
- Wire cutter
- RJ45 cutter/crimper
- Pin crimper
- 5/8” diameter auger drill bit
- 1 1/4” diameter hole saw
- Spade drill bit set
- Wood chisels
- Drywall saw
- Phone/Data wire cutter & crimper
- Vise-Grips™ (2)
- Unibit™ drill

3.2. Power tools

- Impact driver
- Power drill & drill bits
- Circular saw
- Sawsall
- Hammer drill

3.3. Supplies

- Shims
- Wire fishing tape
- Black paint marker
- Sharpie™ marker
- White lithium grease
- Electrical tape
- Bailing wire
- Wire connectors
- Wire nuts
- 5/16” PVC tube

3.4. Electrical aids

- IDEC LCD display
- Multi-meter
- Network cable tester
- Fluke™ Volt Alert
- Wire toner

# 4. Automation System installation

## 4.1. Pre-installation Checks and Decisions

Before beginning, some things need to be checked to ensure a smooth installation.

4.1.1. Ensure that a 110V, 60Hz, 15A (dedicated is preferred), **non-GFI** circuit is located at the automation panel

4.1.2. Pre-installation door checks

- Door Movement - Make sure that the door moves freely over its entire length of travel, and that it is square panel to panel and panel to jambs. If any problems are detected, it is recommended that the door installer be contacted to correct them.

- Head Channel Clearance - If the header above the door sags and distorts the door head channel, it may cause an interference with the drive belt or belt clamp assembly. Therefore, before beginning installation, measure and record the distance between the top of the door and the head channel (See Figure 1). This should be done at several locations over the length of the door travel. The minimum clearance recommended is ¾".

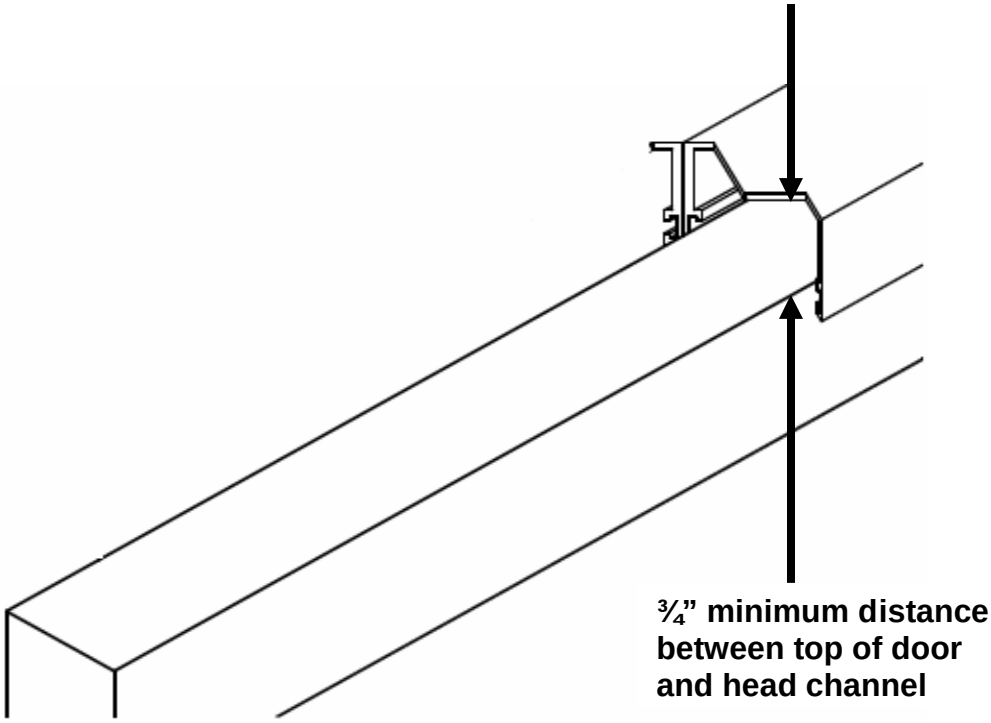



**Figure 1 – Head Channel Clearance**

4.1.3. Prior to starting, inspect all mechanical and electrical components for condition and correct quantity.

4.1.4. Optimizing placement of the mechanical and electrical components makes for both an attractive and convenient installation. When determining component locations, consider the visual impact on the end customer, ease of installation, and future serviceability. Figure 2 shows the typical location of components.

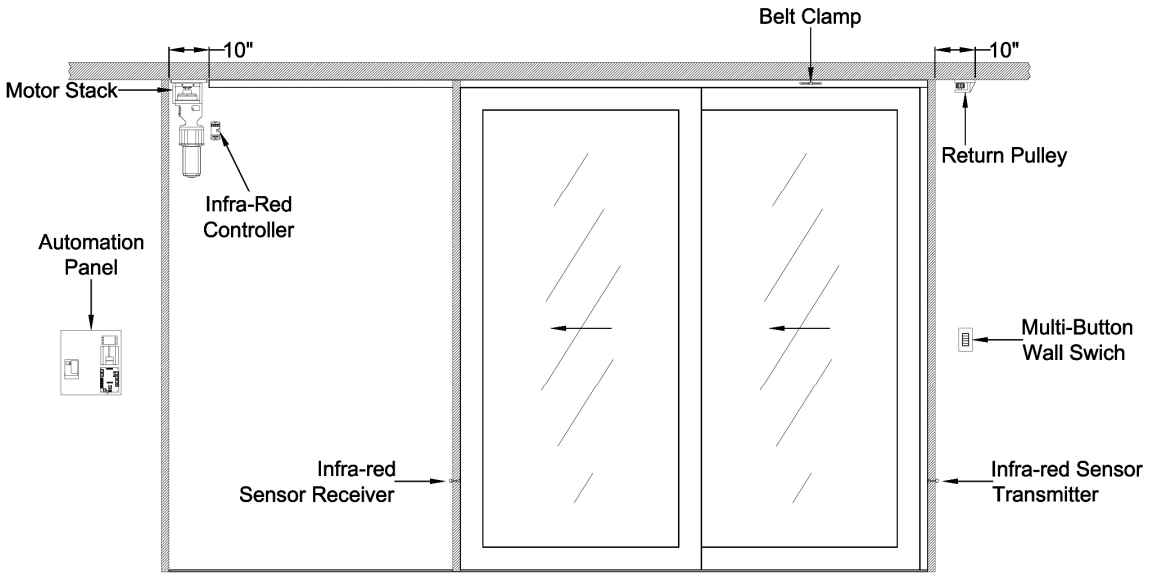



**Figure 2 – Typical Location of Components**

- Automation Panel – The automation panel is an electrical enclosure box that measures 12” x 14” x 5” deep (12” x 18” x 5” deep for 90° doors). It holds the electronics and software th at operate the door automation system. To ensure proper remote reception, the automation panel, which contains the remote control receiver, needs to be mounted within 75 feet of the motor assembly. This panel needs to be accessible and is typically located in an electrical closet or telephone closet. If the automation panel needs to be located more than 75 feet from the motor assembly, please contact Doors In Motion at **1-800-426-7113** for additional options.

  The Automation Panel comes with an electrical “pigtail”, so it can be plugged into a normal 110V, 60Hz, 15A, dedicated, **non-GFI** circuit.

  Safety Features –There are multiple safety features included with the Doors In Motion automation system. Within the automation panel are the following: 1) Front panel fuse, this is a 5AMP reset switch that will prevent too much current from entering the automation panel, 2) Internal 2AMP fuse on the main circuit board, this protects the internal

components of the automation panel, 3) Built into the system are also more safety features including a current limit that will stop the operation of the system if the system senses too much current draw from the motor.

Power Failure – If there is a power failure and no power is supplied to the automation panel, the electro-magnetic brake will release and the door can be operated manually. This is the standard offering to cover all egress and codes. An alternative option is available, so that when power does go out, the door remains locked. There is an additional charge for this option.

- Motor Assembly Access Panel – Most local electrical codes require access to the motor assembly. Typically this is done with a 14" x 14" Access Panel. If the door is a pocket type door, depending on the width of the pocket, access may be able to be achieved via the pocket itself.

- Motor Assembly – On a single pocket door or stacked door, the motor assembly is typically located opposite the lock side jamb or in an extended pocket that the panels rest in when fully opened.

- Idler Return Pulley – The idler return pulley is located on the opposite end of the door from the motor assembly.

- Multi-Button Wall Switch – A low voltage multi-button wall switch, which fits into a single-gang switch box, is typically installed 54" above the floor to control the door. This is an interior switch. The switch will include a button to "open" the door, a button to "close" the door, a button to "stop" the door when it is traveling, and an "unlock" button that allows the user to unlock the brake and manually open the door. When the unlock button is activated, the brake on the motor assembly will release for 10 seconds and allow the door to be opened. If within 10 seconds, the door has not been moved, the brake will re-engage. This switch also has a "reset" button which is used during initial installation and if power is lost.

- Infrared Sensor (one way door) – An infrared sensor is used to detect obstructions. The infrared sensor consists of a controller, transmitter and receiver. The transmitter to receiver range is 38' and both should be mounted 12" above the floor. For ease of connection purposes, the controller is typically installed near the motor assembly. The transmitter is installed in a wall on one side of the door and the receiver is in installed in a wall on the other side of the door closest to the motor assembly.

- Overhead Motion Detector – An overhead motion detector (90° door) is used to detect obstructions. It is mounted above the door and should be located no more that 14' above the floor.

4.1.5. Belt Path

- One Way and 90° Doors - In general, because of ease of installation and the availability of two or more head channel tracks, a two track installation is typically performed on one way and 90° doors. Each direction of the belt rides in separate head channel tracks (See Figure 3).

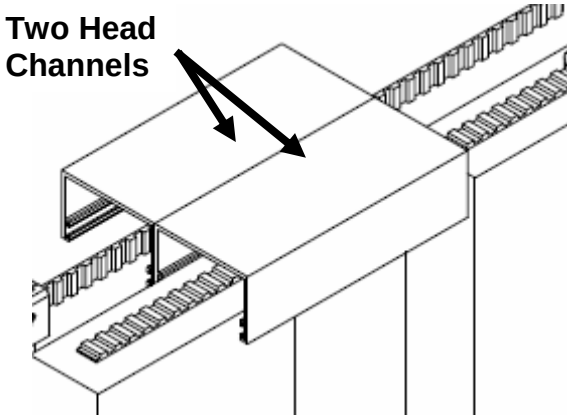



**Figure 3 – Two Track Belt Path Illustration**

- Bi-part Door - In the case of a bi-part door, a single head track channel is used to install the belt. Both directions of the belt travel in a single head track channel (See Figure 4).

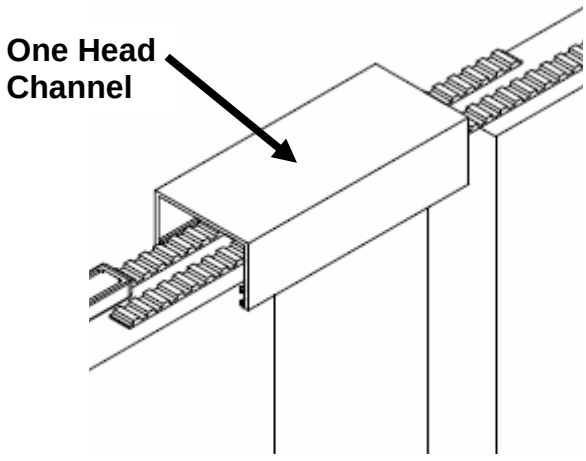



**Figure 4 – One Track Belt Path Illustration**

## 4.2. Safety

**INCORRECT INSTALLATION CAN LEAD TO SEVERE OR FATAL INJURY. FOLLOW ALL INSTRUCTIONS CONTAINED IN THIS MANUAL CAREFULLY.**

**4.2.1. READ AND FOLLOW ALL INSTALLATON INSTRUCTIONS**

4.2.2. Do not connect the automation system to electrical power until instructed to do so

4.2.3. Do not wear rings, watches or loose clothing when installing or servicing the automation system

4.2.4. Wear safety glasses for eye protection when installing or servicing the automation system

4.2.5. Wear ear protection when performing loud operations such as cutting holes for the belt path

4.2.6. Install the automation system on a properly installed door. Have a qualified door service person make adjustments/repairs to the door(s) before installing the automation system. An improperly functioning door could lead to severe injury.

4.2.7. After installing the automaton system, it must stop when the sensors detect the presence of an object or obstruction. The automaton system must also stop when an object is placed in the path of the door.

4.2.8. Installation and wiring must comply with local building and electrical codes.

4.2.9. Connect the power cord to a properly grounded non-GFI outlet. Do not remove the ground pin from power cord.

## 4.3. Installation

4.3.1. Installing mechanical components

- Motor Assembly - Determine the location for the motor assembly. On a single pocket door or stacked door, the motor assembly is typically located opposite the lock side jamb.

  Note: The Motor Assembly typically needs an access panel (See Figure 5). Doors In Motion recommends a 14” x 14” access panel. Select an inconspicuous location for the motor assembly access panel.

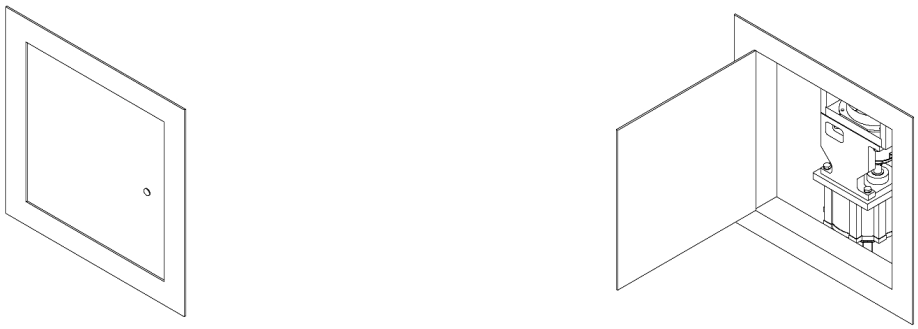


**Figure 5 – Typical Motor Assembly Access Panel**

Figure 6 below shows a typical location for the motor assembly and access panel. Although the access panel should be in an inconspicuous exterior location, it is the point of access for the motor assembly and consideration should be given to accessibility for both installation, inspection, and future service.

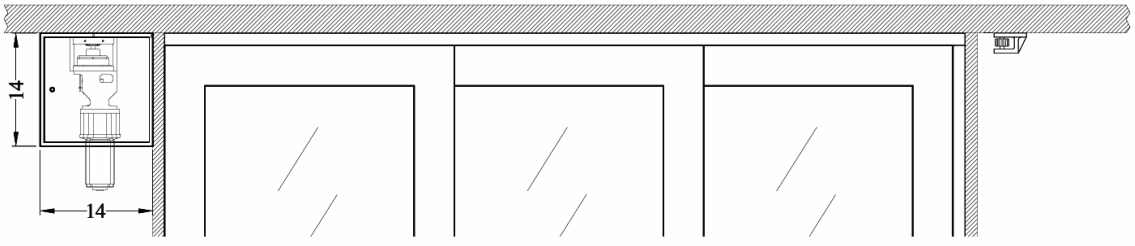



**Figure 6 – Typical Motor Assembly and Access Panel Location**

Figure 7 bellow shows the typical location, of the motor assembly and access panel, inside the pocket area for a pocket door. The motor assembly is mounted perpendicular to the door system header and typically 8-10 inches (can be further if it will aid installation) away from the stopping point of the lead door panel.

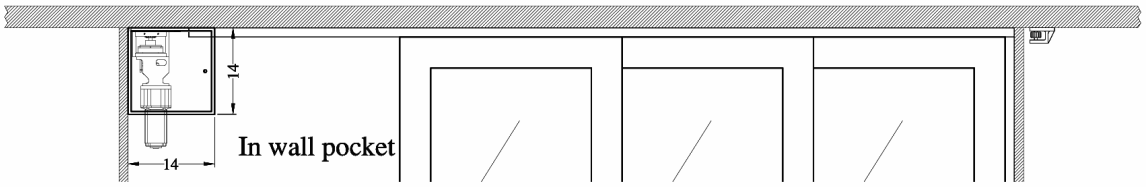



**Figure 7 –Motor Assembly and Access Panel Inside Door Pocket**

Figure 8 below shows the location of the motor assembly and access panel, outside the pocket area for a pocket door. If the motor assembly is mounted where there is a wall stud or door frame between the motor assembly and head track channel, a hole is drilled for the drive belt to pass through. Later in this instruction manual, more information is provided on drilling holes for the drive belt path.

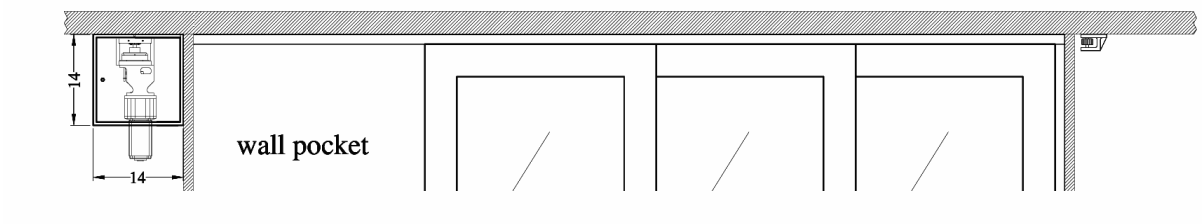



**Figure 8 –Motor Assembly and Access Panel Outside Door Pocket**

- Installation of Motor Assembly for One Way and 90° Doors – When installing the motor assembly on a one way or 90°d oor, center the motor assembly between the two head track channels (See Figure 9).

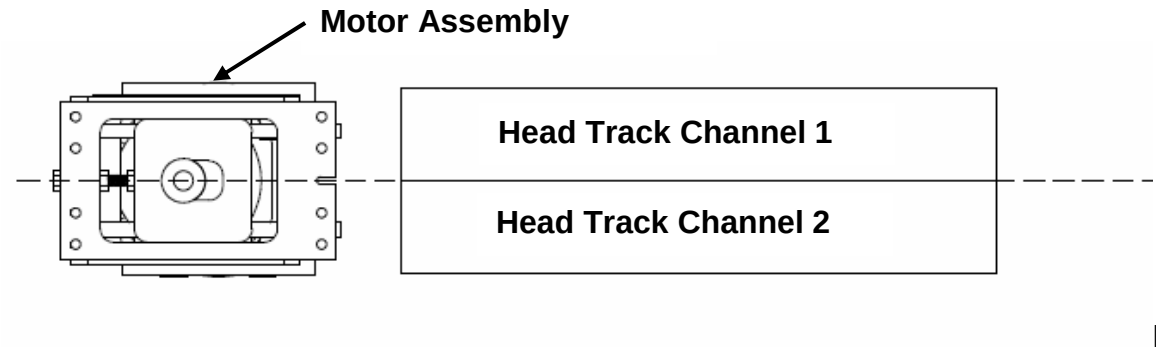



**Figure 9 –Motor Assembly Centered Between Two Head Track Channels**

- Installation of Motor Assembly for Bi-part Door – When installing the motor assembly on a bi-part door, align the motor assembly with the center of the head track channel that contains the lead door panel (See Figure 10).

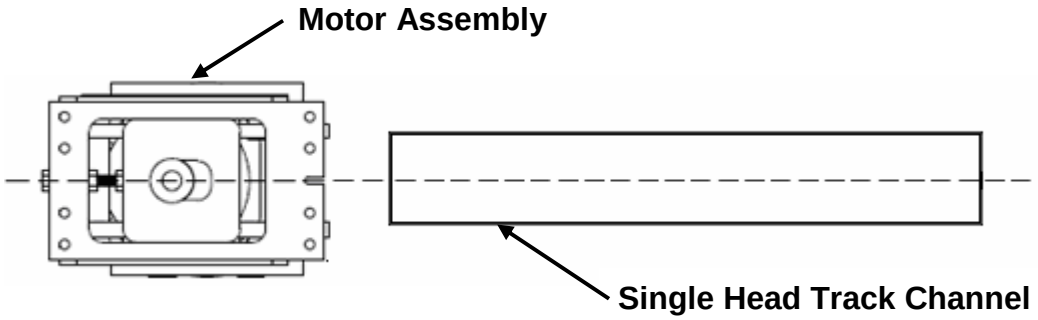



**Figure 10 –Motor Assembly Aligned with Single Head Track Channel**

**<u>Important Note</u>**: If the motor assembly is mounted outside the door pocket area, clearance will need to be provided through the jamb for the drive belt.

<u>Motor Assembly Belt Path Clearance for One Way and 90° Doors (Two Head Track Channels for Belt Path)</u> – For one way and 90° doors, it will be necessary to either drill or cut two 1 1/4" holes (2" center to center") for the drive belt to pass through (See Figure 11). Drilling the holes needs to be done **<u>before</u>** installing the motor assembly; h<u>owever, to ensure proper location of the holes, first read the rest of these instructions</u>.

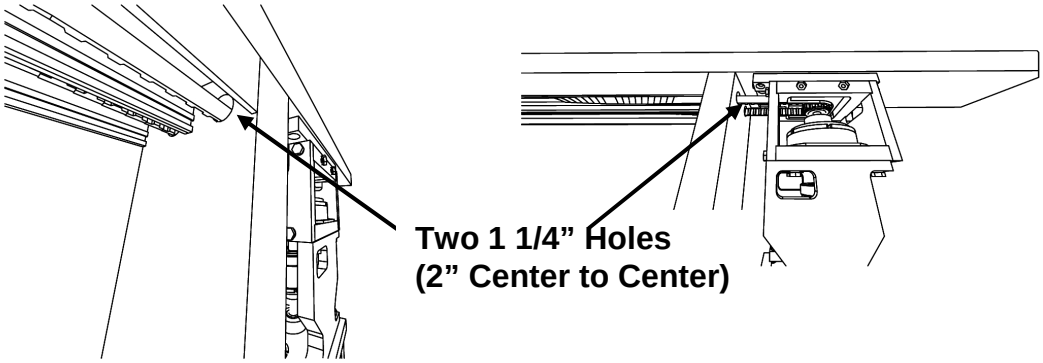



**Figure 11 – Holes Needed for Drive Belt Path for <u>Outside Door Pocket Installation for One Way and 90° Doors</u>**

Motor Assembly Belt Path Clearance for Bi-part Door (One Head Track Channel for Belt Path) – For bi-part doors using a single head track channel for the belt path, it will be necessary to cut a "window" that is 1 1/2" wide by 1" high (See Figure 12). Cutting the "window" needs to be done **before** installing the motor assembly; however, to ensure proper location of the "window", first read the rest of these instructions.

