DYNATECT®

DYNAMIC EQUIPMENT PROTECTION

Gortite®
Powered Roll-Up Door

Patent Pending

Installation Guide

VPB0032

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1. INTRODUCTION

a) Welcome!

Thank you for choosing Dynatect as your solution partner. This guide contains essential information on your new Gortite Powered Roll-Up Door. Please take the time to thoroughly read and understand this guide prior to installation, operation, or maintenance of the equipment. Please consider filing this guide so that it can be referenced again for future adjustment or maintenance purposes.

Since Dynatect is continually improving its products and services, this guide may include updates from a previous version. If you need additional copies of any instructions or if you have questions, recommendations, or feedback regarding the safe and proper installation/operation of your Gortite Powered Roll-Up Door, please contact a sales representative or Dynatect directly at 262-786-1500. We appreciate your business and the confidence you have placed in us. Please contact us if we can be of further assistance.

b) Inspect Your Shipment

Please thoroughly inspect the shipment and compare it to the bill of lading. Account for all items in the container or package and inspect the container and each item for damage and/or concealed damage. Notify the carrier immediately if there are any shortages, damages, or concealed damage; add any necessary notations to your bill of lading; and request that the carrier return and conduct an inspection.

File your claim with the carrier promptly and support it with photographs and all available documentation. Ensure all missing or damaged parts are replaced and that any mechanical problems are corrected prior to installing the unit. Dynatect is not responsible for collection of claims or replacement of lost or damaged materials due to carrier negligence.

c) Before beginning installation, please:

- Carefully read the complete installation manual.
- Make sure the door opening is square and free of weld crowns or other obstructions.
- When unpacking, be careful not to scratch the door and/or other components.

d) Safety/Guarantee:

The guidelines and procedures in this book are published in good faith and have been checked for accuracy, however, no warranties, either expressed or implied, are made; nor are successful results guaranteed. The author and editors do not take any responsibility for human error, typographical mistakes, or variations in individual work. Nor shall they be liable for special, consequential, or exemplary damages resulting, in whole or part, from the reader's utilization of, or reliance upon, this material. The reader is expressly warned to consider and adopt all safety precautions and activities presented herein to avoid potential hazards and liabilities. By following the instructions and guidelines contained herein, the reader willingly assumes all risks in connection with these instructions and guidelines.

2. TOOLS & EQUIPMENT

a) Tools

- Tape Measure
- Marking Pen
- Fasteners
- Drill
- Drill Bits
- Pliers
- Screwdriver
- Metric Allen Wrench Set
- Permabond® 910

MOUNTING HARDWARE:

- The installer may use any appropriate mounting hardware and any thread-locking technology to ensure the hardware (NOT INCLUDED) does not back out due to vibration (self-tapping, split washers, adhesives, etc.)
- For the canister and shade, M5 or #10 button head mounting hardware is recommended to minimize shade travel interference in the siderails

ELECTRICAL: The controller comes with pre-attached automotive connectors. Dynatect also supplies mating connectors for use by the installer. Those mating connectors include ferrules which are crimped using industry standard universal tools:

- NEW-AS1 (Figure 2a)
  -or-
- a collection of more specialized tools like the IWD-12 and IWD-1620 (Figures 2b & 2c):

Figure # 2a

Figure # 2b

Figure # 2c

b) Layout Mounting Holes

Dynatect recommends pre-drilling the mounting holes for all roll-up door components, however, mounting holes can be drilled as the components are installed. Pre-drilling the holes requires temporarily mounting the roll-up door components in their respective locations, drilling holes, removing the component and then reinstalling when required.

3. REFERENCE DRAWINGS

Body with a rectangular opening ready for a roll-up door

Body with swingout doors may accommodate a roll-up door assembly with the addition of a fabricated framework

4. MOUNTING THE CONTROLLER

a) Before proceeding with any installation, determine the desired mounting location of the controller (~5” x ~5” x ~1.6”).

b) To minimize potential interference, **read this entire manual** to fully understand the motion of the door, the expanding size of the roller when the door opens, the mounting of the anti-pinch cover, the geometry of the pennant plate standoffs, the length and routing of the cables.

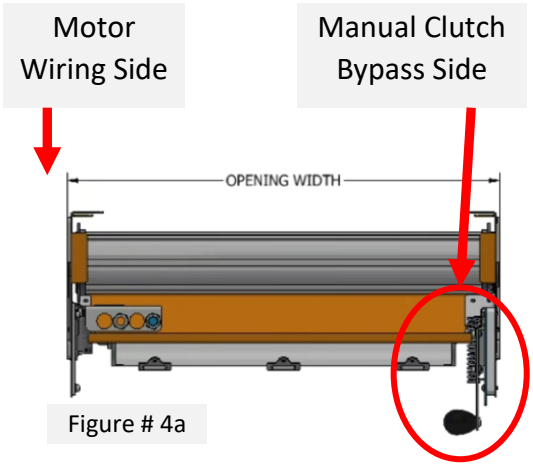

Figure # 4a

Figure # 4b

c) The controller can be attached at any location desired by the installer. The typical mounting location is on the same vehicle side as the motor wiring which is opposite the manual clutch bypass (Figure 4a). This allows use of the factory-supplied cable lengths without extensions.

d) Relocating the controller may require extending cables (see SECTION 26. EXTENDING CABLES).