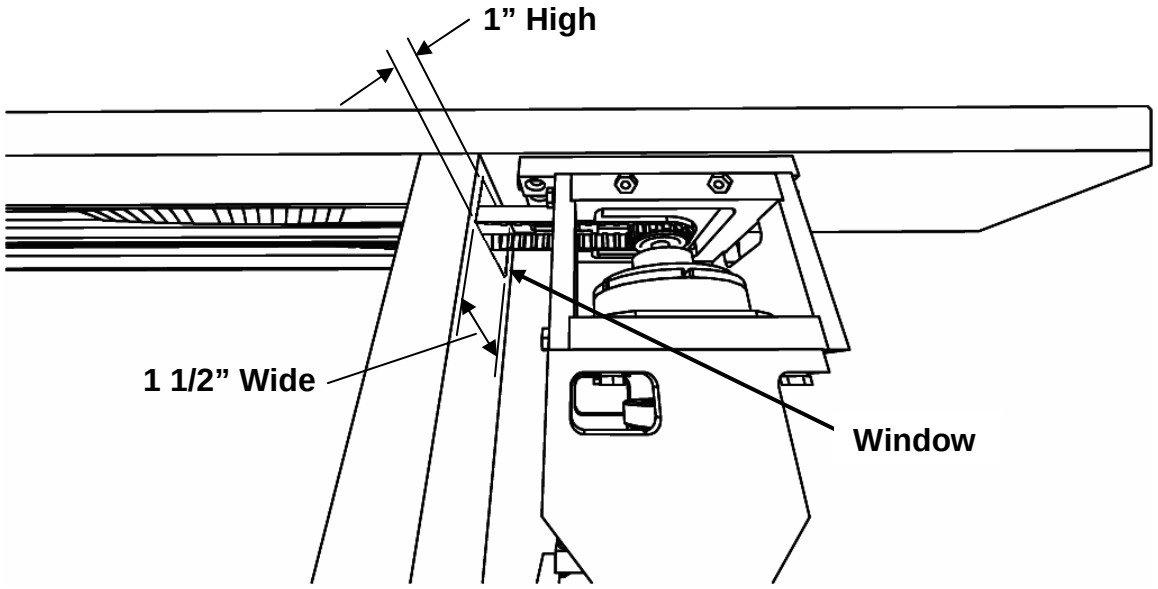



**Figure 12 – Window Needed for Drive Belt Path for Outside Door Pocket Installation for Bi-part Door**

**For proper drive belt operation, it is critical that the motor assembly is aligned on the same plane as the head track channel and that it is level (See Figure 13).** Under typical conditions, flush mounting the motor to the header will achieve proper alignment; however, if the head track channel has been shimmed, the motor assembly must be shimmed to match.

.

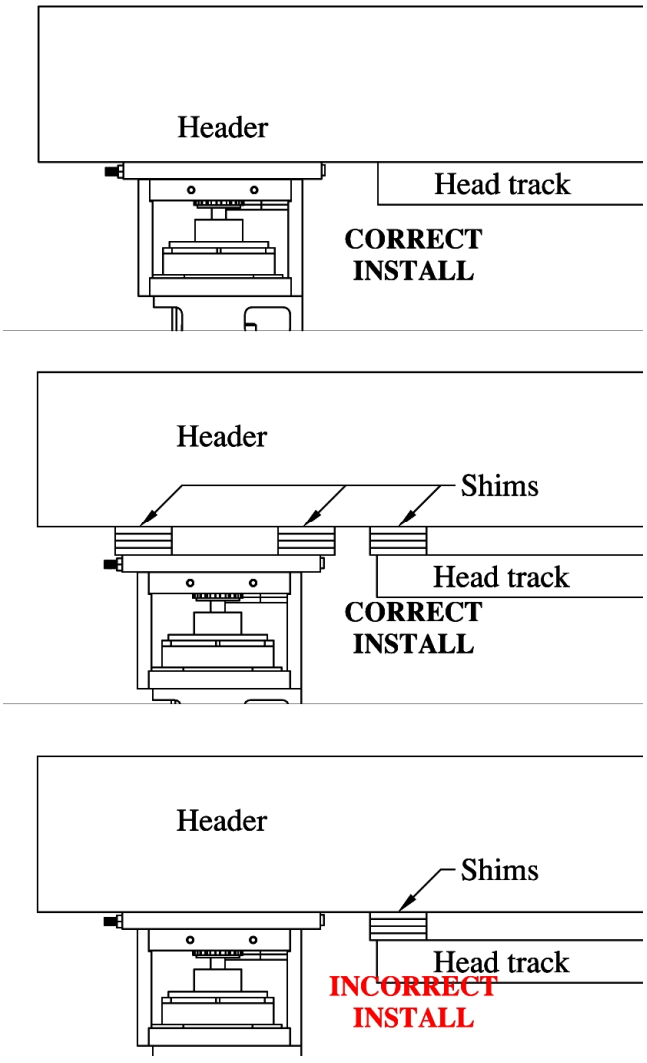



**Figure 13 – Shimming Motor Assembly**

The motor assembly should be installed 6 inches beyond the end of the final door panel or door jamb, with the belt tensioning nut facing away from the door panel or jamb (See Figure 14).

**Important Note:** The motor assembly must be mounted to a solid support member such as a 2"x8" header. It is not acceptable to mount the motor assembly to ½" plywood.

There is a pilot screw slot in the mounting plate. To make installation easier, first install a 3" - #12 wood screw to center and support the motor assembly. Then attach the motor assembly to the header using the four (4) 3" - #12 wood screws supplied. Once the motor assembly is attached, check to make sure that it is centered, square, and level.

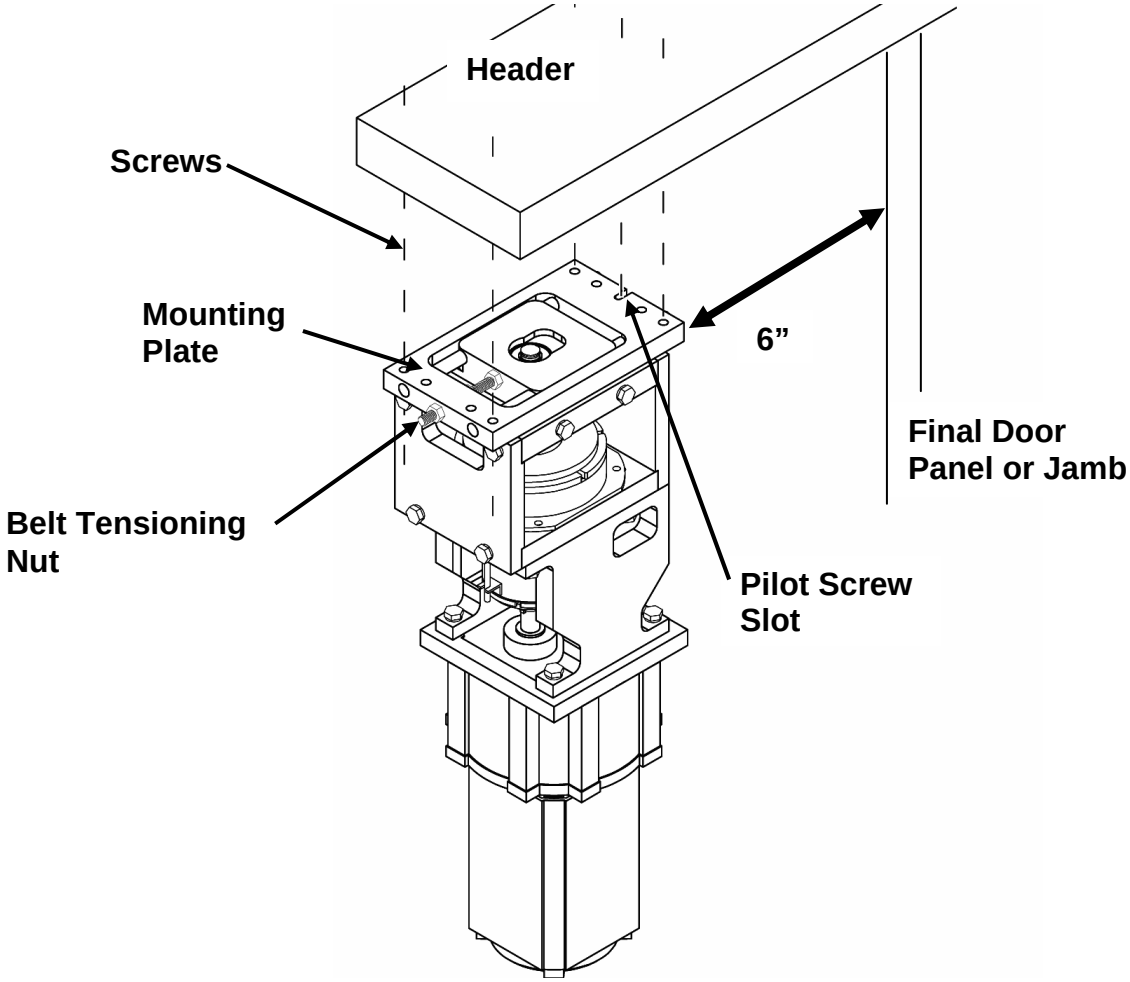



**Figure 14 –Motor Assembly Installation**

Inside Door Pocket Installation of Motor Assembly - When installing the motor assembly, a minimum of 5 inches of clearance must be allowed, within the wall system (See Figure 15).

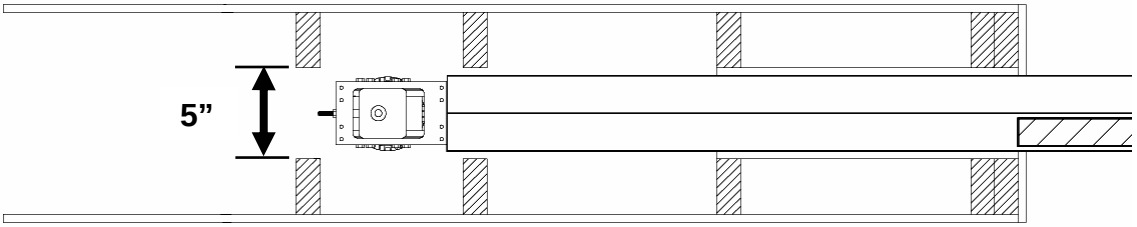



**Figure 15 –Top View of Clearance Needed for Motor Assembly Installation Inside Door Pocket (Shown with Two Track Installation)**

A minimum of 10 inches of clearance must be allowed from the end of the head track channel to the wall stud (Figure 16).

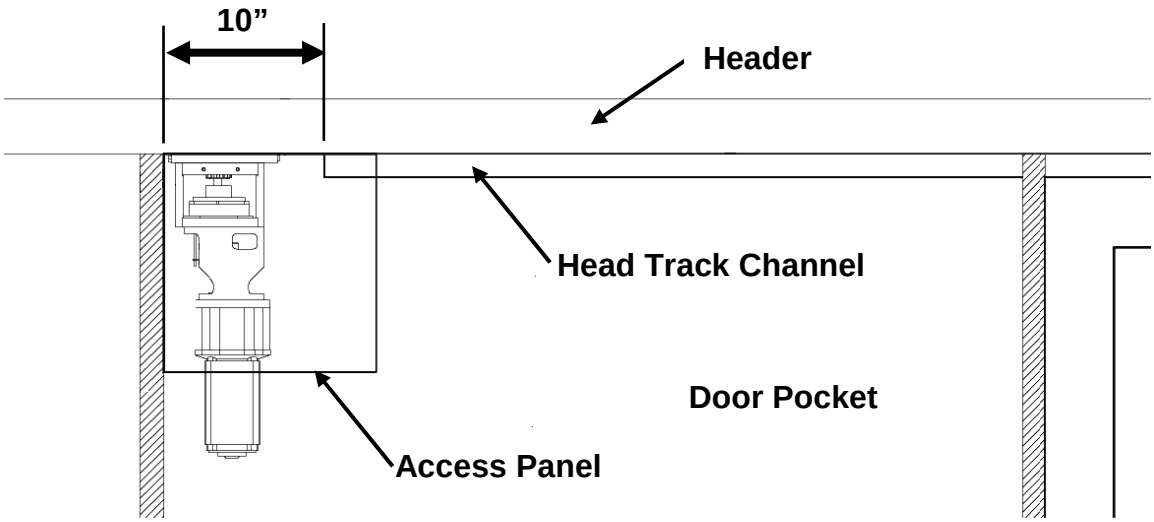



**Figure 16 –Side View of Clearance Needed for Motor Assembly Installation Inside Door Pocket**

Outside Door Pocket Installation of Motor Assembly - When installing the motor assembly, a minimum of 5 inches of clearance must be allowed, within the wall system (See Figure 17).

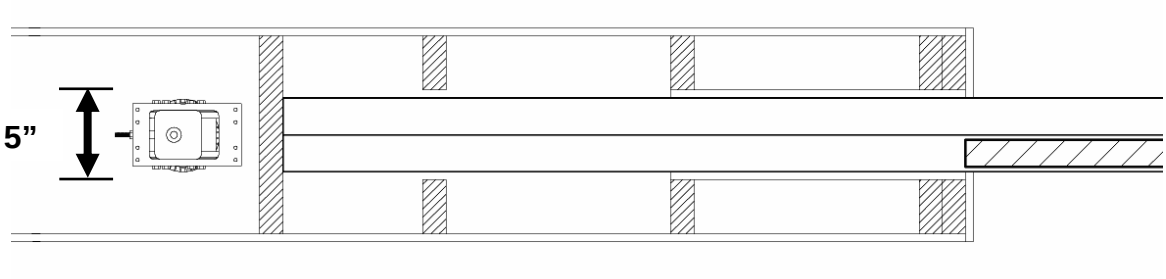



**Figure 17 –Top View of Clearance Needed for Motor Assembly Installation Outside Door Pocket (Shown with Two Track Installation)**

A minimum of 10 inches of clearance must be allowed from the wall stud (Figure 18).

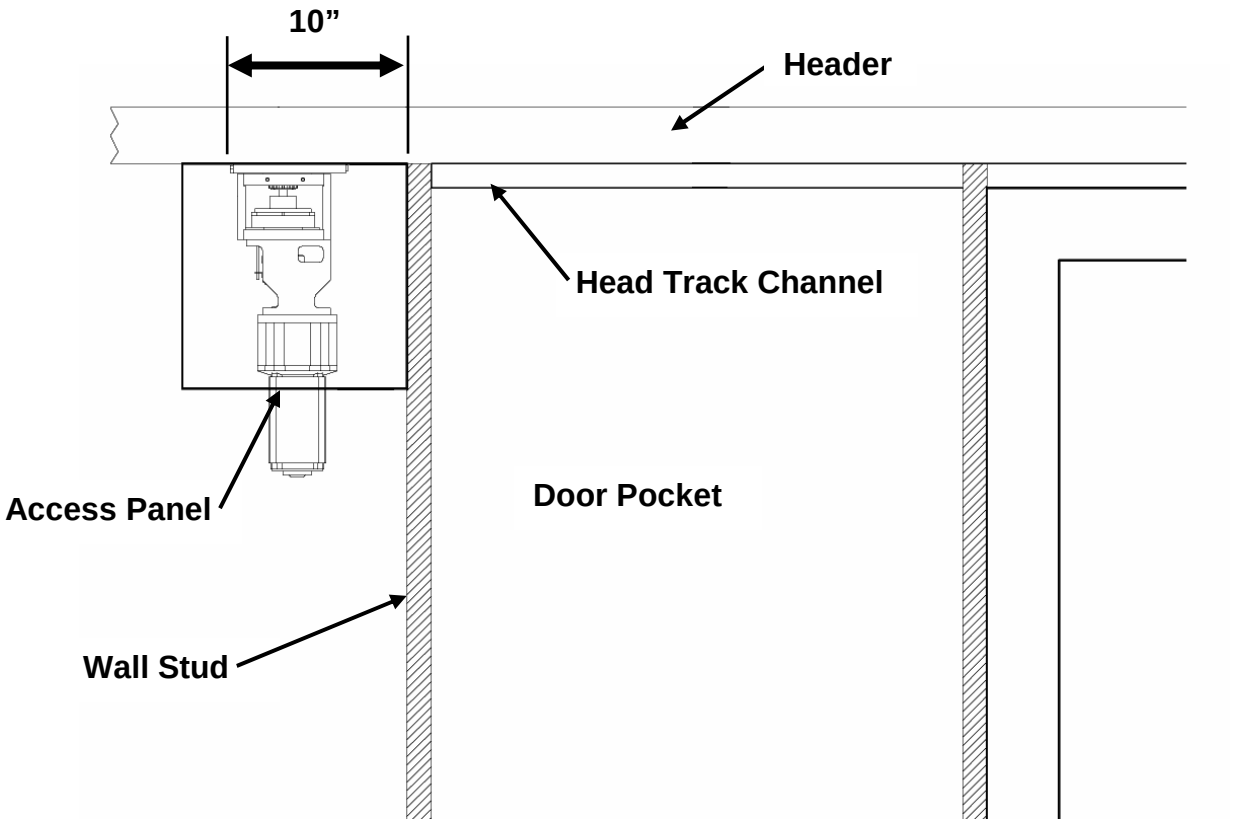



**Figure 18 – Side View of Clearance Needed for Motor Assembly Installation Outside Door Pocket**

- Installation of Standard Idler Return Pulley for One Way Door – When installing the standard idler return pulley for a one way door, center the idler return pulley between the two head track channels (See Figure 19).

  **Important Note:** Idler return pulley must be mounted to a level solid support member such as a 2”x8” header. It is not acceptable, for example, to mount the idler return pulley to ½” plywood.

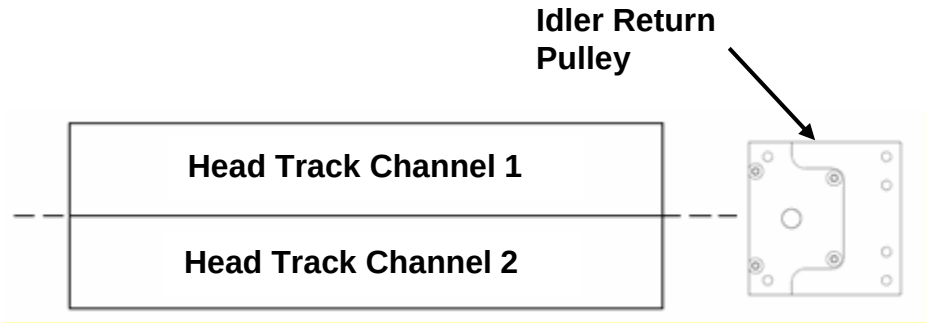



**Figure 19 –Standard Idler Return Pulley Centered Between Two Head Track Channels**

- Installation of Standard Idler Return Pulley for Bi-part Door – When installing the standard idler return pulley for a bi-part door, align the idler return pulley with the center of the head track channel that contains the lead door panel (See Figure 20).

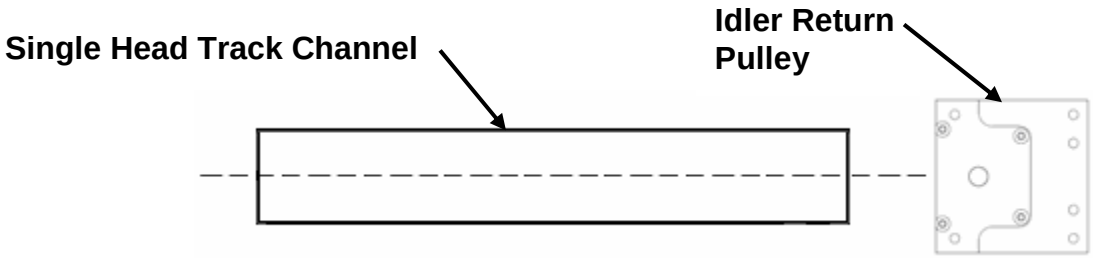



**Figure 20 –Standard Idler Return Pulley Aligned with Single Head Track Channel**

**<u>Important Note</u>**: If the idler return pulley is mounted outside the door pocket area, clearance will need to be provided for the drive belt path.

<u>Idler Pulley Belt Path Clearance for One Way Door (Two Head Track Channels for Belt Path)</u> – It will be necessary to either drill or cut two 1 1/4" holes (2" center to center") for the drive belt to pass through (See Figure 21). Drilling the holes needs to be done **<u>before</u>** installing the idler return pulley; <u>however, to ensure proper location of the holes, first read the rest of these instructions</u>.

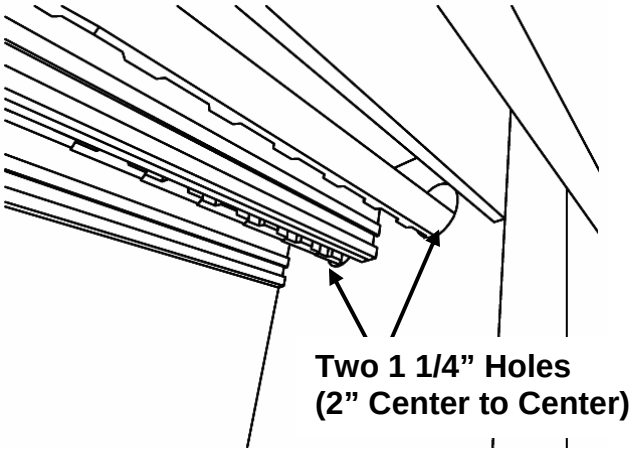



**Figure 21 – Drive Belt Path Holes for <u>Outside Door Pocket Installation of Idler Pulley for One Way Door</u>**

Idler Pulley Belt Path Clearance for Bi-part Door (One Head Track Channel for Belt Path) – For bi-part doors using a single head track channel for the belt path, it will be necessary to cut a “window” centered on the head track channel that is 1 1/2” wide by 1” high (See Figure 22). Cutting the “window” needs to be done **before** installing the idler pulley; however, to ensure proper location of the “window”, first read the rest of these instructions.