e) Potential mounting of controller on pennant plates
   i) Due to door roll-up geometry, the controller cannot be mounted on the inside of the pennant plates. This is because the diameter of the roller increases as the door opens potentially creating interference.
   ii) The pennant plates are designed to be mounted flush against the compartment walls, which would also preclude mounting the controller on the outside of the pennant plants.
   iii) If the pennant plates are mounted offset from the compartment walls with standoff fabricated by the installer, then there MAY be room on the outside of the pennant plates to mount the controller

f) The controller features a **removable configuration cover which must be accessible** during commissioning (Figure 4b). If the controller is placed between the pennant plate and the wall, this cover may be challenging to access.

g) Consider if the controller could hang loose until the controller configuration is complete (Section 19. CONFIGURING DOOR TRAVEL), then mount the controller in a tighter/more-obscure location.

h) The controller is not orientation dependent. It can be attached on any surface horizontally, vertically, diagonally, or in any rotation.

i) The controller can be mounted over an existing unused hole or cutout, it does not require a solid surface.

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j) The controller can be mounted anytime during the installation process.

i) After the door installation is complete, then ensure that all power and control wiring is appropriately secured to prevent a snag-hazard. Cover with sleeving/looms as needed.

k) The installer will need to pre-drill two holes into the mounting surface to accommodate the two mounting holes of the controller (Figures 4b & 4c).

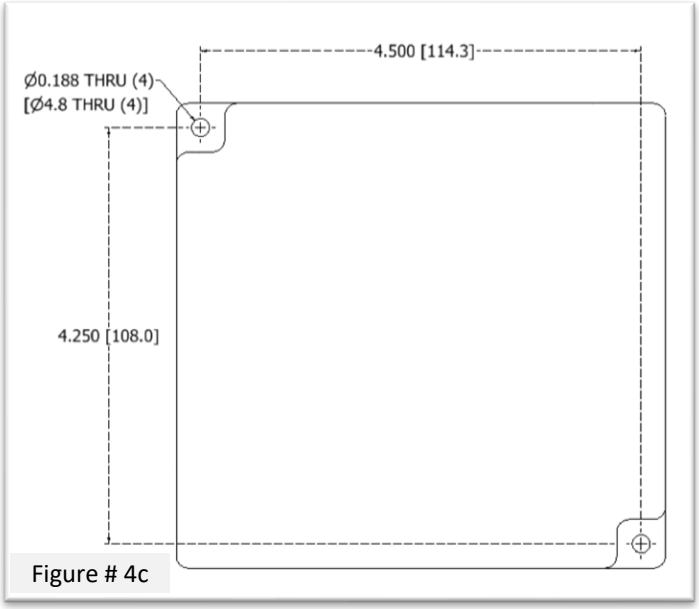

Figure # 4c

l) The installer may use any appropriate mounting hardware and any thread-locking technology to ensure the hardware (NOT INCLUDED) does not back out due to vibration (self-tapping, split washers, adhesives, etc.).

m) Do not connect any of the wiring harnesses until Section 13. CONNECTING THE CONTROLLER

n) Temporarily secure any wiring so it is out of the way before continuing installation.

5. HEADER GEOMETRY

a) The section is an overview only – **no installer actions required in this education section**.

a) 3D models of your ordered door assembly are available upon request (similar to Figure 5b).

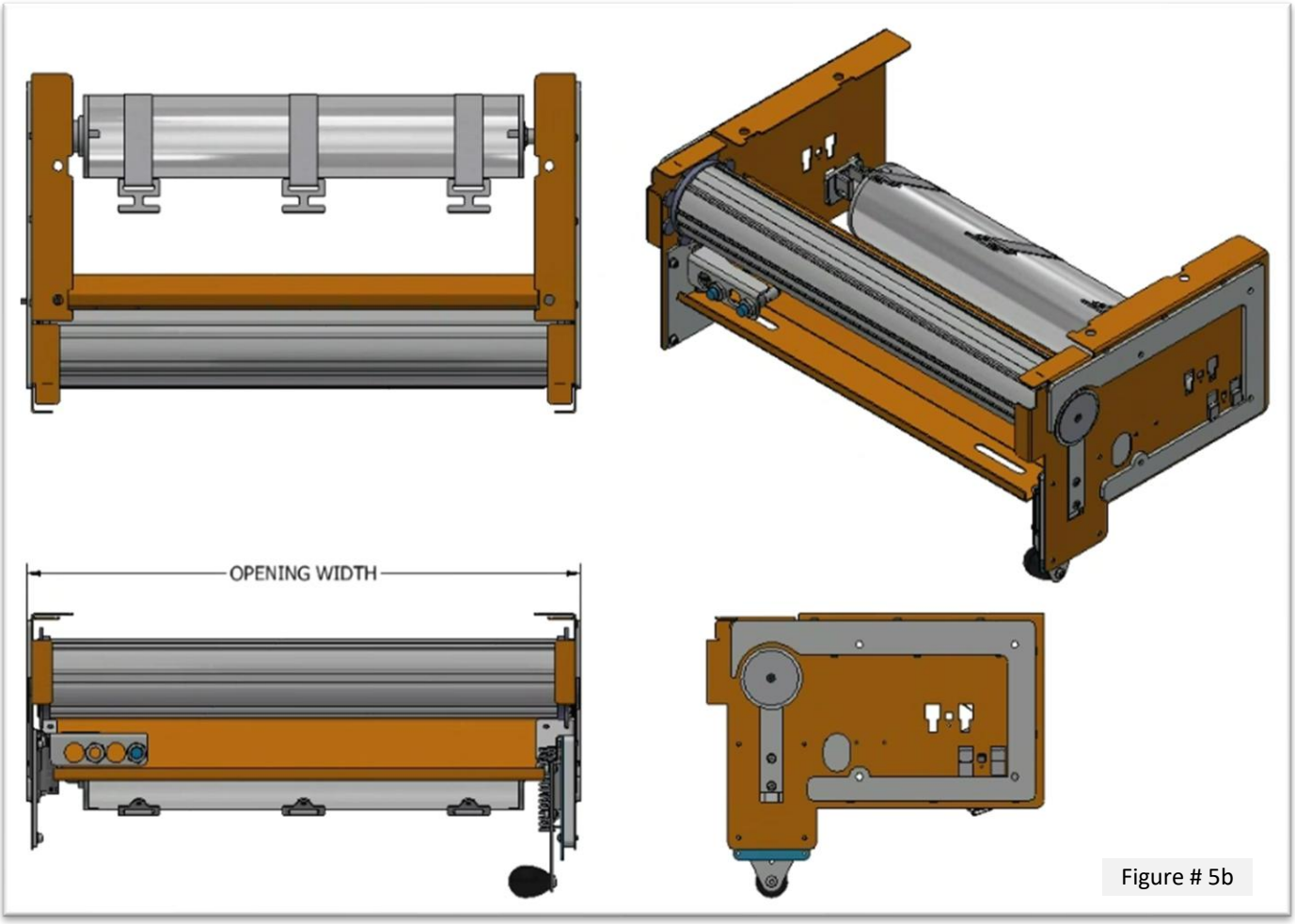

Figure # 5b

6. SILL PLATE MOUNTING*

*Optional (if ordered)

a) Position the sill plate as shown in Figures # 6a & 6b. Mark and drill 11/64” holes.
Note: The sill plate must be in place prior to mounting the Side Rails.

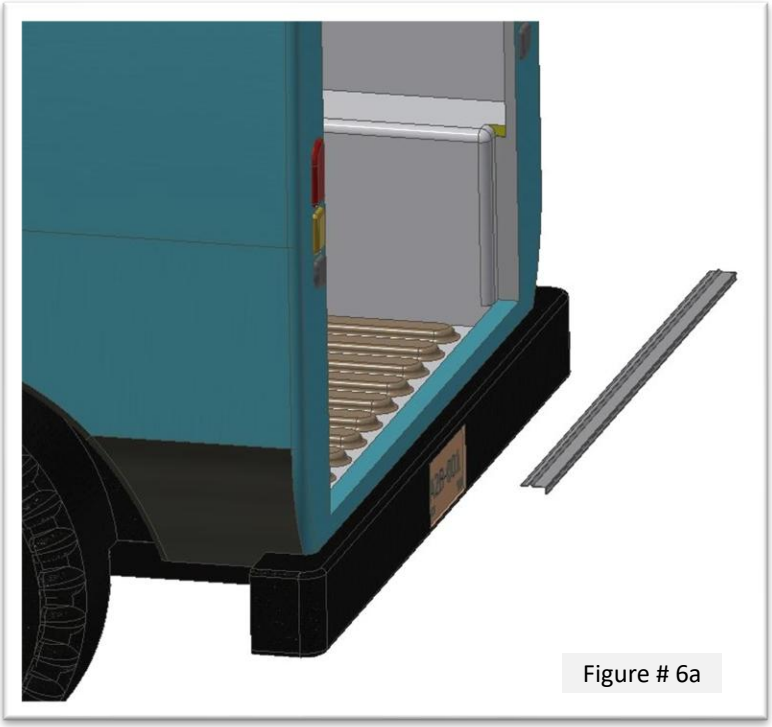

Figure # 6a

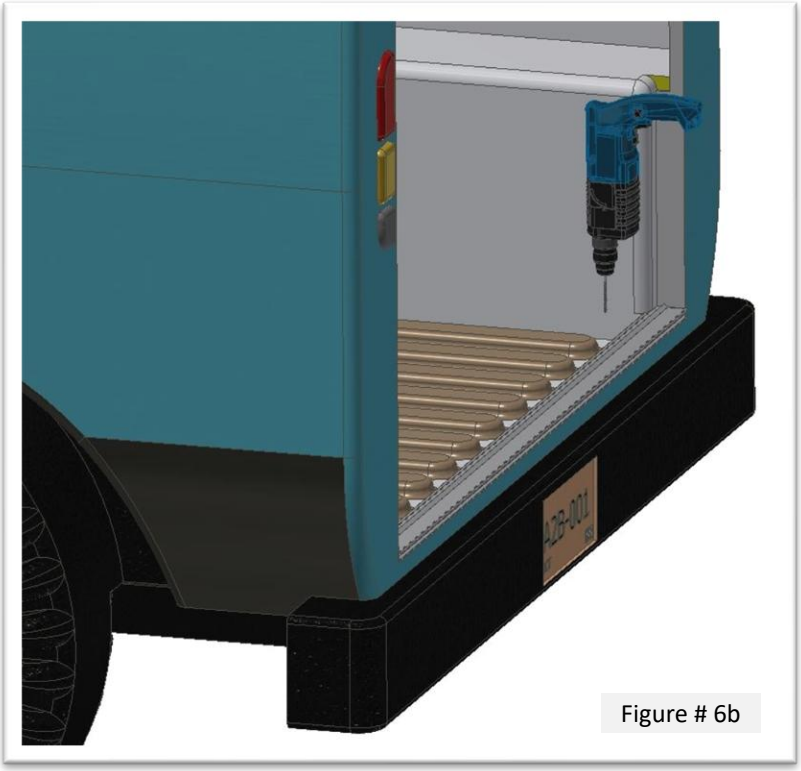

Figure # 6b

7. SIDE RAIL MOUNTING

a) Position the Side Rails as shown in Figure 7a.