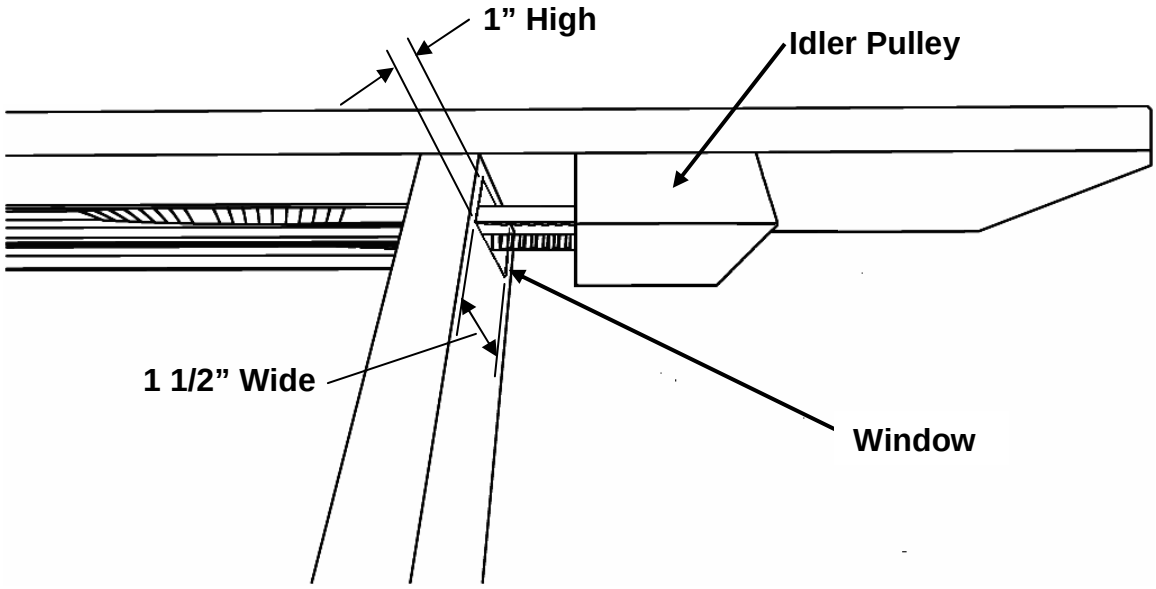



**Figure 22 – Drive Belt Path “Window” for Outside Door Pocket Installation of Idler Pulley for Bi-part Door**

**For proper drive belt operation, it is critical that the idler return pulley is aligned on the same plane as the head track channel and that it is level (See Figure 23).** Under typical conditions, flush mounting the idler return pulley to the header will achieve proper alignment; however, if the head track channel has been shimmed, the idler return pulley must be shimmed to match.

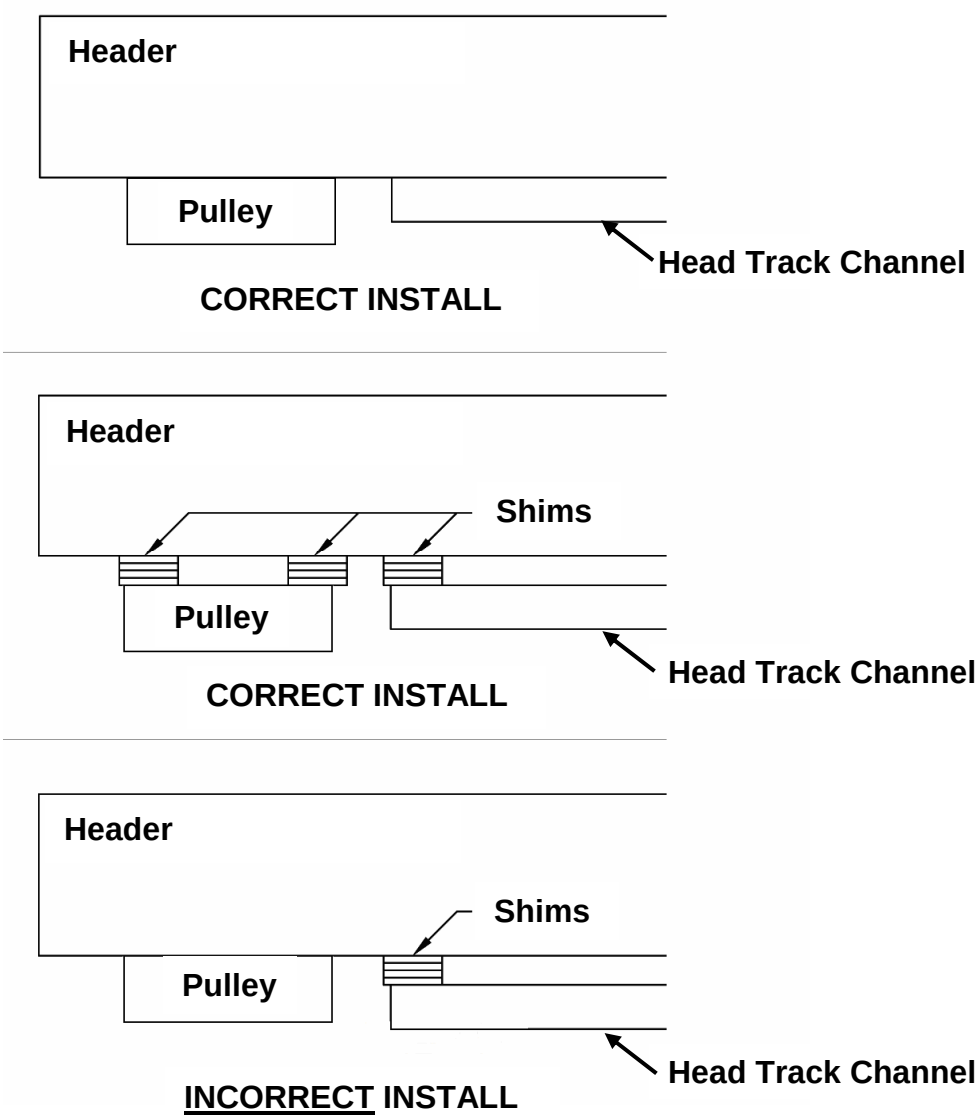



**Figure 23 –Standard Idler Return Pulley Shimming**

Inside Door Pocket Installation of Standard Idler Return Pulley - When installing the idler return pulley inside of the door pocket, a minimum of 5 inches of clearance must be allowed, within the wall system (See Figure 24).

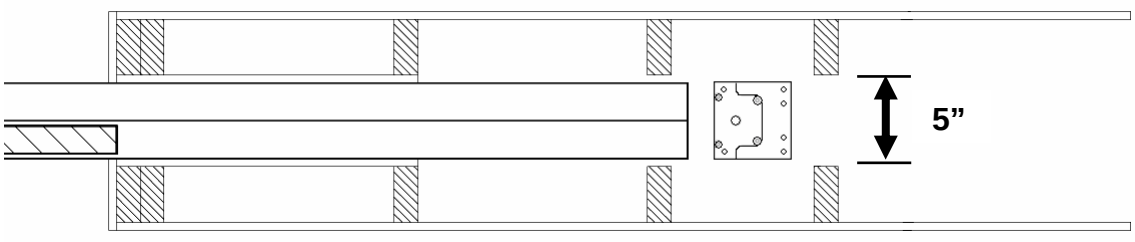



**Figure 24 –Top View of Clearance Needed for Standard Idler Return Pulley Installation Inside Door Pocket**

A minimum of 6 inches of clearance must be allowed from the end of the head track channel to the wall stud (See Figure 25). Attach the pulley to the header location using the supplied four (4) 3” - #12 wood screws. Once the idler return pulley is attached, check to make sure that it is centered, square, and level.

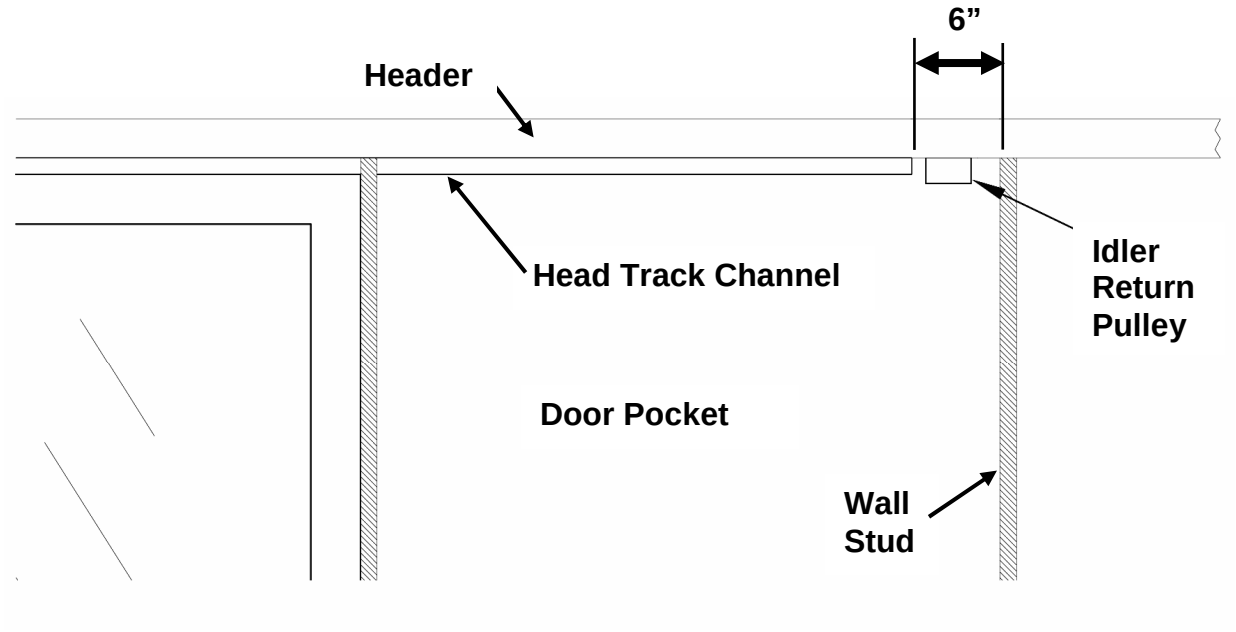



**Figure 25 –Side View of Clearance Needed for Standard Idler Return Pulley Installation Inside Door Pocket**

Outside Door Pocket Installation of Standard Idler Return Pulley- When installing the idler return pulley outside of the door pocket, a minimum of 5 inches of clearance must be allowed, within the wall system (See Figure 26).

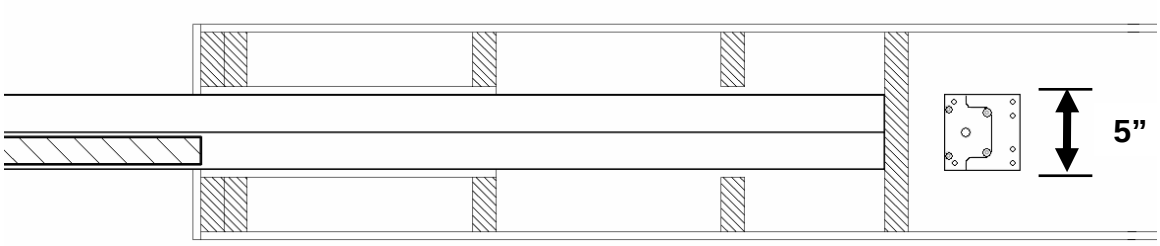



**Figure 26 –Top View of Clearance Needed for Standard Idler Return Pulley Installation Outside Door Pocket**

A minimum of 6 inches of clearance must be allowed from the wall stud (Figure 27). Attach the pulley to the header location using the supplied four (4) 3” - #12 wood screws. Once the idler return pulley is attached, check to make sure that it is centered, square, and level.

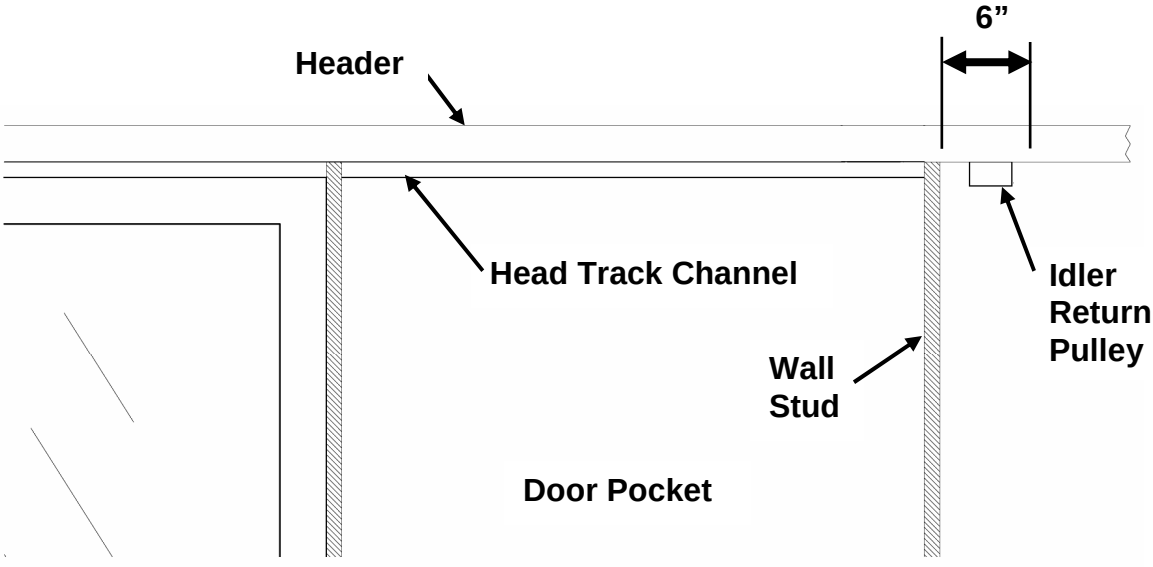



**Figure 27 –Side View of Clearance Needed for Standard Idler Return Pulley Installation Outside Door Pocket**

- Installation of In-line Idler Return Pulleys for 90° Door – When installing idler return pulleys for a 90° door, it will be necessary to install in-line idler return pulleys (See Figure 28).

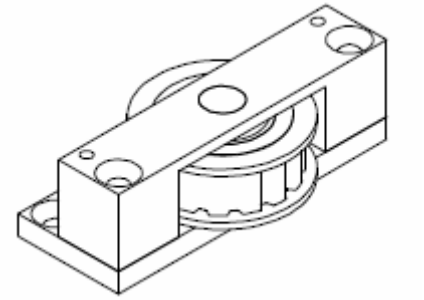


**Figure 28 – In-line Idler Return Pulley**

To install the in-line idler return pulleys, slots which are a minimum of 2 inches in length need to be cut into the head track channels (See Figure 29). The in-line idler return pulley should only protrude beyond the wall of the head track ¼". Attach each in-line pulley to the head track channel and header using the supplied two (2) 3" - #12 wood screws and two (2) 1"- #8 self-tapping screws.

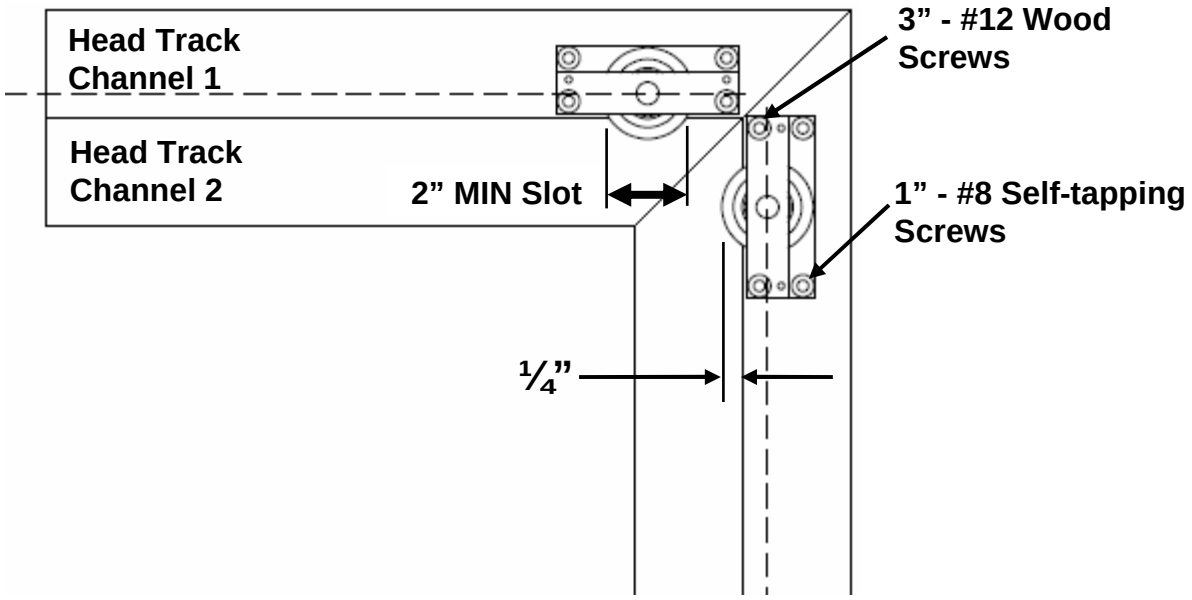



**Figure 29 –Bottom View of Clearance Needed for In-line Idler Return Pulley Installation on 90° Door**

- Routing of Drive Belt for One Way and 90° Doors – Starting at the trailing edge style of the lead door panel, route the drive belt through the head track channel, around the motor assembly pulley, through the other head track channel, around the idler return pulley and back to the trailing edge style of the lead door panel (See Figure 30).

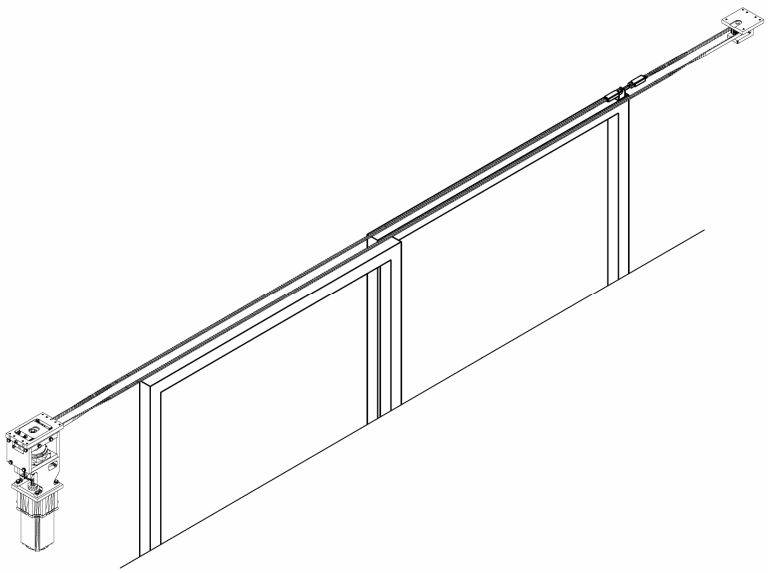


**Figure 30 – Drive Belt Routing for One Way and 90° Doors**

- Installation of Belt Clamp Assembly for One Way and 90° Doors - Figure 31 shows the standard belt clamp assembly. **To allow for maximum belt tensioning travel, slide the motor assembly on its mounting plate as far away from the belt tensioning nut as possible**. To ensure proper fit of the drive belt into the belt clamp assembly, cut the belt close to one of the teeth. Insert the drive belt **(teeth up)** through the left belt wing and install one 8 – 32 X 3/8" machine screw to hold the belt wing to the belt wing mount bracket. Take as much slack out of the belt as possible **without leaving the belt too short and also ensuring full engagement of the belt with the belt wing mounting bracket.** Cut the belt close to one of the teeth. Insert the drive belt **(teeth up)** through the right belt wing and install one 8 – 32 X 3/8" machine screw to hold belt wing to the belt wing mount bracket.

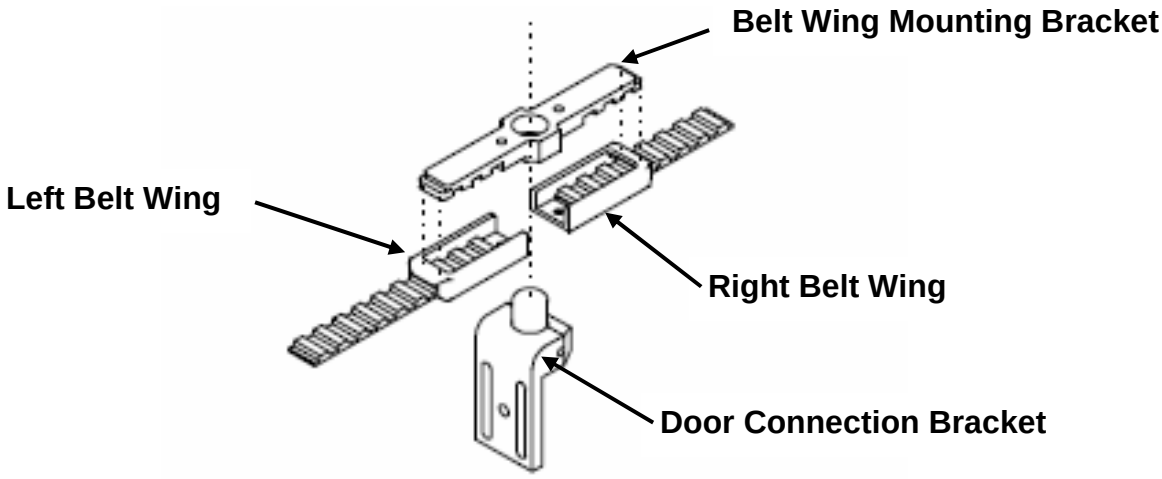



**Figure 31 – Standard Belt Clamp Assembly**

- Installation of Door Connection Bracket for One Way and 90° Doors – The door connection bracket (See Figure 32) is designed so that a door panel does not need to be removed from the track system to be installed.