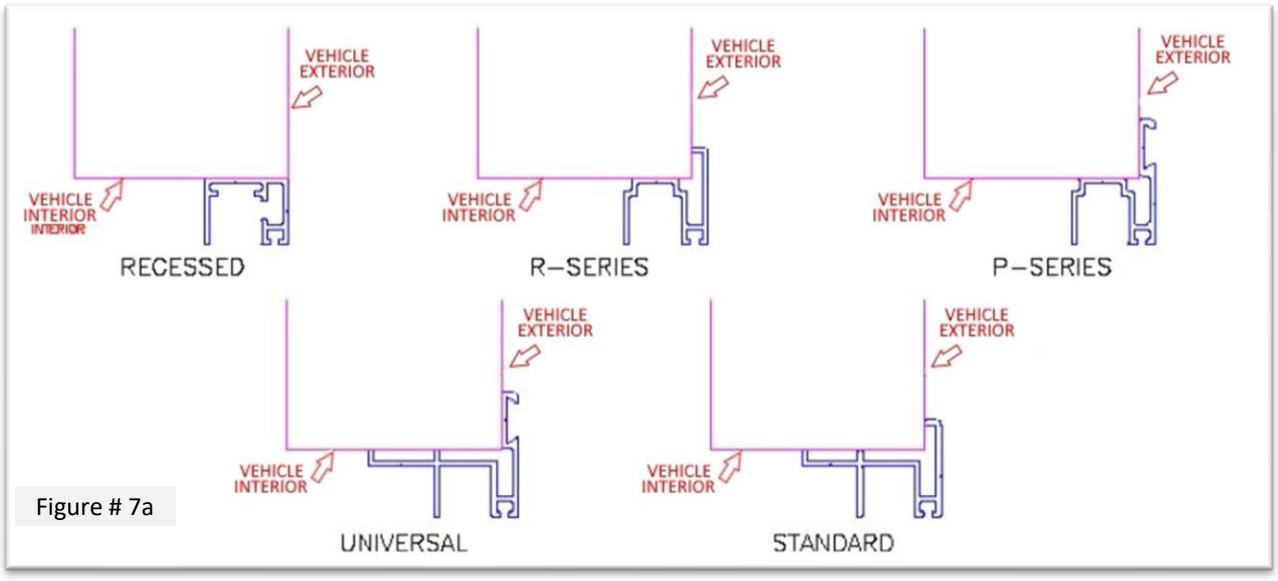

Figure # 7a

b) The Side Rail bottom should be resting either on the opening floor, or on top of the optional Sill Plate as shown in Figure 7b.

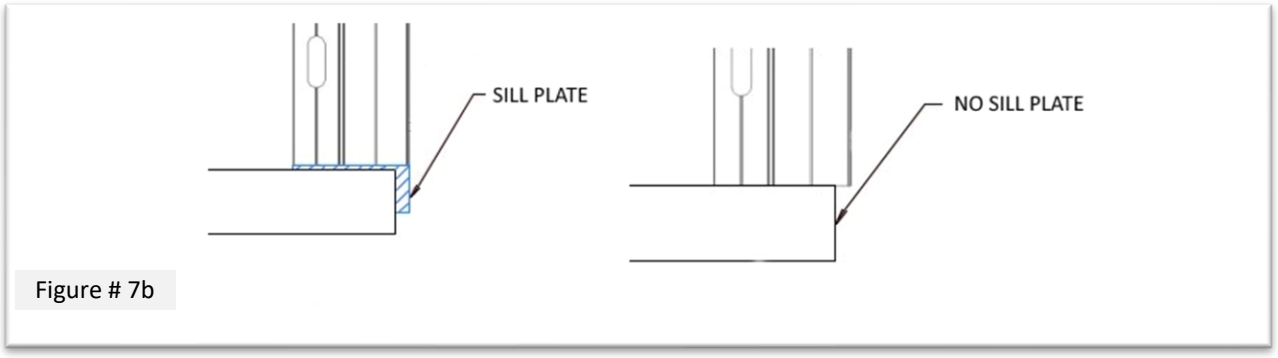

Figure # 7b

c) One end of the side rail is cutaway and thinner for door clearance into the vehicle. This cutaway side should be oriented up as shown in Figure 7c.

Figure # 7c

d) Mark the holes and drill 11/64” holes as shown in Figure 7d. If side rails are not pre-drilled, drill the holes approximately 12 inches (305mm) apart through the side rails and into the vehicle structure. **Do not fasten the side rails at this point.**

   a. If the installation includes the optional top rail, then leave the side rails temporarily in place for the next Section 8. **TOP RAIL MOUNTING**.
   b. If the installation does not include the optional top rail, then set the side rails aside until required in Section 10. **SHADE MOUNTING**.

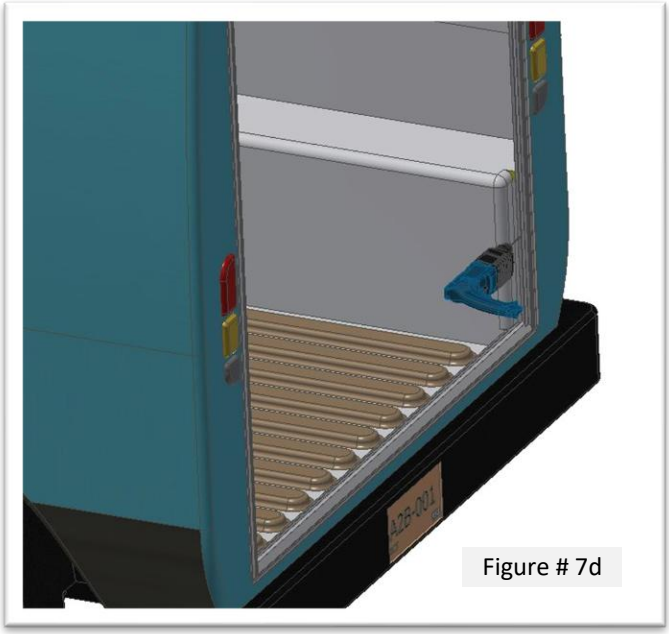

Figure # 7d

8. TOP RAIL MOUNTING*

*Optional (if ordered)

a) Position the Top Rail against and flush with the bottom edge of the header (approx. ¼" above the Side Rails), and with the edges of the Side Rail. See Figure #8a

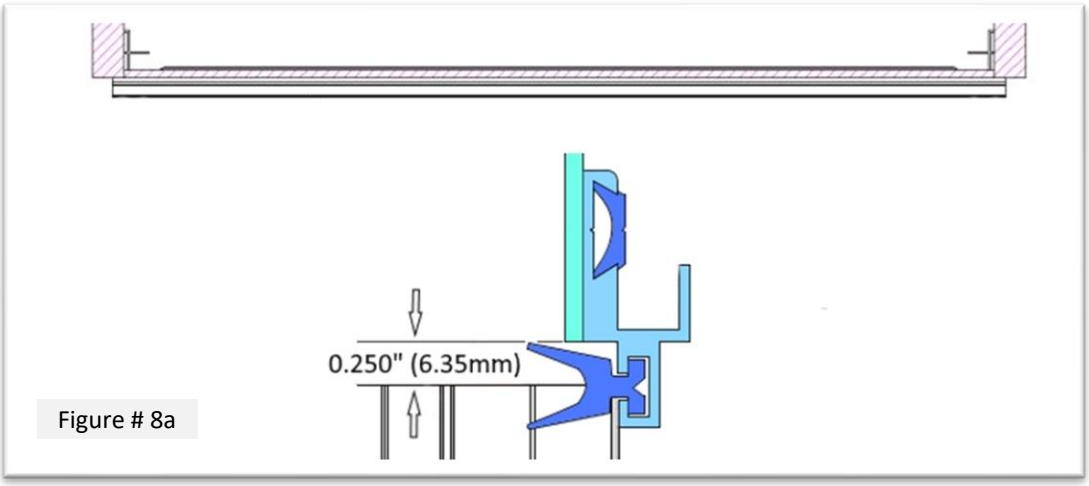

Figure # 8a

b) Cut the top seal ends at an angle to fit between the side seals. See Figure #8b

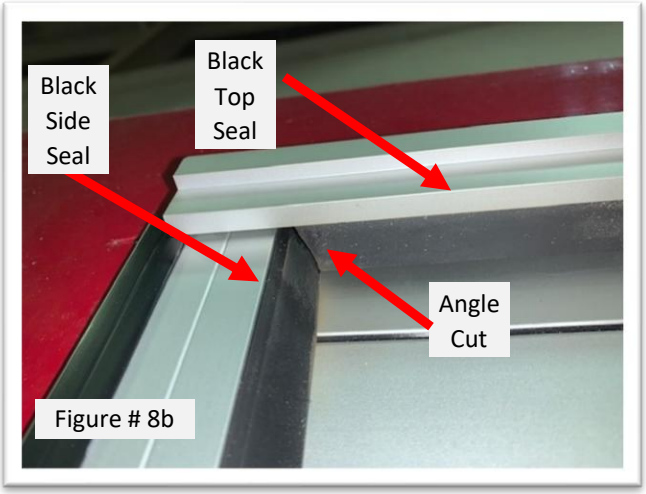

Figure # 8b

c) If there are no pre-drilled holes, then drill holes no more than 12 inches apart. The screws should not extend more than 1/8” into the compartment. If the screws extend further into the compartment, they will likely scratch the door behind the top sill. See Figure #8c

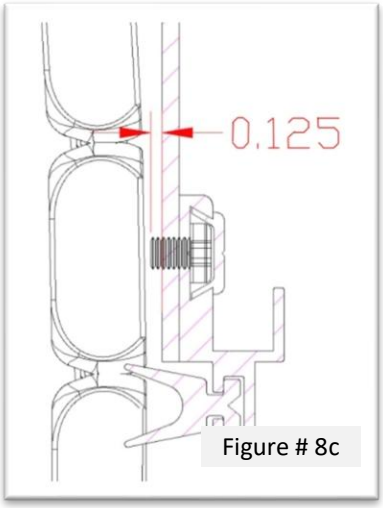

Figure # 8c

d) Fasten the top rail. Do not fasten the side rails – set them aside until required in Section 10. **SHADE MOUNTING**.