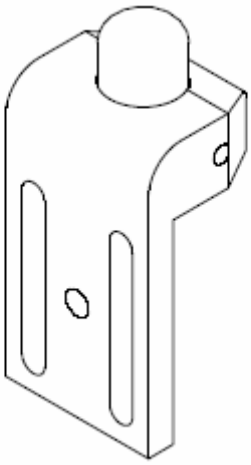


**Figure 32 – Door Connection Bracket**

The bracket is typically installed on the trailing edge, at the top, of the lead door panel (See Figure 33). Pull the belt clamp assembly and belt down to the top of the door. Align the door connection bracket with the belt clamp assembly. Recess the connection bracket about 1/8" from the top of the door. Attach the bracket with five (5) 8 – 24 x 1" machine screws.

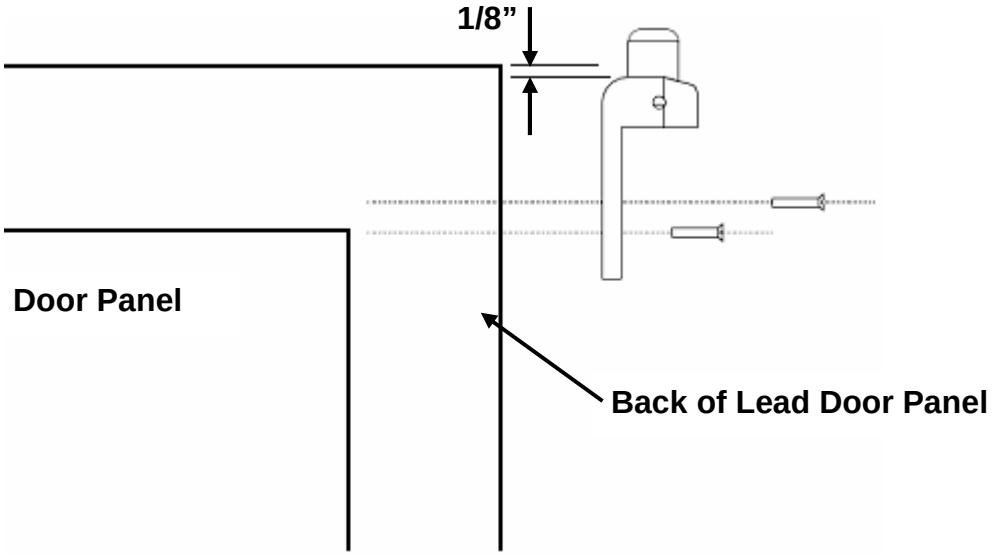



**Figure 33 – Installation of Door Connection Bracket**

- Tightening the Drive Belt - To allow for maximum belt tensioning travel, slide the motor assembly on its mounting plate as far away from the belt tensioning nut as possible. Tighten the drive belt using the 7/16" belt tensioning nut at the rear of the motor assembly (See Figure 34). The drive belt should be tightened until there is **no slack or no belt sag**. If the drive belt is too loose when operating the door, the belt will "flap" and make noise. To ensure proper belt tensioning and alignment, manually push the door fully open and then fully closed.

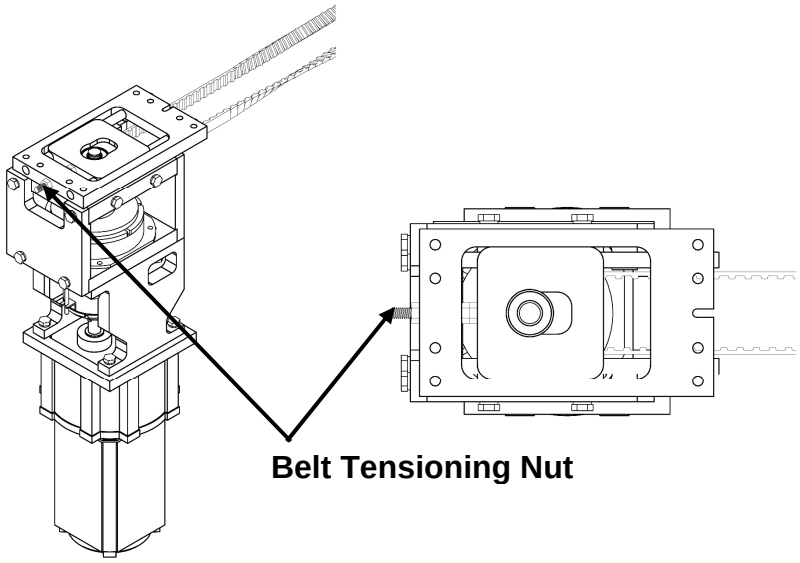



**Figure 34 – Tightening the Belt**

- Routing of Drive Belt for Bi-part Door (Single Head Track Channel) – Starting at the trailing edge style of the “motor side” lead door panel, route the drive belt through the lead door head track channel, around the motor assembly pulley, back through the lead door head track channel, around the idler return pulley, back through the lead door head track channel, and back to the trailing edge style of the “motor side” lead door panel (See Figure 35).

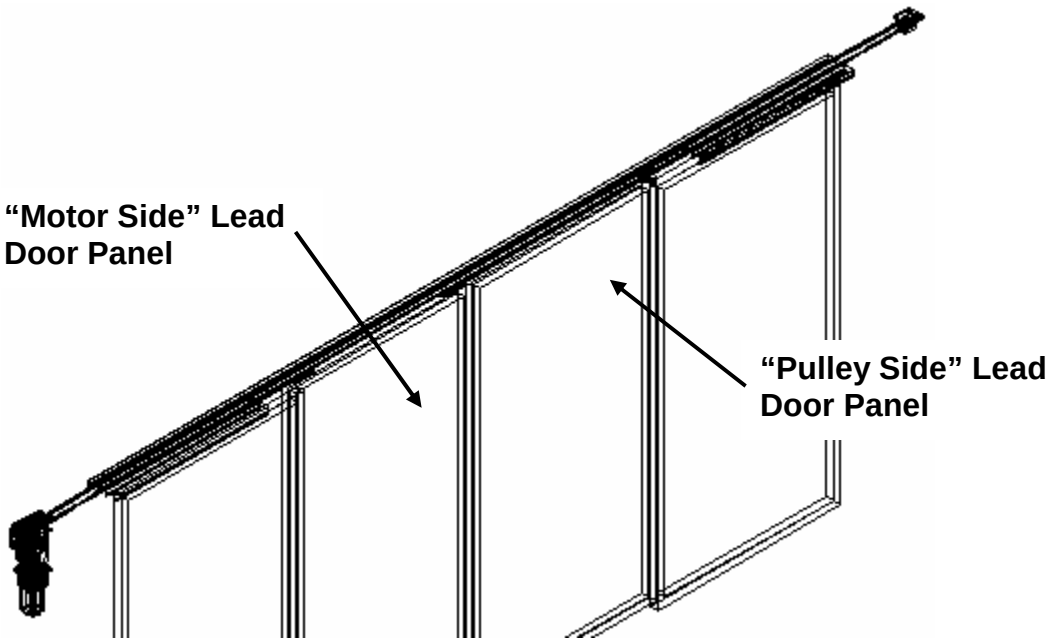



**Figure 35 – Drive Belt Routing for Bi-part Door**

- Installation of Belt Clamp Assemblies for Bi-part Door – A bi-part door requires the installation of both a standard belt clamp assembly and a bi-part belt clamp assembly.

  Install a standard belt clamp assembly and door connection bracket on the trailing edge of the “motor side” lead door panel as described above in the sections titled “Installation of Belt Clamp Assembly for One Way and 90° Doors” and “Installation of Belt Connection Bracket for One Way and 90° Doors.” Tighten the drive belt as described in the section titled “Tightening the Drive Belt.” Test the movement of the door and adjust accordingly.

Close the lead door panels and move them to the “dead center” of the door opening. Without installing the parts, insert the bi-part door connection bracket into the bi-part belt wing mounting bracket. Hold the bi-part belt wing mounting bracket and the bi-part door connection bracket in position as shown in Figure 36, on the top and trailing edge of the “pulley side” lead door panel.

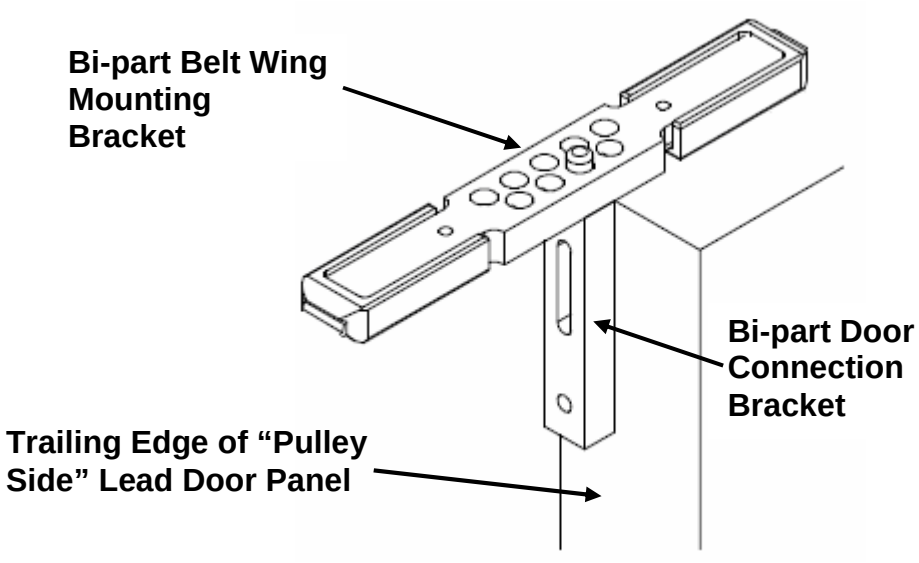



**Figure 36 – Position of Bi-part Belt Wing and Door Connection Bracket on Trailing Edge of “Pulley Side” Bi-part Door**

With the belt under tension **(teeth up)**, pull the belt down and mark the belt where it should be cut to fit into one side of the belt wing mounting bracket (Mark the belt with something visible such as masking tape or a white marker). Move the door aside and mark the portion of the belt that fits into other side of the belt wing mounting bracket.

Loosen the drive belt at the motor assembly by adjusting the belt tensioning nut. Cut out the section of the belt between the two marks. To ensure proper fit of the drive belt into the bi-part belt clamp assembly, cut the belt close to the teeth.

Insert the drive belt **(teeth up)** through the belt wings and install one 8 – 32 X 3/8" machine screw in each side to hold the belt wings to the belt wing mount bracket (See Figure 37).

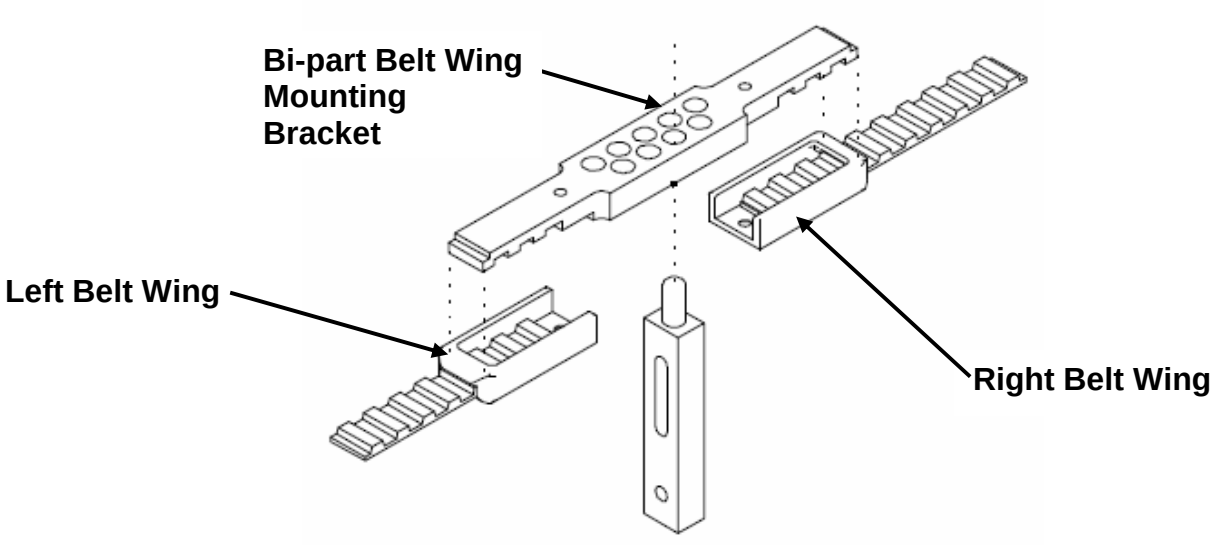



**Figure 37 – Bi-part Belt Clamp Assembly**

Re-tighten the drive belt as described in the section titled "Tightening the Drive Belt." Close the lead door panels and move them to the "dead center" of the door opening.

- Installation of "Pulley Side" Door Connection Bracket for Bi-part Door – The "pulley side" door connection bracket for a bi-part door (See Figure 38) is designed so that a door panel does not need to be removed from the track system to be installed.

**Figure 38 – Bi-part Door Connection Bracket**

With the belt under tension and the doors closed to the "dead center" of the door opening, pull the bi-part belt clamp assembly and belt down to the top of the door. Align the bi-part door connection bracket with the bi-part belt clamp assembly. Attach the bi-part bracket with three (3) 8 – 24 x 1" machine screws.

Re-tighten the drive belt as described in the section titled "Tightening the Drive Belt." Close the lead door panels and move them to the "dead center" of the door opening. If needed, adjust the position of the door connection bracket within the holes of the belt wing mounting bracket.

4.3.2. Installation of belt retention clips

If after proper belt installation and tightening the belt still rubs, sags, "flaps" or is slightly misaligned, it may be necessary to install belt retention clips. The retention clips also help keep the belt teeth in the up position.

**Important Note**: Do not place belt retention clips within the lead door head track channel. This will interfere with the belt clamp assembly during door travel. **Always be sure to keep drive belt teeth facing up.**

Belt retention clips help keep the drive belt aligned properly during door opening and closing (See Figure 39). Belt retention clips are optional for doors with a 12 foot opening or less. These clips keep the drive belt, with the **teeth facing up,** close to the top of the head track channels. Install belt retention clips using the 8 – 24 X 1" machine screws. Multiple clips can be added, throughout the door opening, as needed.

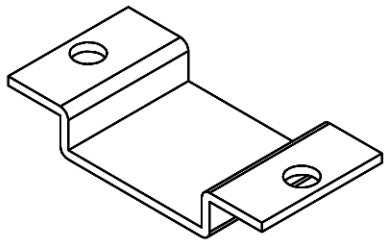
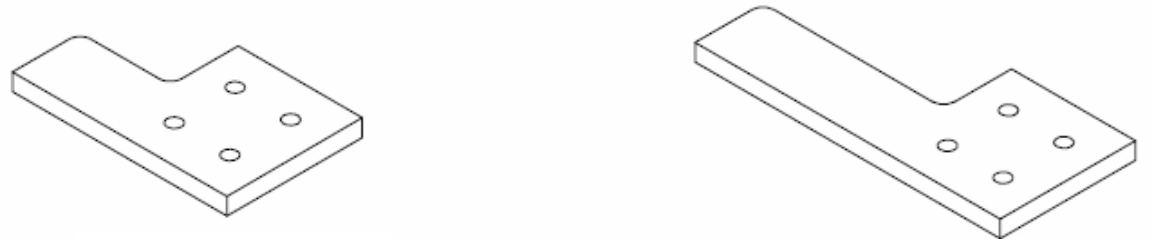


**Figure 39 – Belt Retention Clip**

- Installation of Door Collector Plates – When a multi-panel sliding door is **closing**, factory interlockers "collect" the next door panel. For doors that do not have **opening** interlockers, collector plates (See Figure 40) need to be installed at the top of each door (except the lead panel) (See Figure 41). Depending on the thickness of the door panels 1" or 2" collector plates are used. Install door collector plates using four (4) #8 x 1" self-tapping screws. Make sure the door collector plates are installed on the back side of the door panels.



**1" Collector Plate** **2" Collector Plate**

**Figure 40 – Door Collector Plates**

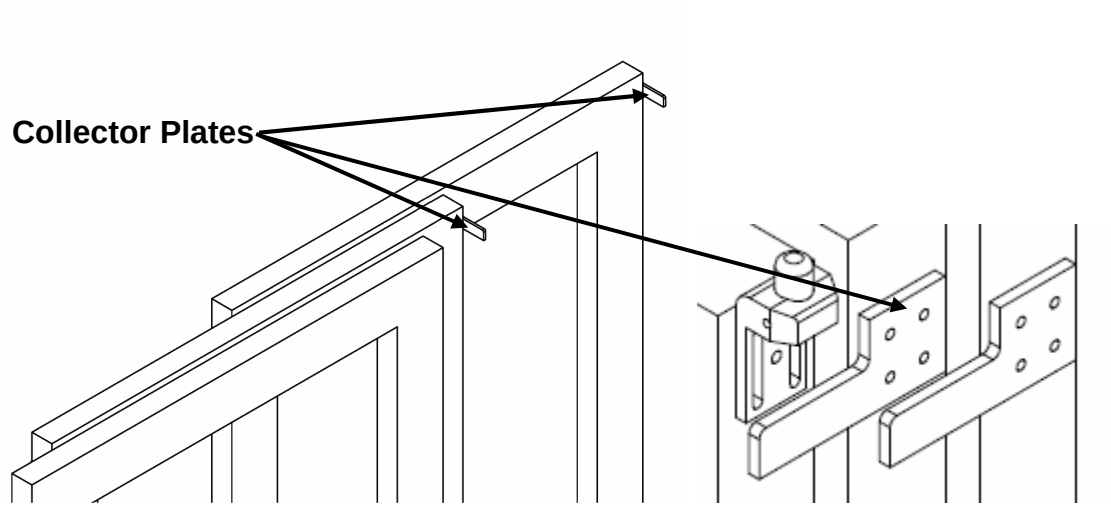



**Figure 41 – Location of Door Collector Plates**

4.3.3. Checking for rubs

Once all of the mechanical components have been installed and **before powering-up the system**, check for rubs and interferences by manually moving the door over the entire length of its travel.

4.3.4. Installing electrical components

Electrical components should be installed in a manner consistent will local electrical codes. **Section 4.1.4** of this Installation Manual shows typical locations of most electrical components.

- "Pre-wiring" – If a customer may want an automation system after construction is complete, but is undecided at the time of construction, Doors In Motion offers a pre-wiring kit. This kit contains all of the necessary wiring and components to facilitate an easy installation after construction is complete. A typical kit includes the following items:

For One Way and Bi-parting Doors

| | | |
|---|---|---|
| 1. | Standard idler return pulley | 1 |
| 2. | 3" - #12 wood screws | 4 |
| 3. | 18-4 motor wire | 75' |
| 4. | 28-8 flat wire | 300' |
| 5. | RJ45 connectors | 8 |
| 6. | Male terminal | 4 |
| 7. | Female terminal | 4 |
| 8. | Male motor connector | 1 |
| 9. | Female motor connector | 1 |
| 10. | Single gang switchbox | 1 |
| 11. | Drive belt | 10' |
| 12. | Zip tie | 6 |
| 13. | 14" x 14" access panel | 1 |
| 14. | Empty 12" x 14" automation panel | 1 |
| 15. | Empty 12" x 14" battery backup panel (optional) | 1 |

For 90° and Other Doors Requiring 2 Motor Assemblies

| | | |
|---|---|---|
| 16. | Replace item 1 above with two in-line pulleys | 2 |
| 17. | Double the quantity of items 1 through 13 above | 2x |
| 18. | Replace item 14 with empty 12" x 18" panel | 1 |

- Infrared Sensor and Controller Installation for One Way and Bi-part Doors – For doors that are one way or bi-part doors, infrared sensor(s) are installed. If needed, more than one set of sensors can be installed. When the door is closing and the infrared beam is interrupted, the door will come to a stop. This is a point-to-point safety beam with a transmitter and receiver mounted 12" from the floor, and should be no more than 38' from the transmitter to the receiver (See Figure 42). The sensor controller can be located anywhere within reach of the wires supplied with the transmitter and receiver; however, an ideal location is inside the motor assembly access panel. This location provides ready access in the event the sensor controller must be reset.

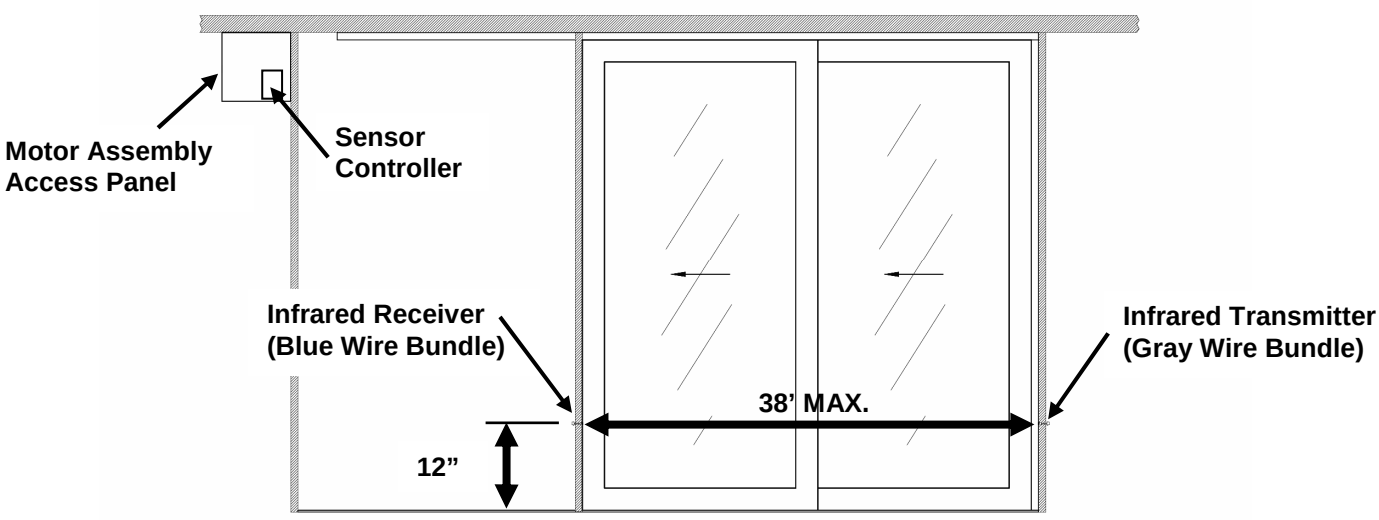



**Figure 42 – Location of Infrared Sensors and Controller**

Because the **blue wire bundle cannot be cut or spliced**, **install the infrared receiver (blue wire bundle) in the door jamb closest** to the automation panel. Install the infrared transmitter (gray wire bundle) at the other end of the opening. The gray wire can be extended or replaced with any common wire bundle with at least two wires. Figure 43 shows the receiver components and mounting hardware that may be used depending on the installation (transmitter components look similar but have a gray wire bundle). Using a 2 1/8" length of 5/8" PVC pipe in the wall helps to keep the sensors protected and aligned.

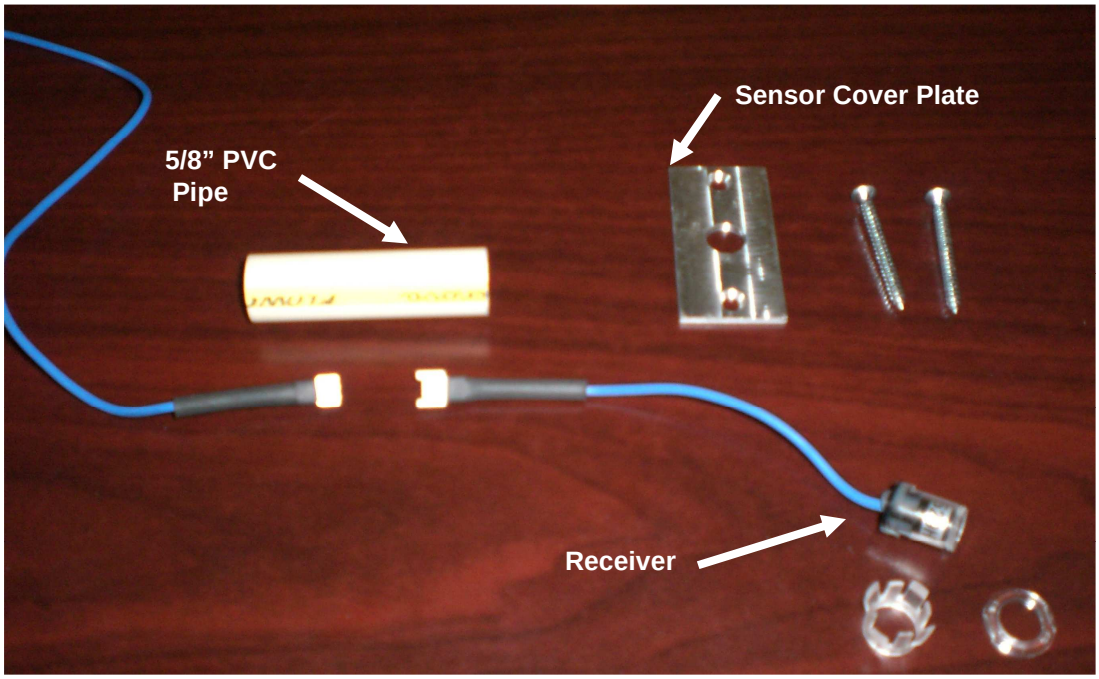



**Figure 43 –Infrared Sensors and Controller**

The wires for both transmitter and receiver sensors are plugged into the infrared sensor controller (See Figure 44).

When terminating the receiver wires (blue wire bundle) at the sensor controller, the white shielded wire is inserted into the blue port number 6 and the unshielded wire is inserted into the yellow port number 7. If two sensor sets are used, the additional receiver wires are plugged into ports 8 and 9.

When terminating the transmitter wires (gray wire bundle) at the sensor controller, the white shielded wire is inserted into the gray port number 10 and the unshielded wire is inserted into the yellow port number 11. If two sensor sets are used, the additional transmitter wires are plugged into ports 12 and 13.

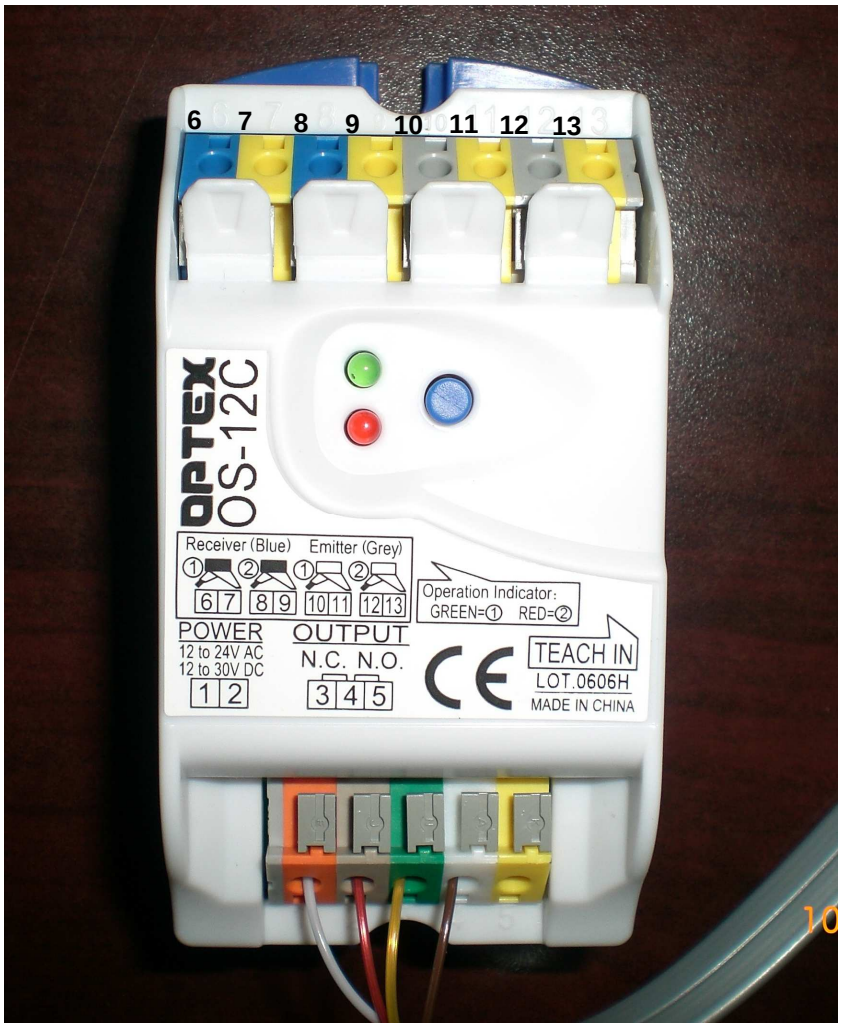



**Figure 44 – Infrared Sensor Controller**

- Electrical Connections When Using Infrared Sensor – Figure 45 shows the electrical connections for a system which uses an infrared sensor.

  A. Automation panel
  B. Motor
  C. Clutch, brake and encoder
  D. Multi-button wall switch
  E1. Infrared sensor receiver
  E2. Infrared sensor transmitter
  F. Infrared sensor controller
  G. 110V, 60Hz, 15A, dedicated, **non-GFI** circuit

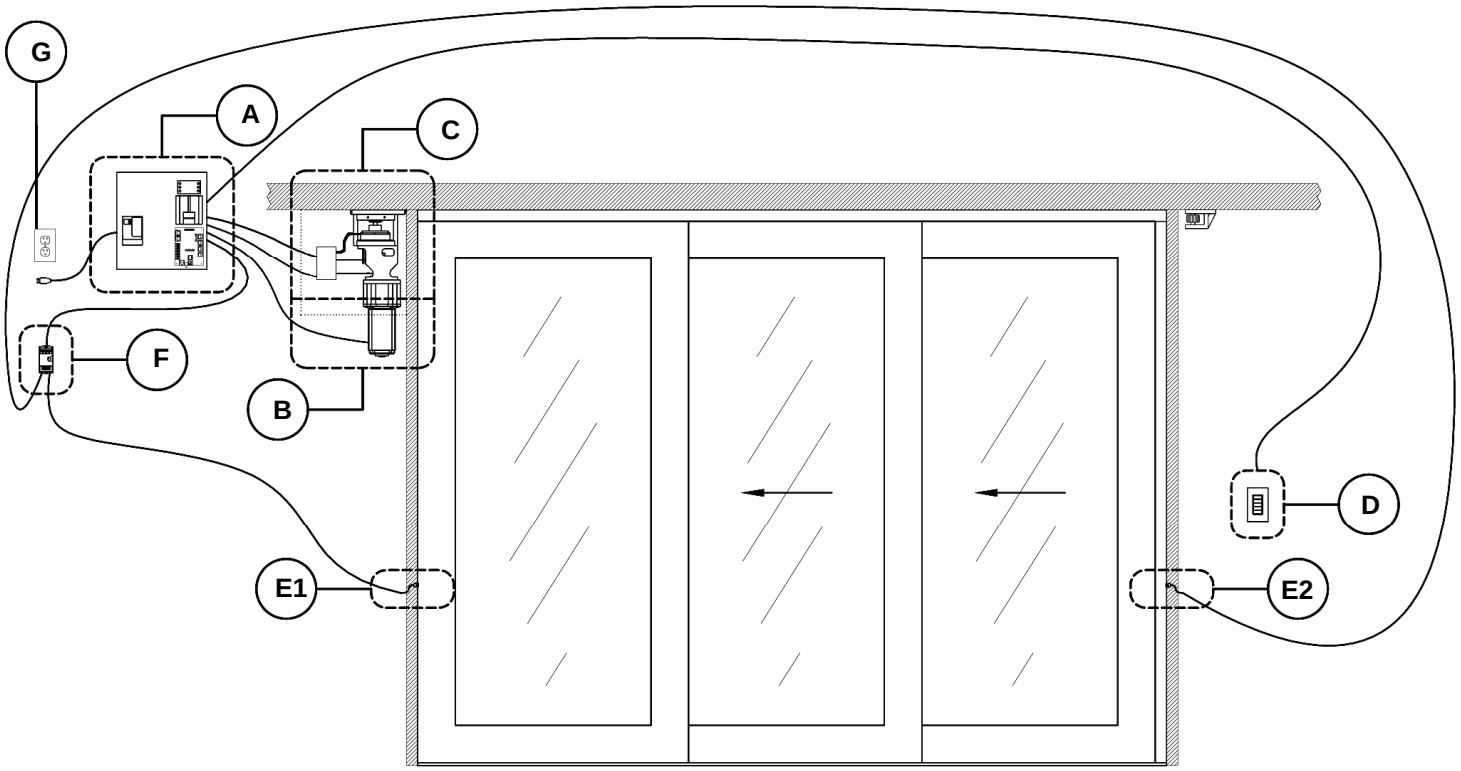



**Figure 45 – Electrical Connections for One Way or Bi-part Doors**

**Important Note**: Before running any wires, to avoid confusion, it is strongly advised that all wires are labeled with a black Sharpie™ marker. For ease of installation and to avoid damaging connectors, wires should be run first and then the connectors should be applied.
.

Circuit A – Automation Panel to Power Supply – When ready to power-up the system, connect the automaton panel to "G" which is a 110V, 60Hz, 15A, dedicated, **non-GFI** circuit. "G" should be within 6 feet of the automaton panel. A "pigtail" is supplied inside the automation panel.

Circuit B – Motor to Yaskawa™ Motor Drive in Automation Panel – Use the 18-4 wire harness provided, or use 4 conductor 18 gage wire and automotive connectors, to run from the motor to the Yaskawa™ motor drive in the automation panel. There are two automotive type connectors in the automation panel. It is acceptable to connect to either one. The purpose for the two connectors will be explained later in this manual.

Circuit C – Motor Breakout Board to Automation Panel Main Circuit Board – There are two 28-8 flat wire cables, with male RJ45 connectors. These cables run from the motor breakout board, on the side of the motor assembly, to the automation panel main circuit board.

The first cable runs from the female connector on the motor breakout board labeled "ENCODER" to the female connector on the automation panel main circuit board labeled "ENCODER 1".

The second cable runs from the female connector on the motor breakout board labeled "CLTH / BRK" to the female connector on the automation panel main circuit board labeled "CTCH / BRK 1".

Circuit D – Multi-button Switch to Automation Panel Circuit Board - There is one 28-8 flat wire cable, with male RJ45 connectors, that runs from the multi-button wall switch to the female connector on the automation panel main circuit board labeled "WALL SW".

Circuit E1 – Infrared Receiver to Infrared Controller - Use blue wire bundle to run from infrared receiver to infrared controller. To terminate the receiver wires at the sensor controller, the white shielded wire is inserted into the blue port number 6 and the unshielded wire is inserted into the yellow port number 7. If two sensor sets are used, the additional receiver wires are plugged into ports 8 and 9.

Circuit E2 – Infrared Transmitter to Infrared Controller - Use gray wire bundle to run from infrared transmitter to infrared controller. To terminate the transmitter wires at the sensor controller, the white shielded wire is inserted into the gray port number 10 and the unshielded wire is inserted into the yellow port number 11. If two sensor sets are used, the additional transmitter wires are plugged into ports 12 and 13.

Circuit F – Infrared Controller to Automation Panel Circuit Board - There is one 28-8 flat wire cable, with male RJ45 connectors, that runs from the infrared controller to the female connector on the automation panel main circuit board labeled “MOTION”.

- Overhead Motion Detector Installation for 90° Doors – For 90° doors, an overhead motion detector is installed (See Figure 46).

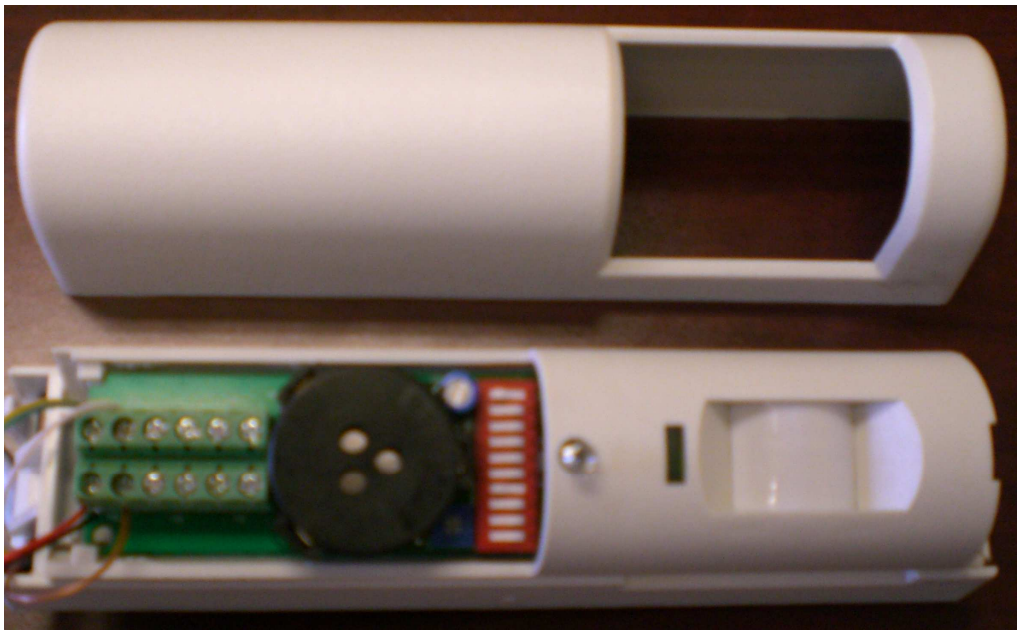


**Figure 46 – Overhead Motion Detector with Cover Removed**

When terminating the wires at the overhead motion detector, connect them as shown in Figure 47.

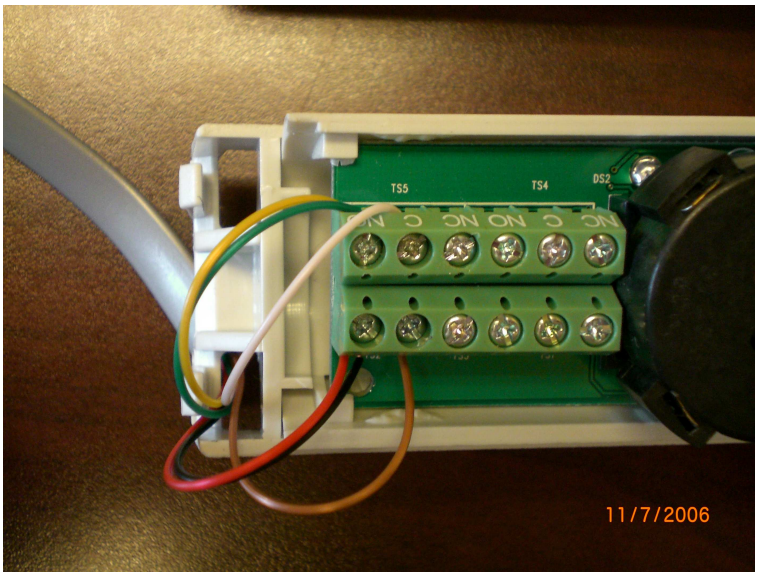



**Figure 47 – Overhead Motion Detector Connections**

The overhead motion detector is located above where the two doors meet and should be installed no more than 14’ above the floor (See Figure 48). When the door is closing and the motion detector senses motion, the door will come to a stop.

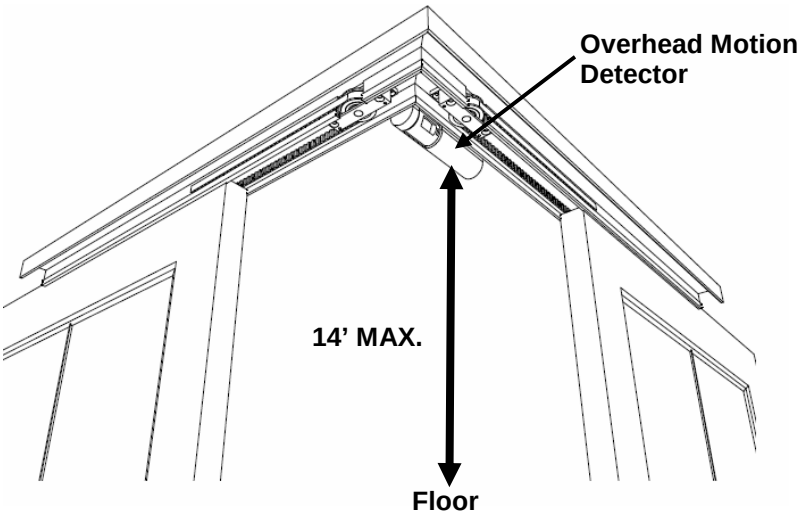



**Figure 48 – Overhead Motion Detector Location**

- Electrical Connections When Using Overhead Motion Detector – Figure 49 shows the electrical connections schematic for a system which uses an overhead motion detector for a 90° do or (only one door shown).

  A. Automation panel
  B. Motor
  C. Clutch, brake and encoder
  D. Multi-button wall switch
  E. Motion detector
  F. 110V, 60Hz, 15A, dedicated, **non-GFI** circuit

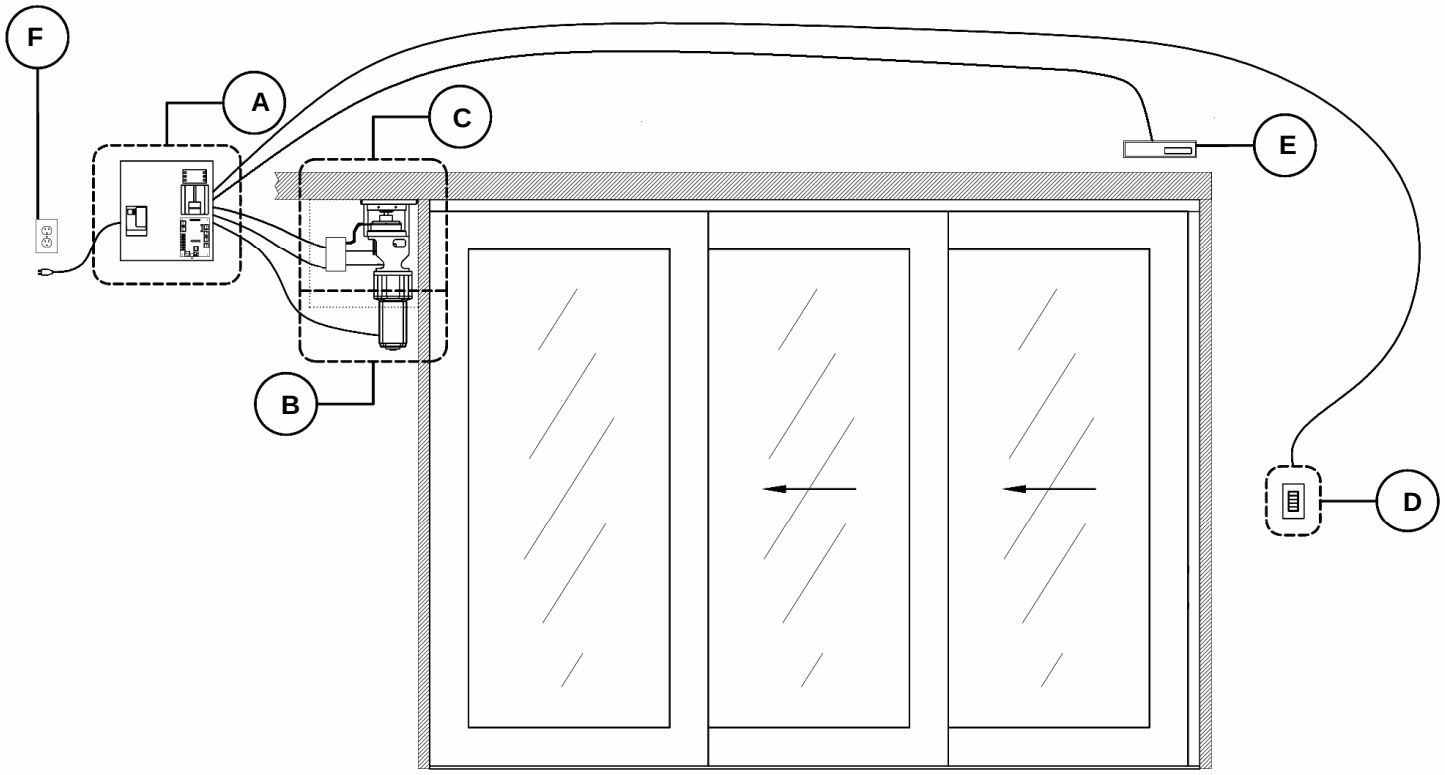



**Figure 49 – Electrical Connections for 90° Door**

**Important Note**: Before running any wires, to avoid confusion, it is strongly advised that all wires are labeled with a black Sharpie™ marker. For ease of installation and to avoid damaging connectors, wires should be run first and then the connectors should be applied.