9. MOUNTING THE DRIVE ROLLER ASSEMBLY

a) The Drive Roller Assembly (Figure 9a)
   a. Consists of:
      i. Pennant plates (brown) and cross member (grey)
      ii. Driven roller (COGs on each end)
      iii. Anti-pinch Guard (yellow)
      iv. The spring roller (with straps)
      v. Excludes the side rails, shade, controller
   b. Is not a rigid assembly. Two technicians (recommended) may be required to fit and mount the Drive Roller Assembly into the vehicle.

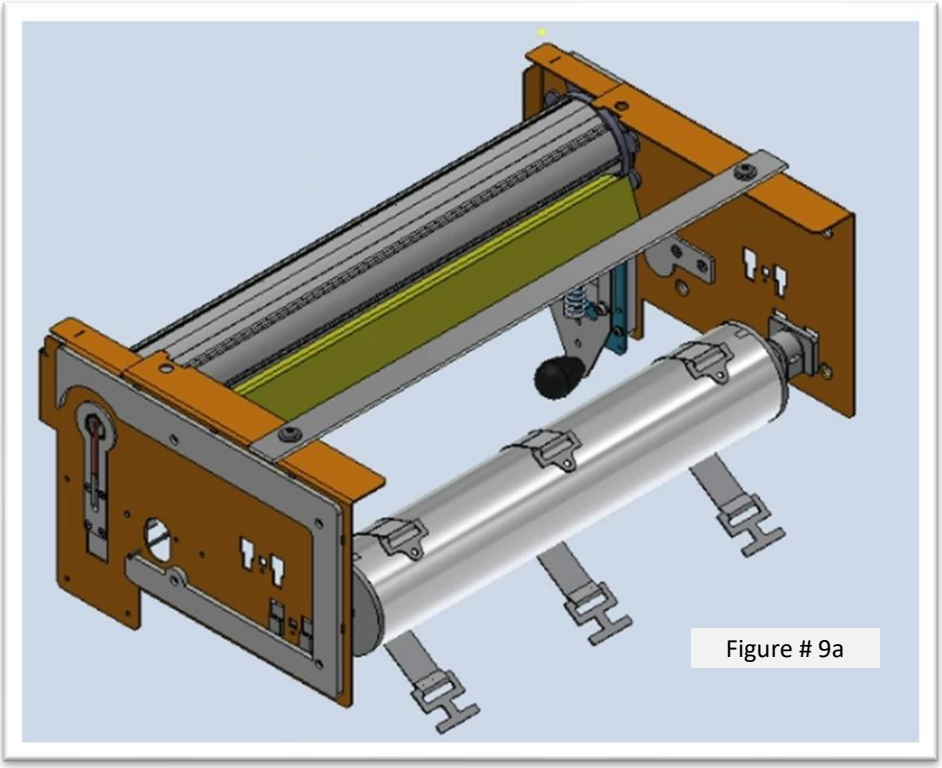

Figure # 9a

b) Typical standard pennant plates shown in Figure #9b. Similar on both sides. Pennant plates shown are illustrative and may vary depending on door geometry. Custom mounting holes should be resolved during approval drawing phase (pre-shipment). Installer can add/move installation points as needed.