Circuit A – Automation Panel to 110V Circuit – When ready to power-up the system, connect the automaton panel to "F" which is a 110V, 60Hz, 15A, dedicated, **non-GFI** circuit. "F" should be

within 6 feet of the automaton panel. A “pigtail” is supplied inside the automation panel.

Circuit B – Motor to Yaskawa™ Motor Drive in Automation Panel – Use the 18-4 wire harness provided, or use 4 conductor 18 gage wire and automotive connectors, to run from the motor to the Yaskawa™ motor drive in the automation panel. There are two automotive type connectors in the automation panel. It is acceptable to connect to either one. The purpose for the two connectors will be explained later in this manual.

Circuit C – Motor Breakout Board to Automation Panel Main Circuit Board – There are two 28-8 flat wire cables, with male RJ45 connectors. These cables run from the motor breakout board, on the side of the motor assembly, to the automation panel main circuit board.

The first cable runs from the female connector on the motor breakout board labeled “ENCODER” to the female connector on the automation panel main circuit board labeled “ENCODER 1”.

The second cable runs from the female connector on the motor breakout board labeled “CLTH / BRK” to the female connector on the automation panel main circuit board labeled “CTCH / BRK 1”.

Circuit D – Multi-button Switch to Automation Panel Circuit Board - There is one 28-8 flat wire cable, with male RJ45 connectors, that runs from the multi-button wall switch to the female connector on the automation panel main circuit board labeled “WALL SW”.

Circuit E – Motion Detector to Automation Panel Circuit Board – The motion detector comes with a 28-8 flat wire “pigtail”, with male RJ45 connector. A female/female RJ45 coupler is used as a junction between the motion detector and a 28-8 flat wire cable, with male RJ45 connectors. The 28-8 flat wire cable runs from the RJ45 coupler to the female connector on the automation panel main circuit board labeled “MOTION”.

- Battery Backup Panel Installation (optional) – The battery backup panel is an optional item which ensures that the door stays locked for up to 24 hours, during a power outage. It requires a normal 110V, 60Hz outlet (pigtail supplied inside battery backup panel), and should be installed near the automation panel (Figure 50). Due to the weight of the battery backup panel (50 lbs), consideration should be given on how to mount it to the wall system.

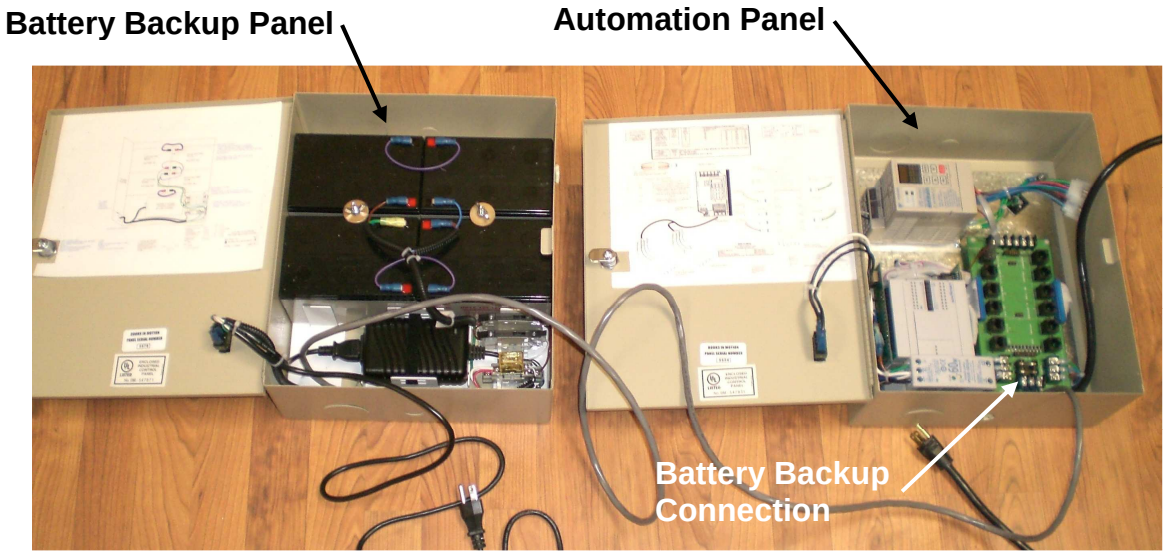



**Figure 50 –Battery Panel and Automation Panel**

The battery backup panel is connected to the automation panel as shown in Figure 51. Wiring from the battery backup panel to the automation panel is provided.

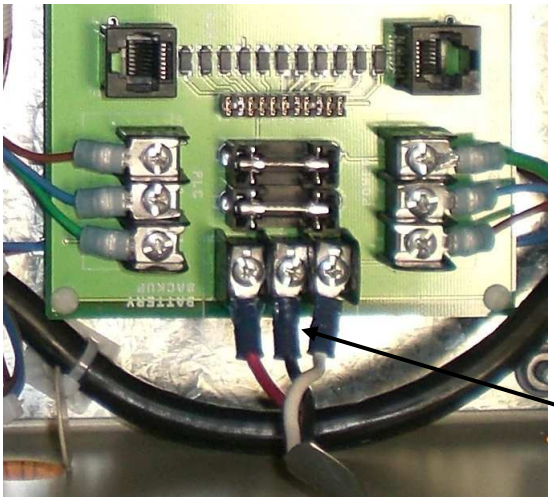



**Figure 51 –Connection of Battery Backup Wires to Automaton Panel**

- Secure Keypad Installation (optional) – The secure keypad uses a digital encryption scheme to prevent unauthorized users from operating the door system without a password. It consists of two modules, the receiver module and the keypad module. The receiver module (See Figure 52) must be in a secure location.

  The receiver module has 3 connection points. First is the "SECURE" connection which is connected to the keypad. The remaining two usable connections are for connection to the door system. These two connections are interchangeable and are labeled "WALL SW / KEYPAD". Only one of the "WALL SW / KEYPAD" connections must be used. The other "WALL SW / KEYPAD" connector may then be used as a pass thru connector so an additional module may be daisy chained together if desired.

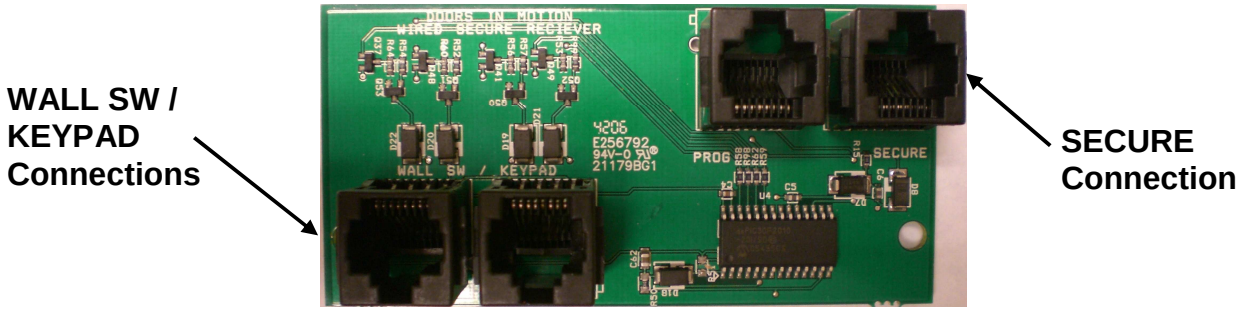



**Figure 52 – Receiver Module**

The keypad module (See Figure 53) can be placed in an unsecured location. Only one connection on the keypad module labeled "SECURE" is used. This connection provides power and secure communication between the keypad module and the receiver module.

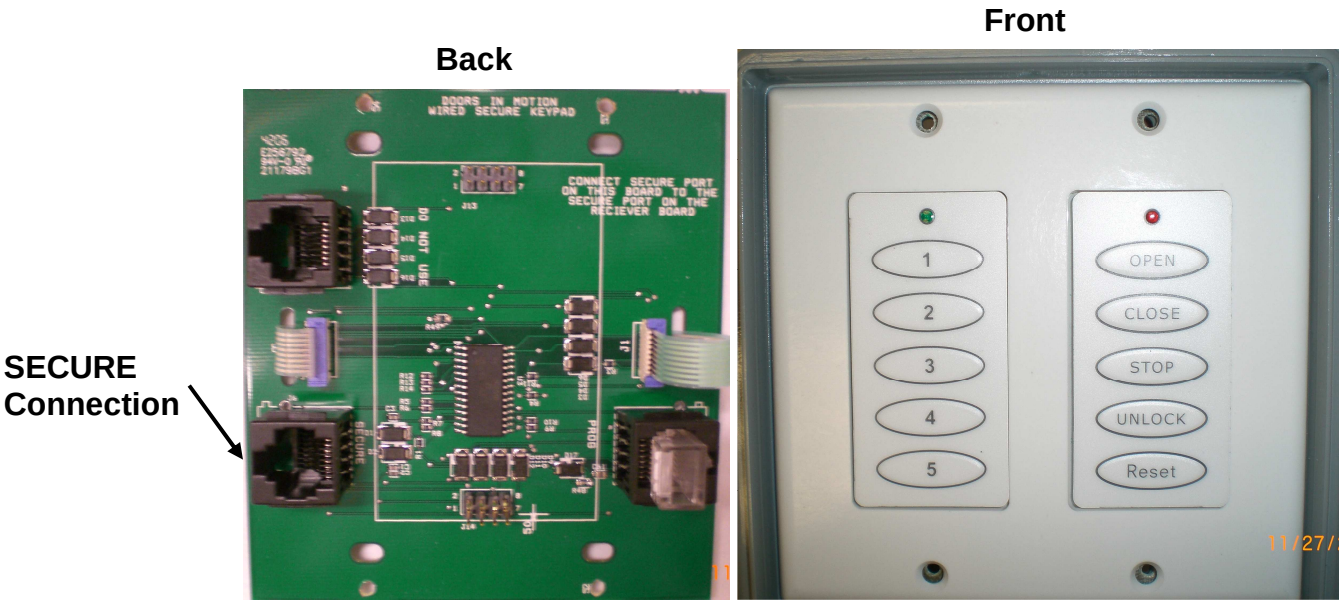



**Figure 53 – Secure Keypad Module**

Figure 54 is a schematic for the connection of the secure keypad.

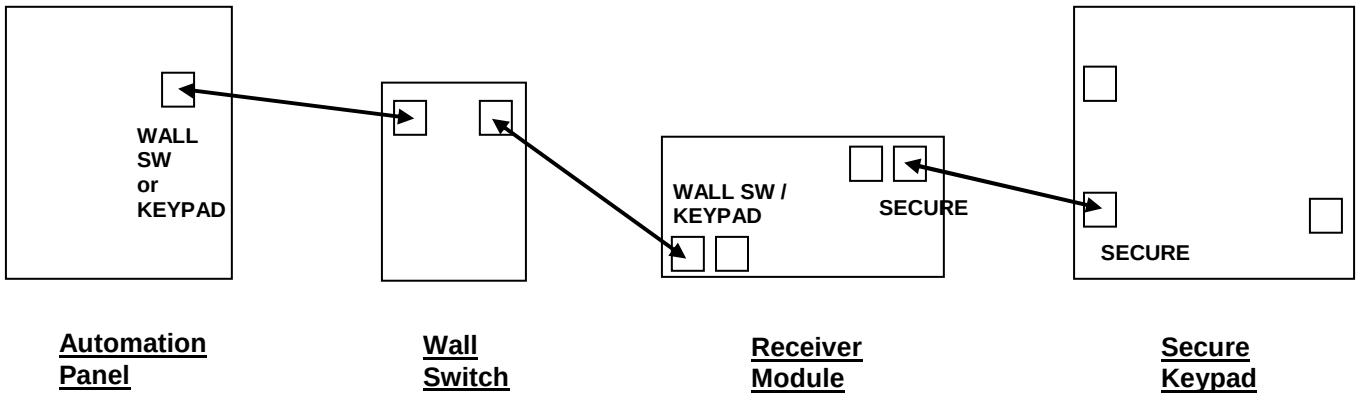



**Figure 54 – Secure Keypad Connection Schematic**

Setup and Test of the Secure Keypad – To setup and test the secure keypad, connect to a functional door system as described above. Enter the FACTORY password of 1234. The green light on password keypad (See Figure 55) will start slowly blinking. This indicates that secure mode is active and the right hand user keypad is now active. Press the button on the right corresponding with the task you wish to accomplish. There is a 60 second time-out period from the time the password is correctly entered. If the green light blinks quickly, this indicates an incorrect password or the use of a user button in non-secure mode. Non-secure mode has no functionality other than the ability to enter a password.

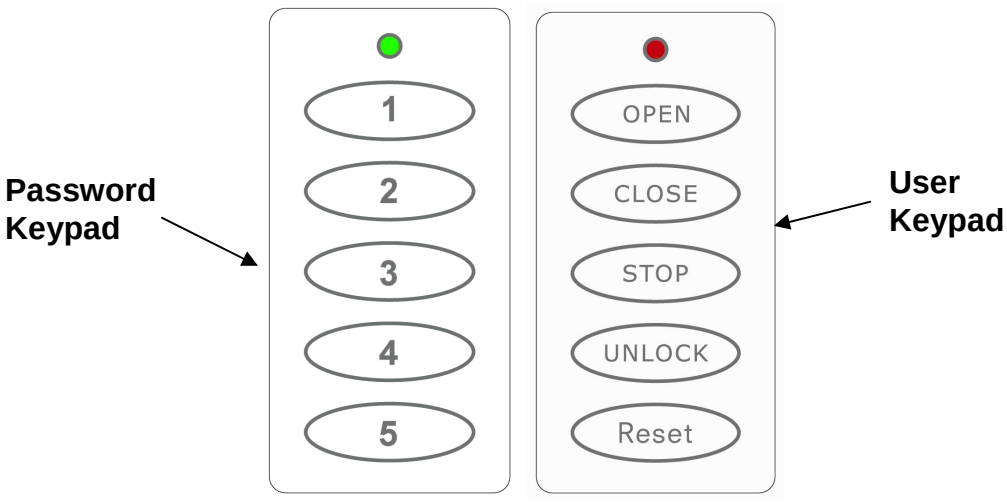



**Figure 55 – Secure Keypad**

To change the password, the user is required to press several buttons simultaneously. Begin by pressing and holding the reset button, then the unlock button; while holding these two buttons, press the number 5 button, and then release all three buttons at once. Once this is completed, the green light will blink slowly, enter the old password. The green light will turn on steady. Then enter the new password. The green light will blink 3-5 times then go out. The new password is accepted. Remember and enter the new password here:_____.

**INDICATORS**:
Red Light Blinks – button on the user keypad was pressed
Green Light Blinks Once – button on the password keypad was pressed
**Green Light On (not blinking) – No password set; must set immediately to avoid accidentally locking up keypad!**

Green Light Slow Blink – Password entered and in secure mode; user keypad now active
Green Light Fast Blink – Wrong password or user keypad pressed in non-secure mode

**TROUBLESHOOTING**:

| | |
|---|---|
| • Keypad does not work | Do any lights blink?<br><br>Yes, does the green light display any of the indicators above? Wrong password?<br><br>No, lights do not work….<br>• Check wiring connected to back of keypad<br>• Check connections in panel<br>• Does door work from a normal keypad or home automation system?<br>• Is power out?<br>• Contact the factory |
| • Forgot password<br>• Accidentally keyed in a password which is now unknown | • Is password written in this manual?<br>• Unit must be unplugged and returned to factory to be reset; factory will only need the Keypad portion of the system |
| • All other problems | • Contact Doors In Motion Representative |

- Wire Types - Two types of wire are needed for installation of the Doors In Motion Automation System. The connection from the automation panel to the motor uses 18-4 wire terminated with automotive type connectors (See Figure 56).

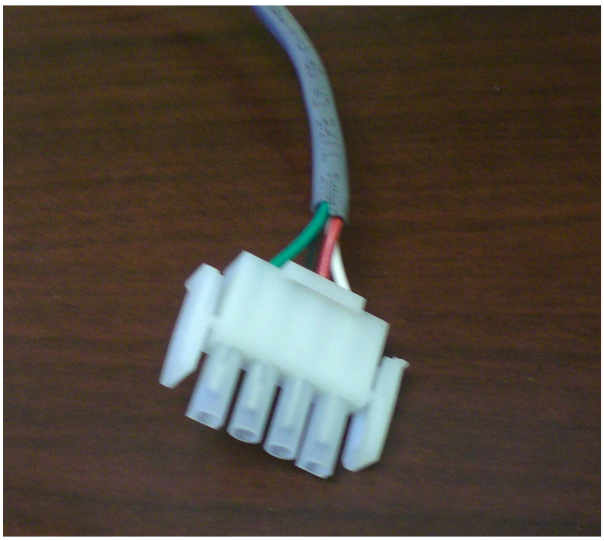


**Figure 56 – 18-4 Wire with Automotive Type Connector**

All other connections, except the infrared sensors, use 28-8 flat wire terminated with male RJ45 connectors (See Figure 57).

**Figure 57 – 28-8 Flat Wire with RJ45 Connector**

4.3.5. Applying Automotive Type Connectors – When applying the automotive type connectors, first make sure that the wires are properly identified. Strip-off about 1 1/2” of the outer jacket of the 18-4 wire and strip-off about 1/4” of jacket off each conductor (See Figure 58).

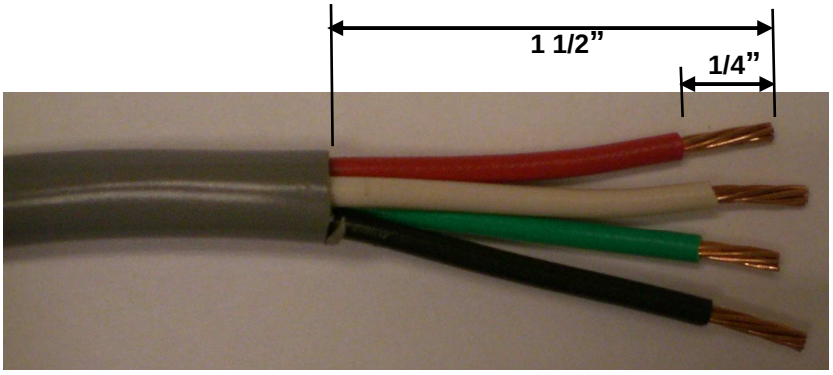



**Figure 58 – Stripped 18-4 Wire**

Use a high quality conductor crimper (Figure 59) to crimp the male and female pins (Figure 60), onto the 18-4 wires.

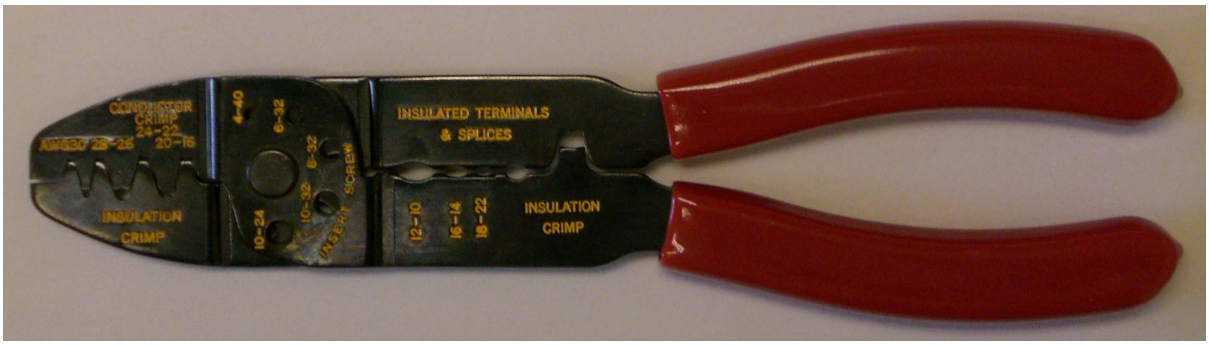



**Figure 59 – Conductor Crimper**

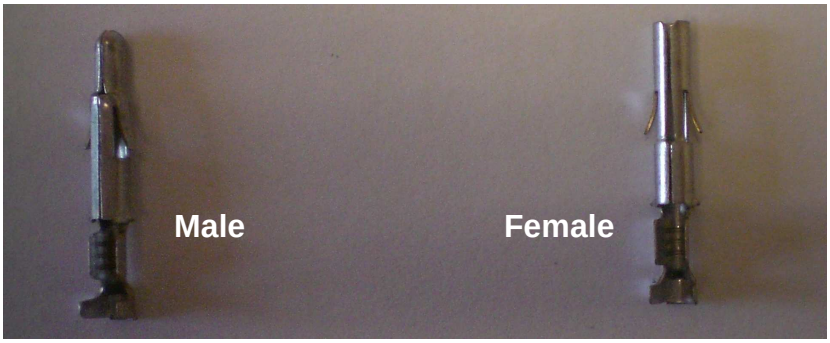



**Figure 60 – Male and Female Pins for Automotive Type Connectors**

Crimp the pins onto both the jacket and the bare wire (Figure 61). The crimper has jaws for both types of crimps.


**Figure 61 – Crimping Pins onto 18-4 Wires (Female Shown)**

Insert pins into connectors (Figure 62). Female pins are inserted into male connectors until they snap. Male pins are inserted into female connectors until they snap.

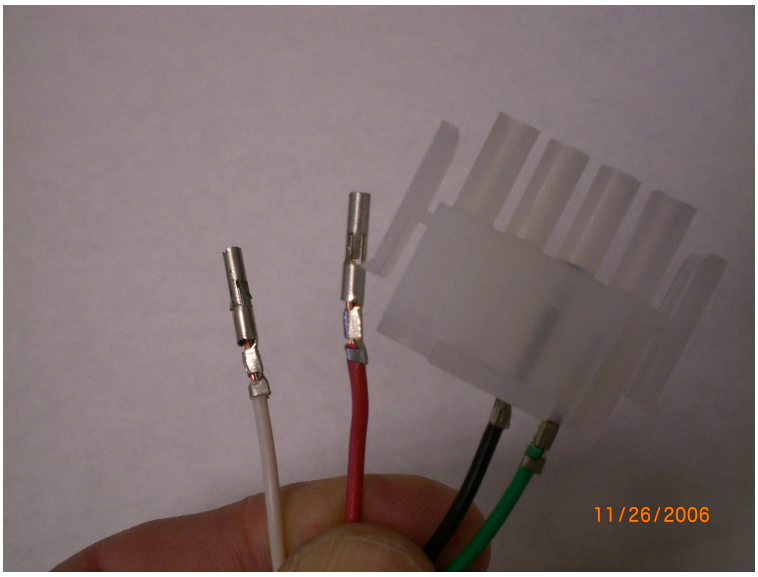



**Figure 62 – Example of Female Pins Being Inserted Into Male Automotive Connector**

4.3.6. Applying RJ45 Connectors – When applying RJ45 connectors, first make sure that all wires are properly identified. Use a high quality 28-8 data/phone cable stripper (See Figure 63) to create a clean and even end on the 28-8 flat wire cable.

**Figure 63 – Data/Phone Cable Stripper**

Then strip off about ½" of the outside jacket **(only the outside jacket will be stripped)**. The 8 individual wires should have their relative shields intact (See Figure 64).


**Figure 64 – Stripped Cable**

While holding the cable, identify the outermost colors of the 8 wires. Choose the left extreme wire to be the #1 wire (See Figure 65).

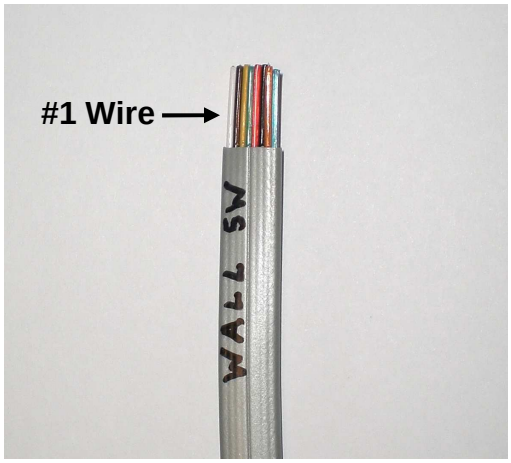



**Figure 65 – Identifying the #1 Wire**

Crimp the male RJ45 connector in the following sequence:

1. Position wire inlet hole facing you with the retention tab facing down (See Figure 66). The left side of connector is designated position #1.

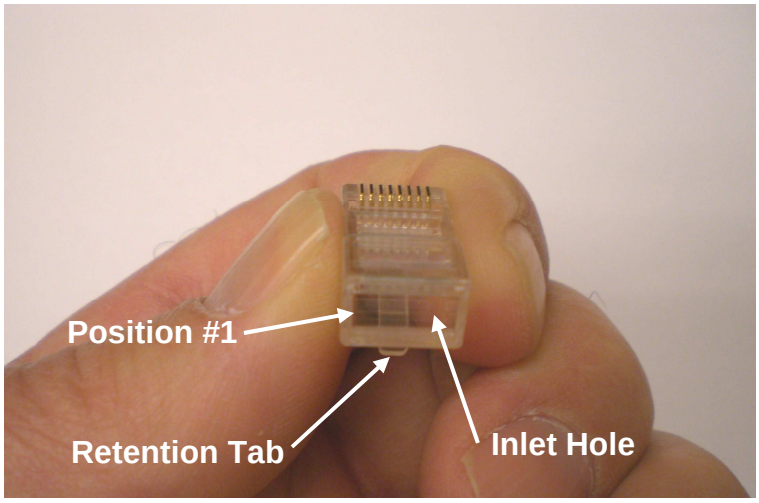



**Figure 66 – Positioning RJ45 Connector for 28-8 Cable Insertion**

2. Insert the stripped cable into the connector so that the #1 wire lines up with the connector position #1 (See Figure 67). Make sure to push the cable all of the way into the connector.

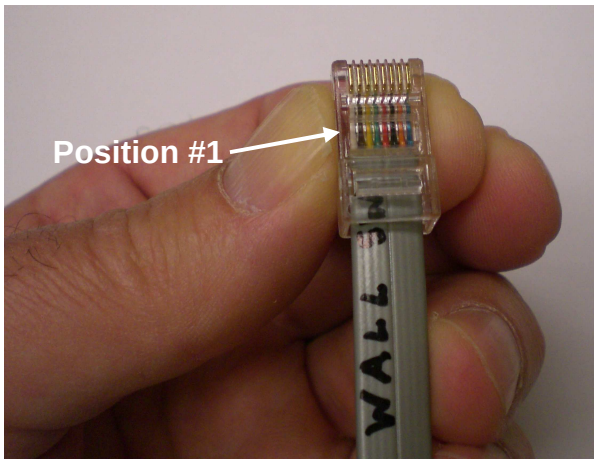



**Figure 67 – RJ45 Connector with 28-8 Cable Inserted**

3. Insert the wire/connector assembly into the correct crimper opening (Figure 68) and crimp to form a permanent wire/connector assembly.

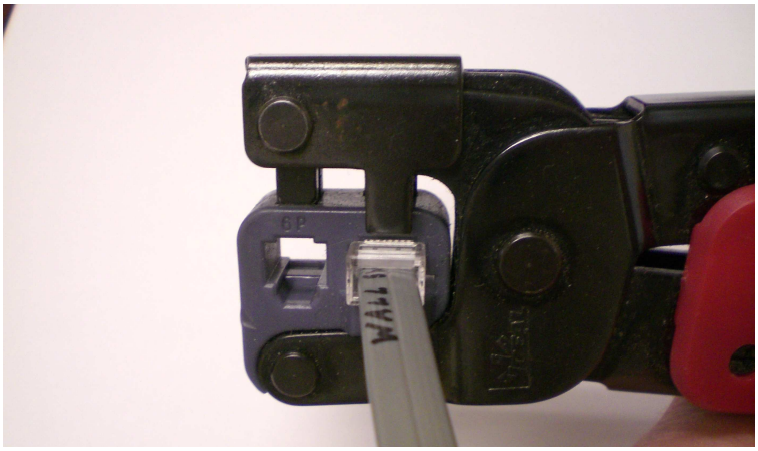


**Figure 68 – Crimping RJ45 Connector to 28-8 Cable**

4. Repeat this process for all wires making sure that the **<u>#1 wire/connector position is the same for all wires</u>**.

4.3.7. Connecting The System – After wiring is complete and connectors have been applied, connect the system components as described in the Wiring **Section 4.3.4** of this manual, **except do not connect to the 110V, 60Hz, 15A, dedicated, non-GFI circuit.**

4.3.8. Programmable Logic Controller (PLC)
The Doors In Motion Automation System is equipped with an Idec™ Programmable Logic Controller (PLC) (See Figure 69).

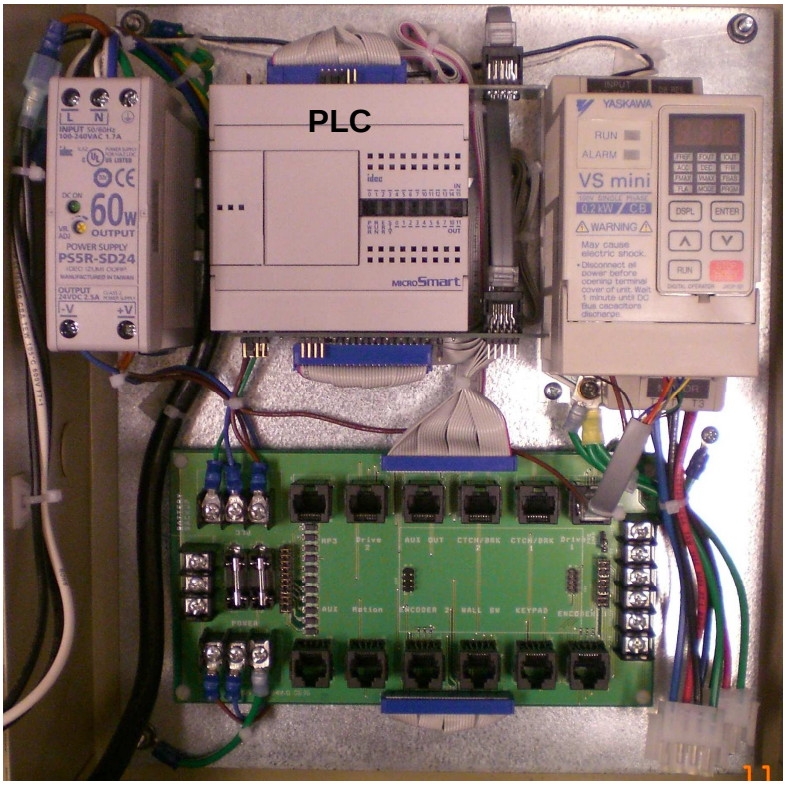



**Figure 69 – Programmable Logic Controller (PLC)**

The PLC functions like a small computer that can be programmed to perform certain functions using a specialized instruction set. The PLC has the capability of 14 inputs and 8 outputs. In general, the software in the PLC can only be modified when connected to a personal computer; however, some program parameters can be changed using the LCD display.

Each system does not come with an LCD display. The LCD display is only intended for use by a certified installer. Figure 70 shows the PLC with the LCD installed.

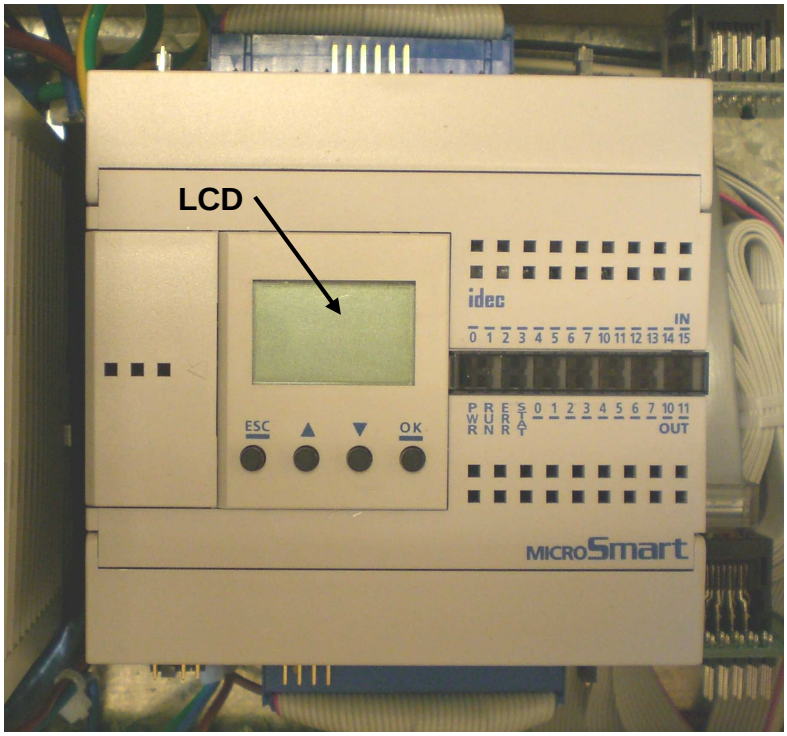



**Figure 70 – Programmable Logic Controller (PLC) with LCD Installed**

The PLC is primarily used to control the function of the door. It accepts input signals from several peripheral sensors and devices and generates output signals to control the door. Buy monitoring inputs, the PLC gathers sufficient information to precisely control the opening, closing, regular stopping, emergency stopping, and unlocking of the door.

The devices that send signals (inputs) to the PLC are:

1. Yaskawa™ Variable Frequency Drive (VFD) for current and torque limits
2. Infrared sensor or overhead motion detector for safety
3. Encoder for door position
4. Multi-button wall switch for door control and programming functions
5. 24V power supply for powering the PLC and special program functions

The devices that receive signals (outputs) from the PLC are:

1. Yaskawa™ Variable Frequency Drive (VFD) for motor movement during opening and closing, acceleration, normal operation, deceleration, stopping, and response to torque and current limits.
2. Clutch to engage the motor shaft to the drive mechanism shaft.
3. Brake to lock the door after the door is fully closed.
4. Other ancillary devices; depending on purchased options.

The PLC has two rows of green LED lights that are used to monitor the individual inputs and outputs (See Figure 71). LEDs located on the side marked “IN” are for inputs. LEDs on the side marked “OUT” are for outputs. Each LED has a number that corresponds to a specific input or output.

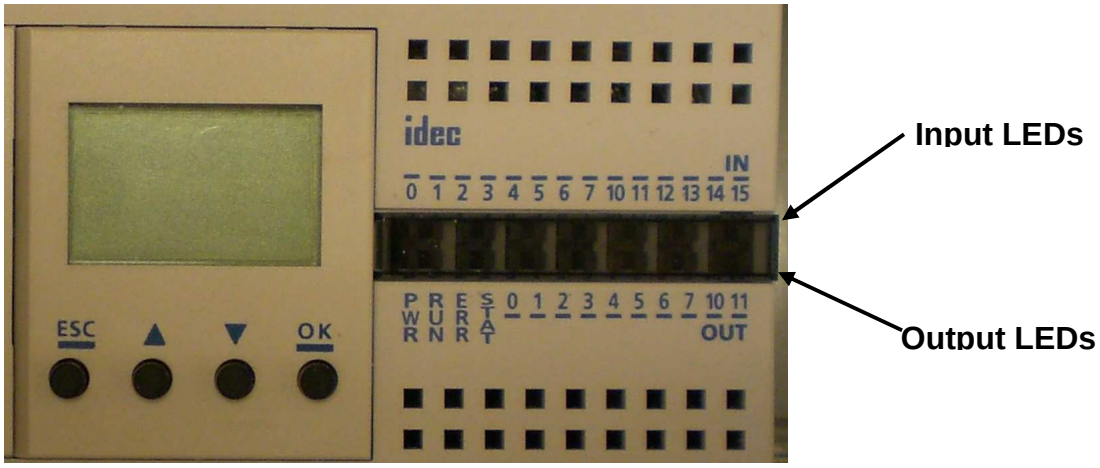



**Figure 71 – Programmable Logic Controller Input and Output LEDS**

The following list of the PLC inputs and outputs:

<u>INPUTS</u>

0. Encoder Channel 1
1. Encoder Channel 2
2. Encoder Channel 3 (reset)
3. Open Command
4. Close Command
5. Battery Backup (24V System)
6. N/A
7. Stop Command

8. N/A
9. N/A
10. Unlock Command
11. Motion Detector
12. N/A (For Special Programming)
13. N/A (For Special Programming)
14. VFD Current Limit
15. N/A (For Special Programming)

OUTPUTS

0. Creep Speed Command
1. Open Command
2. Close Command
3. VFD Fault Reset/Reverse Command
4. Brake Engage
5. Clutch Engage
6. For Special Application Only
7. For Special Application Only
8. N/A
9. N/A
10. MP3 Player
11. Second Deceleration Command/Maximum Opening Indicator

4.3.9. Variable Frequency Drive (VFD) Function and Use

The Yaskawa ™VFD is primarily used to control the torque, current and speed of the AC motor (See Figure 72). It takes 115V AC and outputs 3 Phase 230V AC. It controls the motor by accepting outputs from the PLC as its inputs. The VFD gives either a forward voltage or a reverse voltage to the motor based on the command sent by the PLC. If the VFD detects excessive current or torque from the motor, it sends a signal to the PLC, which compares the signal to preset current levels. The PLC in-turn sends a command signal to the VFD based on door position and direction of movement.


**Figure 72 – Variable Frequency Drive (VFD)**

Explanation of VFD Display - The VFD has one main display for highlighting selected parameters. It also has 12 specialized LED windows for monitoring and changing adjustable parameters without going into the main menu.

FREF - The default display for the VFD is “FREF”, which is set at the factory at 40. This is the frequency current at which the door is set to

run. This parameter can be reduced to about 20 during initial installation and testing of the automation system. It is typically set to 40 after final adjustment.

ACC - The "ACC" parameter displays the last acceleration used by the VFD. This parameter should only be used to change the last acceleration used by the drive e.g. "1st or 2nd ACCEL".

DEC - The DEC parameter displays the last deceleration used by the VFD. This parameter should only be used to change the last deceleration used by the drive e.g. "1st or 2nd DEC".

PRGM - To change an "ACC" or "DEC" other than the last one used by the drive, the "PRGM" parameter should be used. This parameter gives access to all internal menu items of the drive from "n1 to n69"; however, **only "n12, n21, n23 and n51" should ever be adjusted. No other parameters should be adjusted on the VFD, since this could result in serious damage to the door. Any other changes made without prior instructions from Doors In Motion will void the warranty of your control system**. The following lists the adjustable parameters and factory settings:

| Parameter | | | DIM Factory Setting |
|---|---|---|---|
| 1. | FREF | Run Speed | 40 |
| 2. | n12 | Creep Speed | 8.0 |
| 3. | n21 | 1st Deceleration | 1.0 |
| 4. | n23 | 2nd Deceleration | 1.0 |
| 5. | n51 | Torque Detection | 30 |

4.3.10. Initial Programming Instructions

All parameters for the automation system are preset to a default values at the factory. For the control system to fully drive the door to the maximum opening, the maximum opening must be programmed into the permanent memory of the PLC. The following instructions are for use when the automation system is first installed:

1. Make sure all components are connected and the door is secured to the automation system.
2. Manually close the door to the fully closed position.
3. Remove plastic face cover on PLC where the LCD is installed.
4. Plug the LCD into the PLC.
5. Power-up the automation panel (you should see VER0204 on the LCD display).
6. Press the down arrow "▼" 3 times or until you see "DR".
7. Press the "OK" button until the bottom line on the display is all zeros and not flashing (press about three times).
8. Manually open the door approximately 4 feet.
9. Check the digital display on the LCD, if numbers have appeared, continue to step 10.

**If no numbers appear on the LCD, change the encoder connection at the motor assembly break out board (See Figure 73) from "ENCODER AB" to "ENCODER BA" or from "ENCODER BA" to "ENCODER AB" depending on how the connection was initially made. After changing the connection, it is critical that you unplug the system and return to Step 2.**

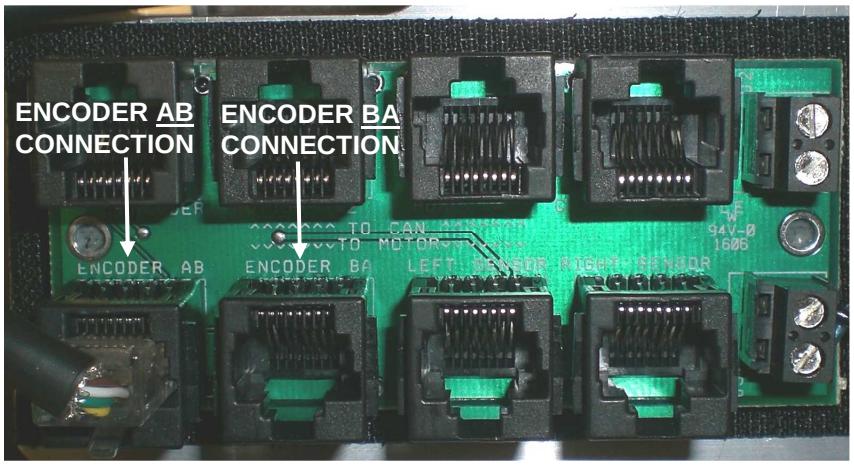



**Figure 73 – Changing ENCODER AB to ENCODER BA on Motor Breakout Board**

10. When numbers appear on the display, the encoder is connected correctly.

11. Manually open the door to its fully open position.
12. Press and hold the “RESET” button on the multi-button wall switch for 5 seconds.
13. Verify that the LED on the “OPEN” button of the multi-button wall switch is lit.
14. Remove the small programming jumper (See Figure 74), on the main circuit board, in the automation panel, labeled “PRG JMPR”. Removing this jumper allows the system to be reset if power is lost and will ensure that the PLC retains the fully open and fully closed positions.