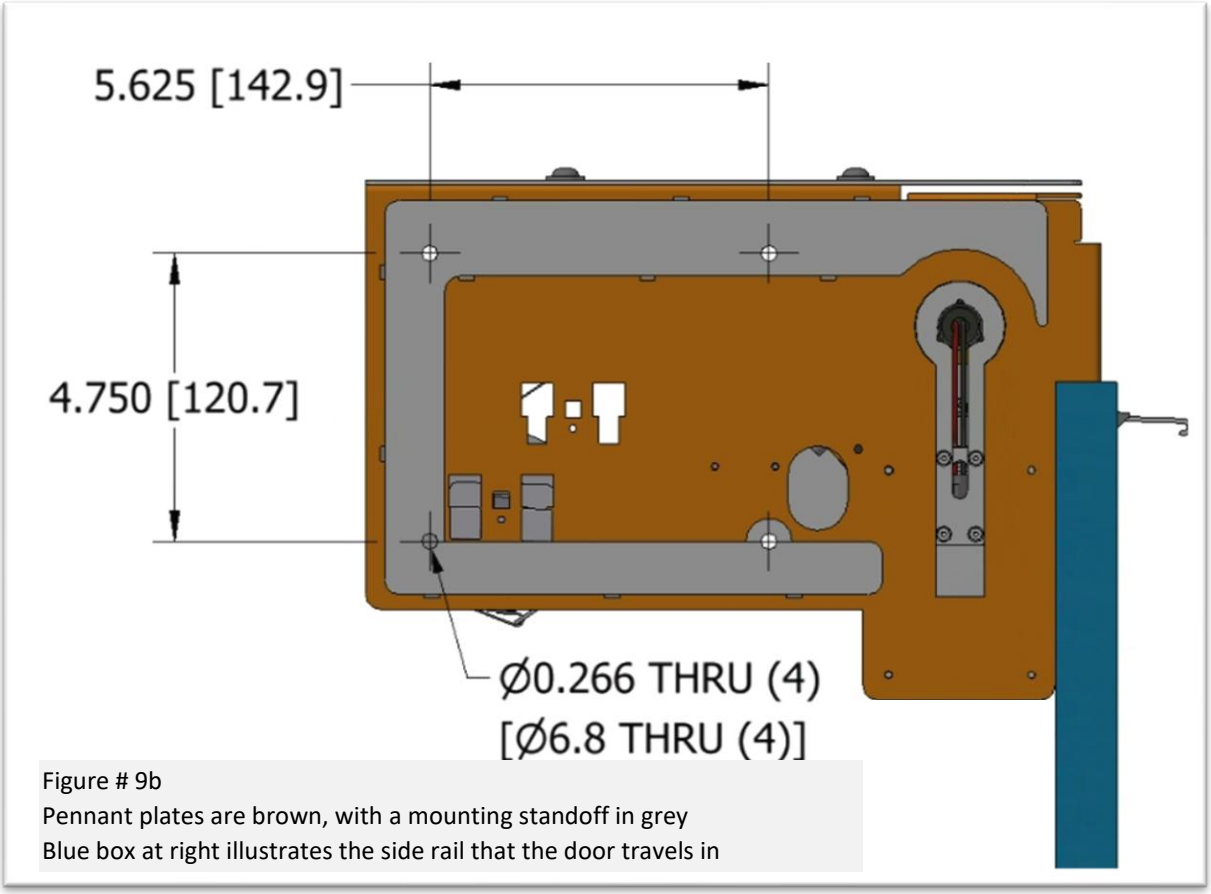

Figure # 9b
Pennant plates are brown, with a mounting standoff in grey
Blue box at right illustrates the side rail that the door travels in

c) The installer may use any appropriate mounting hardware and any thread-locking technology to ensure the hardware (NOT INCLUDED) does not back out due to vibration (self-tapping, split washers, adhesives, etc.).

d) Pennant plates (Figure 9b) must be mounted to surfaces in the same plane and/or width as the door opening.

e) For some applications, the pennant plates would be mounted flush against the compartment walls (Figures 9b & 9c)

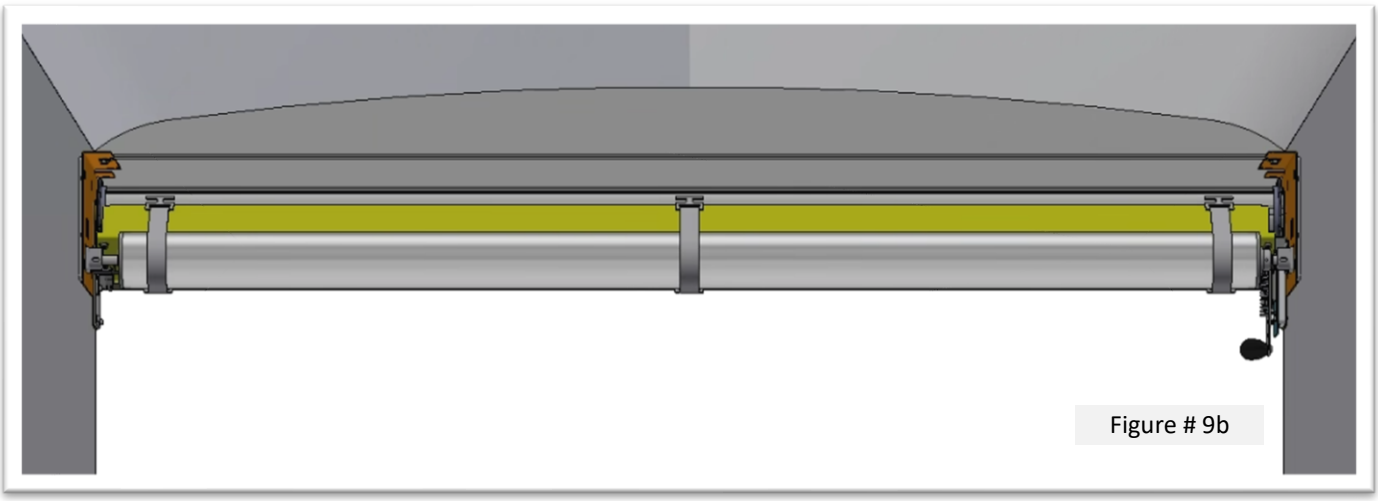

Figure # 9b

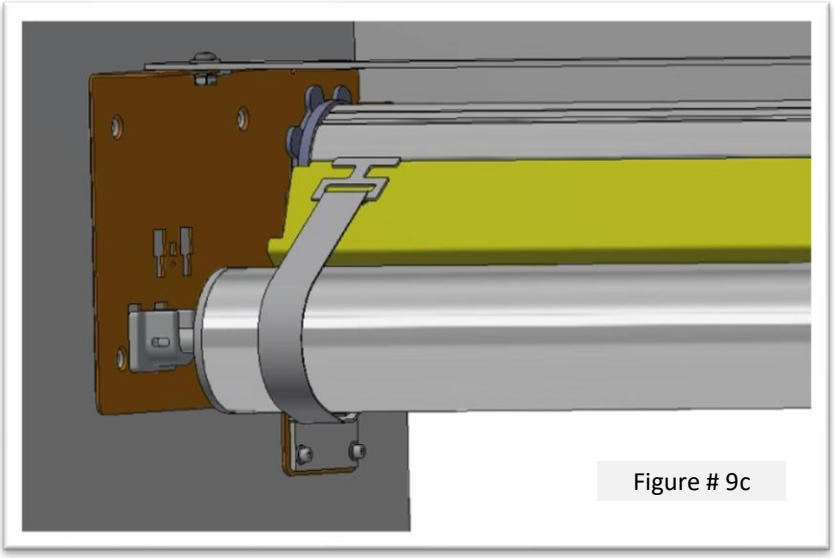

Figure # 9c

f) For some applications, the pennant plates would have to stand-off from the compartment walls to align with the door opening (Figure 9d)
   i) In these applications, **the installer is responsible for fabricating the stand-offs consistent with the geometry of the compartment.** Example stand-offs shown in purple in Figure 9d, 9e, and 9f.