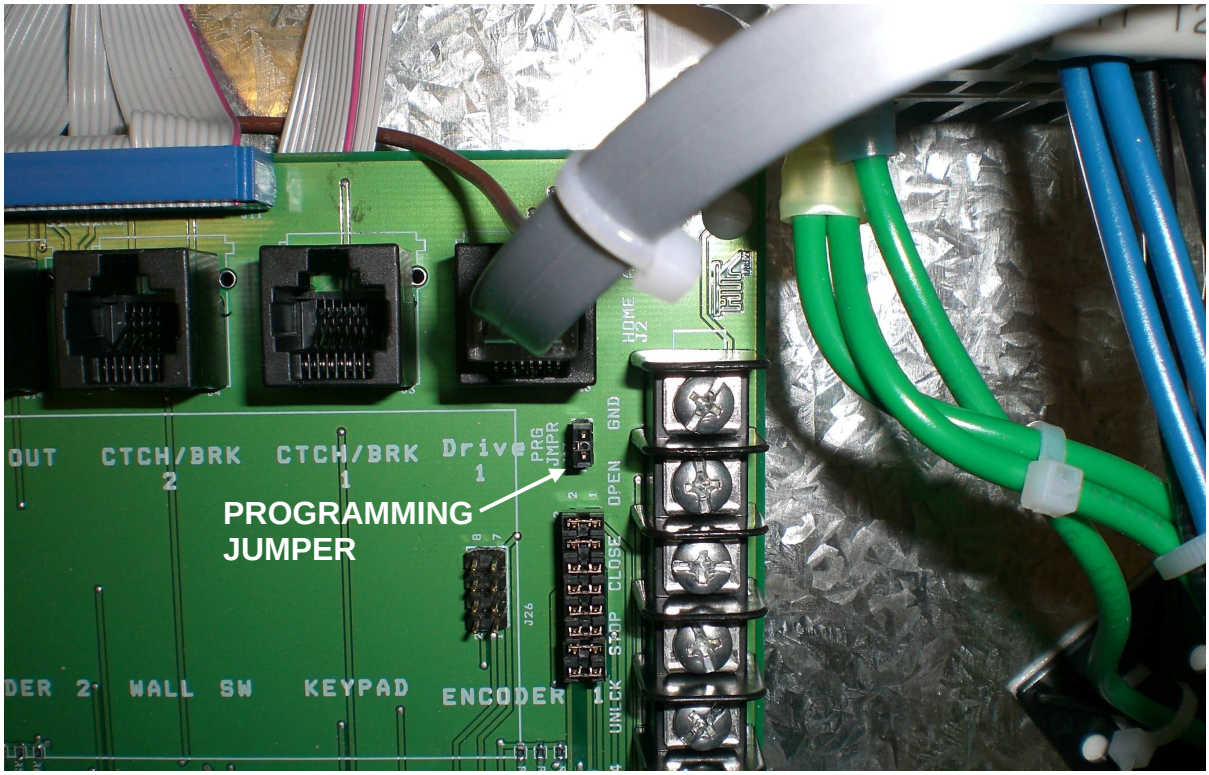



**Figure 74 – Location of Programming Jumper**

15. Manually close the door to its fully closed position (**If the brake happens to engage before you are fully closed, press the “UNLOCK” button on the multi-button wall switch and continue closing the door. This is normal).**
16. Press and hold the “RESET” button on the multi-button wall switch for 5 seconds.
17. The door has now been set for its fully opened and fully closed positions and these positions have been saved in the PLC.
18. Press the “UNLOCK” button on the multi-button wall switch, and manually open the door to approximately its “middle position”.

19. Press the “CLOSE” button on the multi-button wall switch. If the door begins to **close,** the correct motor harness connection in the automation panel was initially selected. If the door begins to **open**, press the “STOP” button on the multi-button wall switch and switch the motor wiring harness connection in the automation panel. After switching the harness connection, press the “CLOSE” button and the door will fully close.
20. Once the door is fully closed, press the “OPEN” button and the door will open to its fully open position.
21. The door is now programmed and ready for use

4.3.11. Final Programming Instructions

Since different doors have different weights and different amounts of rolling friction, final programming is required for smooth door operation. The following process describes final programming:

1. Remove the motion “jumper”, from the automation panel circuit board, and connect either the infrared sensor or the overhead motion sensor (See Figure 75).

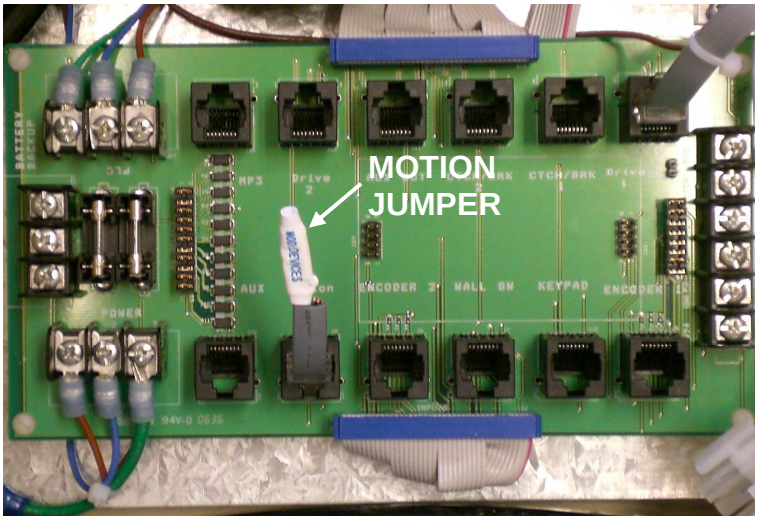



**Figure 75 – Location of Motion Jumper**

2. Operate the door back and forth several times and observe its operation. Time how many seconds it takes to open and close the door. Observe its acceleration, how fast it travels, its deceleration, how it enters the jamb, and listen for how long the motor stays on once it reaches the jamb. Decide what changes need to be made to ensure smooth operation.

3. Changes can be made to the PLC and VFD factory settings to adjust door operation. To achieve smooth door operation,

changes to the PLC and VFD settings are often made in conjunction with one another.

4. PLC Adjustments – Only 2 parameters on the PLC may need to be adjusted to achieve smooth door operation. These parameters are T0087 and T0008.

   Understanding T0087 "Crawl Time" – This setting determines how long the automation system will keep the motor running after the door closes. This setting is set at the factory at 1500 milliseconds, which is 1.5 seconds.

   Adjusting T0087 "Crawl Time" – To adjust the Crawl Time, follow the following steps:

   1. Insert the LCD into the PLC.
   2. When the LCD is plugged in for the first time, some characters may be displayed.
   3. Use the following sequences to navigate to the "TIME" parameter T0087:
   4. Press the **OK** button once and check what parameter is displayed. If **TIM** is displayed, proceed to the steps below. If any other parameter is displayed, scroll through the parameters until **TIM** is displayed**.**
   5. Press the **OK** button once. T0000 with the last digit blinking should be displayed, if the **TIM** parameter has not been adjusted before.
   6. Press the **OK** button once. The last digit should start blinking faster.
   7. Use the ▼ or ▲buttons to set this digit to 7 and press the **ESC** button once. This digit should start blinking slower.
   8. Press the ▲ button once to move the cursor to the left so that digit position two should start blinking.
   9. Press the **OK** button once. This digit should start blinking faster.
   10. Use the ▼ or ▲ button to set this digit to the desired number e.g. 8 and press the **OK** button once. T0087 should be displayed at the top and C01500 should be displayed at the bottom without any digits blinking.
   11. Assuming for example it is desired to adjust T0087 from the factory setting of 1500 milliseconds (1.5 seconds) to 3000 milliseconds (3 seconds), do the following:
   12. Press the **OK** button once. The last digit should start blinking.
   13. Press the ▲ button 2 times to move the cursor to the left so that the 5 starts blinking.

14. Press the **OK** button once. This digit should start blinking faster.
15. Use the ▼ or ▲ button to set this digit to the desired number e.g. 0 and press the **ESC** button. This digit should start blinking slower.
16. Press the ▲ button once to move the cursor to the left so that the number 1 should start blinking.
17. Press the **OK** button once. This digit should start blinking faster.
18. Use the ▼ or ▲ button to set this digit to your desired number e.g. 3 and press the **OK** button. This digit should stop blinking and P03000 should be displayed at the bottom. "Crawl Time" T0087 has successfully been adjusted from 1500 milliseconds (1.5 seconds) to 3000 milliseconds (3 seconds).

Understanding T0008 "Run Time" – The T0008 setting determines how much time the system has to open or close the door. This setting is set at the factory at 120 seconds. The length of time needed to closed or open the door should be measured and T0008 should be set at roughly 3 seconds beyond this time. For example, if it requires 40 seconds to fully open the door, T0008 should be set at 43 seconds.

Adjusting T0008 "Run Time" – Adjusting the run time is usually the last step in "tuning". To adjust the Run Time, follow the following steps:

1. Insert the LCD into the PLC.
2. When the LCD is plugged in the first time, some characters may be displayed.
3. Use the following sequences to navigate to the "TIME" parameter T0008.
4. Press the **OK** button once and check what parameter is displayed. If **TIM** is displayed, proceed to the steps below. If any other parameter is displayed, scroll through the parameters until **TIM** is displayed**.**
5. Press the **OK** button once. T0000 with the last digit blinking should be displayed, if the **TIM** parameter has not been adjusted before.
6. Press the **OK** button once. The last digit should start blinking faster.
7. Use the ▼button to set this digit to 8 and press the **OK** button. T0008 should be displayed at the top and C00120 should be displayed at the bottom without any digits blinking.
8. Press the **OK** button once. The last digit at the bottom should start blinking.

9. Press the **OK** button once and the last digit should start blinking faster.
10. Use the ▼ or ▲ button to set this digit to the desired number e.g. 2 and press the **ESC** button. This digit should start blinking slower.
11. Press the ▲ button once to move the cursor to the left so that the number 2 should start blinking.
12. Press the **OK** button once. This digit should start blinking faster.
13. Use the ▼ or ▲ button to set this digit to the desired number e.g. 4 and press the **ESC** button. This digit should start blinking slower.
14. Press the ▲ button once to move the cursor to the left so that the number 1 should start blinking.
15. Press the **OK** button once. This digit should start blinking faster.
16. Use the ▼ or ▲ button to set this digit to the desired number e.g. 0 and press the **OK** button. This digit should stop blinking and P00042 should be displayed at the bottom. The door "Run Time" T0008 has successfully been changed from 120 seconds to 42 seconds.

5. VFD Adjustments – Only 5 parameters on the VFD may need to be adjusted to achieve smooth door operation. These parameters are FREF, n12, n21, n23, and n51. FREF adjusts door opening and closing speed and n12, n21, n23, and n51 are all related to "Crawl" speed.

   Understanding FREF "Door Speed" – FREF is the default condition on the VFD display. FREF controls the speed at which the door travels during both opening and closing, by changing the AC voltage frequency. FREF is set at the factory at 40 Hz, which is typically a door speed of about 6 inches per second.

   Adjusting FREF "Door Speed" – To adjust FREF, push the up or down arrows on the VFD.

   Understanding n12 "Opening /Closing Crawl Speed" – The n12 setting determines the crawl speed as the door approaches the jamb. This setting is set at the factory at a frequency 8 Hz.

   Adjusting n12 "Opening/Closing Crawl Speed" – If the door is heavy and is barely moving after it enters crawl mode in either direction, increase n12 to give it more crawl speed. It may be necessary to increase n21 and/or n23 to retain momentum to help the door fully open or fully close. Use the following process to adjust n12:

1. On the VFD, press the **DSPL** button 11 times or until the red led on the **PRGM is** lit.
2. Press the **ENTER** button once. An “n” value should be displayed.
3. Use the ▼ or ▲ buttons to select n12.
4. Press the **ENTER** button once. The current value should be displayed.
5. Use the ▼ or ▲ buttons to adjust it to the desired value. It should start blinking.
6. Press the **ENTER** button once. N12 should be displayed again.
7. Press the **DSPL** button once. The preset frequency e.g. 40.0 should be displayed.

Understanding n21 “1st Deceleration” – The n21 setting determines the rate of door deceleration during closing. This setting is set at the factory at 1%.

Adjusting n21 “1st Deceleration” - If the door is not slowing down fast enough during the closing crawl stage, n21 should be lowered e.g. from 1.0 to 0.7 to force the door to slow down faster. Use the following process to adjust n21:

1. On the VFD press the **DSPL** button 11 times or until the red led on the **PRGM** is lit.
2. Press the **ENTER** button once. An “n” value should be displayed.
3. Use the ▼ or ▲ buttons to select n21.
4. Press the **ENTER** button once. The current value should be displayed.
5. Use the ▼ or ▲ buttons to adjust it to the desired value. It should start blinking.
6. Press the **ENTER** button once. N21 should be displayed again.
7. Press the **DSPL** button once. The preset frequency e.g. 40.0 should be displayed.

Understanding n23 “2nd Deceleration” – The n23 setting determines the rate of door deceleration during opening. This setting is set at the factory at 1%.

Adjusting n23 “2nd Deceleration” – If the door is not slowing down fast enough during the opening crawl stage, n23 should be lowered e.g. from 1 to 0.5 to force the door to slow down faster. Use the following process to adjust n23:

1. On the VFD press the **DSPL** button 11 times or until the red led on the **PRGM** is lit.
2. Press the **ENTER** button once. An “n” value should be displayed.

3. Use the ▼ or ▲ buttons to select n23.
4. Press the **ENTER** button once. The current value should be displayed.
5. Use the ▼ or ▲ buttons to adjust it to the desired value. It should start blinking.
6. Press the **ENTER** button once. N23 should be displayed again.
7. Press the **DSPL** button once. The preset frequency e.g. 40.0 should be displayed.

n51 "Current Limit" – The n51 setting detects motor current draw. If too much current is drawn, the door reverses direction. If too little current is drawn, the door may not close. This setting is set at the factory at 30%.

Adjusting n51 "Current Limit" - If the door is exerts too much force or too little force, n51 should be adjusted. Use the following process to adjust n51:

1. On the VFD press the **DSPL** button 11 times or until the red led on the **PRGM** is lit.
2. Press the **ENTER** button once. An "n" value should be displayed.
3. Use the ▼ or ▲ buttons to select n51.
4. Press the **ENTER** button once. The current value should be displayed.
5. Use the ▼ or ▲ buttons to adjust it to the desired value. It should start blinking.
6. Press the **ENTER** button once. N51 should be displayed again.
7. Press the **DSPL** button once. The preset frequency e.g. 40.0 should be displayed.

# 5. Typical Problems and Resolution

## 5.1. Power Loss

If power is ever lost, follow these steps:

1. **If the door is in the fully closed position**, when power is restored, simply press and hold the “RESET” button, on the multi-button wall switch, for 5 seconds.

1. **If the door is not in the fully closed position**, when power is restored, the door will lock in its current position (this is an indication that power was lost).
2. Press the “UNLOCK” button on the multi-button wall switch.
3. Manually close the door to its fully closed position.
4. Press and hold the “RESET” button, on the multi-button wall switch, for 5 seconds.
5. The door is now reset and should operate normally.

## 5.2. Trouble Shooting Using PLC Indicator Lights

The PLC indicator lights can be used to trouble shoot fault conditions. The following list indicates what each input and output light corresponds to:

| INPUTS | | OUTPUTS | |
|---|---|---|---|
| 0. | Encoder Channel 1 | 0. | Creep Speed Command |
| 1. | Encoder Channel 2 | 1. | Open Command |
| 2. | Encoder Channel 3 (reset) | 2. | Close Command |
| 3. | Open Command | 3. | VFD Fault Reset/Reverse Command |
| 4. | Close Command | 4. | Brake Engage |
| 5. | Battery Backup (24V System) | 5. | Clutch Engage |
| 6. | N/A | 6. | For Special Applications Only |
| 7. | Stop Command | 7. | For Special Applications Only |
| 8. | N/A | 8. | N/A |
| 9. | N/A | 9. | N/A |
| 10. | Unlock Command | 10. | MP3 Player |
| 11. | Motion Detector | 11. | Second Deceleration Command/ Maximum Opening Indicator |
| 12. | N/A (For Special Programming) | | |
| 13. | N/A (For Special Programming) | | |
| 14. | VFD Current Limit | | |
| 15. | N/A (For Special Programming) | | |

The matrix below can be used to diagnose and correct many fault conditions:

| # | CONDITION | PLC LED STATUS INPUT & OUTPUT | | | | | | | | | | | | | | | POSSIBLE SOLUTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 10 | 11 | 12 | 13 | 14 | 15 | |
| 1 | Power ON door closed | input | * | * | | | | * | | | | X | | | | | Normal operation |
| | | output | | | | | X | | | | | | | | | | |
| 2 | Power ON door fully open | input | * | * | | | | * | | | | X | | | | | Normal operation |
| | | output | | | | | | | | | | X | | | | | |
| 3 | Power ON door partially open | input | * | * | | | | * | | | | X | | | | | Normal operation |
| | | output | | | | | | | | | | | | | | | |
| 4 | Power ON door opening/slowing | input | X | X | | | | * | | | | X | | | | | Normal operation |
| | | output | * | X | | | | X | X | | X | | | | | | |
| 5 | Power ON door closing/slowing | input | X | X | | | | * | | | | X | | | | | Normal operation |
| | | output | * | | X | | | X | X | | X | | | | | | |
| 6 | Power ON door will not close | input | * | * | | | | * | | | | | | | | | Check to make sure the motion sensor is not tripped. Input 11 |
| | | output | | | | | | | | | | | | | | | must be on for the door to close. Check motion wires. |
| 7 | Power ON door will not open or close | input | * | * | | | | * | | | | X | | | | | Momentary power loss. Press unlock, close door manually, |
| | | output | | | | | X | | | | | | | | | | press RESET for 5 seconds. Door should run. Check 2A fuse. |
| 8 | Power ON door closed but will not open | input | * | * | | | | * | | | | X | | | | | Incorrect maximum opening programming. Please go to the |
| | | output | | | | | | | | | | X | | | | | initial programming section to program max distance. |
| 9 | Power ON door closed but will not open | input | * | * | | | | * | | | | X | | | | | Clutch is not engaging. Check the clutch wire between the |
| | | output | | X | | | | X | X | | X | | | | | | controller board and the motor board and the clutch terminal. |
| | | | | | | | | | | | | | | | | | Motor not turning. Check motor wire between VFD and the |
| | | | | | | | | | | | | | | | | | motor. Check connection between controller board and VFD |
| 10 | Power ON encoder counts in reverse when opened manually | input | | | | | | * | | | | X | | | | | Encoder channels reversed. Switch encoder channels .e.g.. |
| | | output | | | | | | | | | | | | | | | AB to BA at the motor board |
| 11 | Power ON door runs normal in one direction & slow in the other | input | | | | | | * | | | | X | | | | | Incorrect motor direction. Switch the motor wire plug at the |
| | | output | | | | | | | | | | | | | | | VFD to reverse motor direction. Check for solid connections. |
| 12 | Power ON door will not move when pushed manually with program jumper connected | input | * | * | | | | * | | | | X | | | | | Brake is engaged independent of the resident program. ل Turn |
| | | output | | | | | | | | | | | | | | | system off, unplug brake/clutch wire, measure continuity |
| | | | | | | | | | | | | | | | | | between output 4 and com 1 at the PLC. Call DIM support if |
| | | | | | | | | | | | | | | | | | there is continuity, else redo the terminals for brake/clutch wire. |
| 13 | Power ON motor too weak to open/close the door or too hot | input | | | | | | * | | | | X | | | | | Check motor connection between VFD and motor. Ground wire |
| | | output | | | | | | | | | | | | | | | may be interchanged with a live wire on one of the legs. |
| 14 | Power ON PLC/power supply blinking ON and OFF or OFF | input | | | | | | * | | | | X | | | | | An input or output wire is shorting out. Unplug all wires and |
| | | output | | | | | | | | | | | | | | | plug them in one at a time. Redo the bad connector. |
| 15 | Power ON encoder will not count up or down | input | | | | | | * | | | | X | | | | | Check the encoder wire between the controller board and the |
| | | output | | | | | | | | | | | | | | | motor board. Check encoder AB/BA terminals. Recycle power. |
| 16 | Power ON some switch functions unavailable | input | | | | | | * | | | | X | | | | | Check the wire between the wall switch and the controller |
| | | output | | | | | | | | | | | | | | | board. Use the 28-8 wire tester to test the wire. |
| 17 | Power ON unable to program max distance as described | input | | | | | | * | | | | X | | | | | Connect the wall switch directly to the controller board. Press |
| | | output | | | | | | | | | | | | | | | the buttons and verify all the inputs LEDs light for each button. |
| 18 | Power ON wall switch does not light when pressed | input | | | | | | * | | | | X | | | | | Check the wire connection, if OK, check the controller main |
| | | output | | | | | | | | | | | | | | | board FUSE. If blown, replace with 2A FUSE. |
| 19 | Power ON motor runs for some time after door is fully closed | input | | | | | | * | | | | X | | | | | T87 in the PLC is too long. See Final Tuning section to reduce |
| | | output | | | | | | | | | | | | | | | T87 in the PLC to normal length. |
| 20 | Power ON door stops before max distance after initial programming | input | | | | | | * | | | | X | | | | | Encoder not reset to ZERO when door was openned for max |
| | | output | | | | | | | | | | | | | | | distance programming. Repeat programming sequence |
| | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 10 | 11 | 12 | 13 | 14 | 15 | |

**X** = Should be on ***** = May be on
Input 5 is only for 24V systems

## 6. Maintenance

The Doors In Motion automation system requires little or no maintenance; however, the best protection for the automation system is to keep the door in good working order by ensuring that there is no debris in the door floor track.

## 7. Warranty

The Doors In Motion automation system has a 5 year limited warranty for all parts. There is a 2 year warranty of all labor related to replacement of warranty parts. The warranty period begins once the system has been installed and final adjustments have been made.

## 8. Customer Service

For customer service, please call the toll free number **1-800-426-7113**.