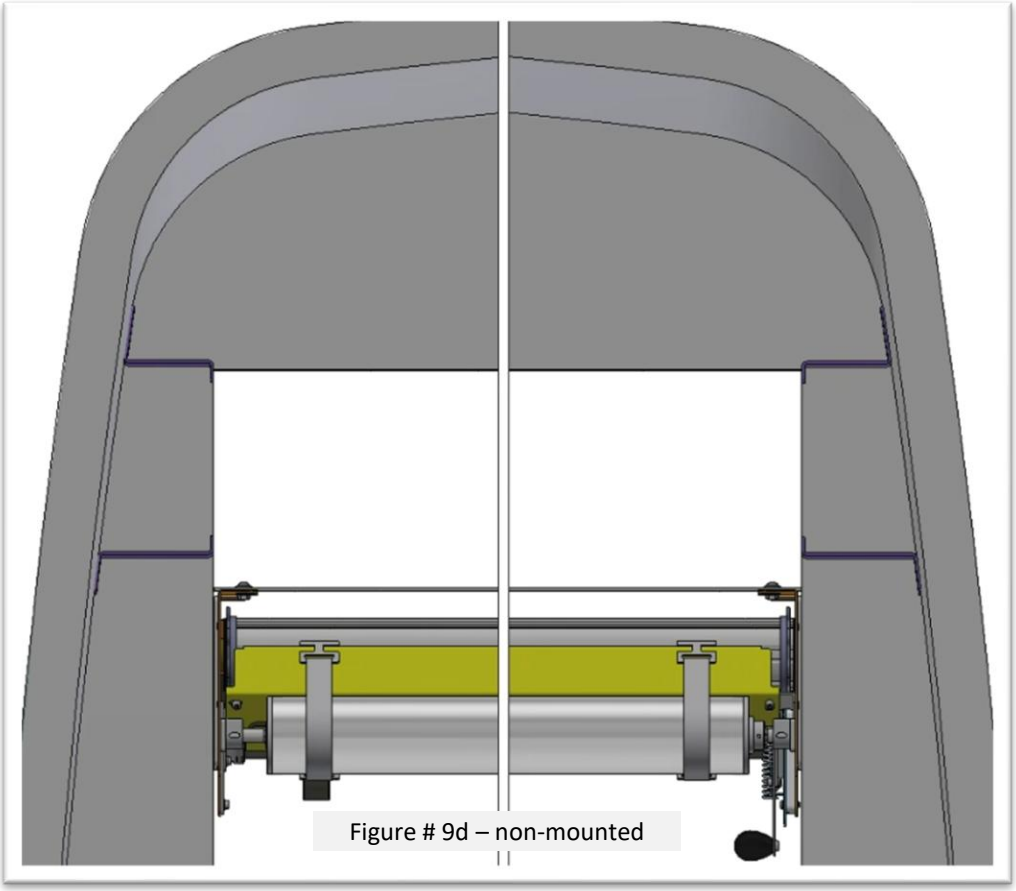

Figure # 9d – non-mounted

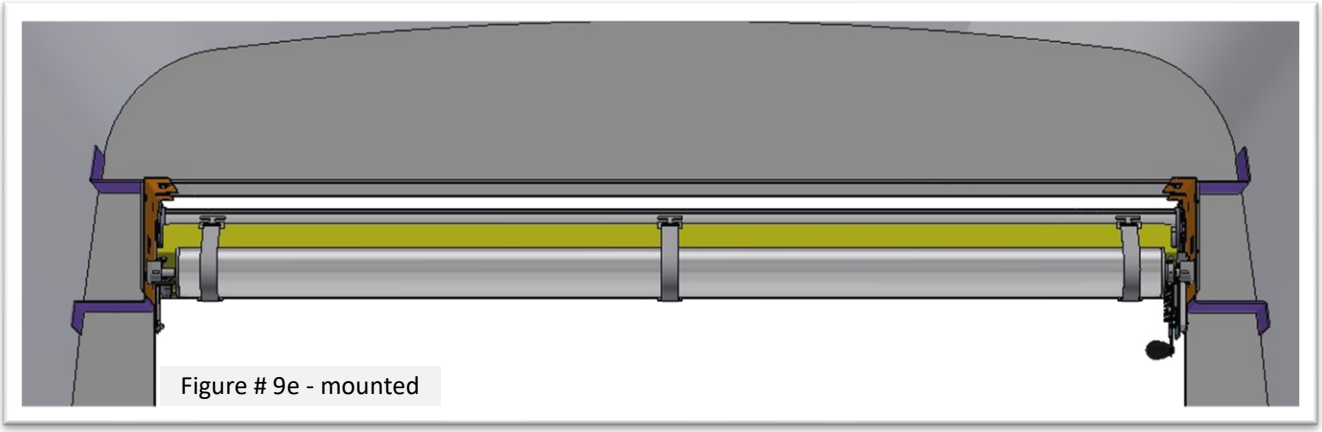

Figure # 9e - mounted

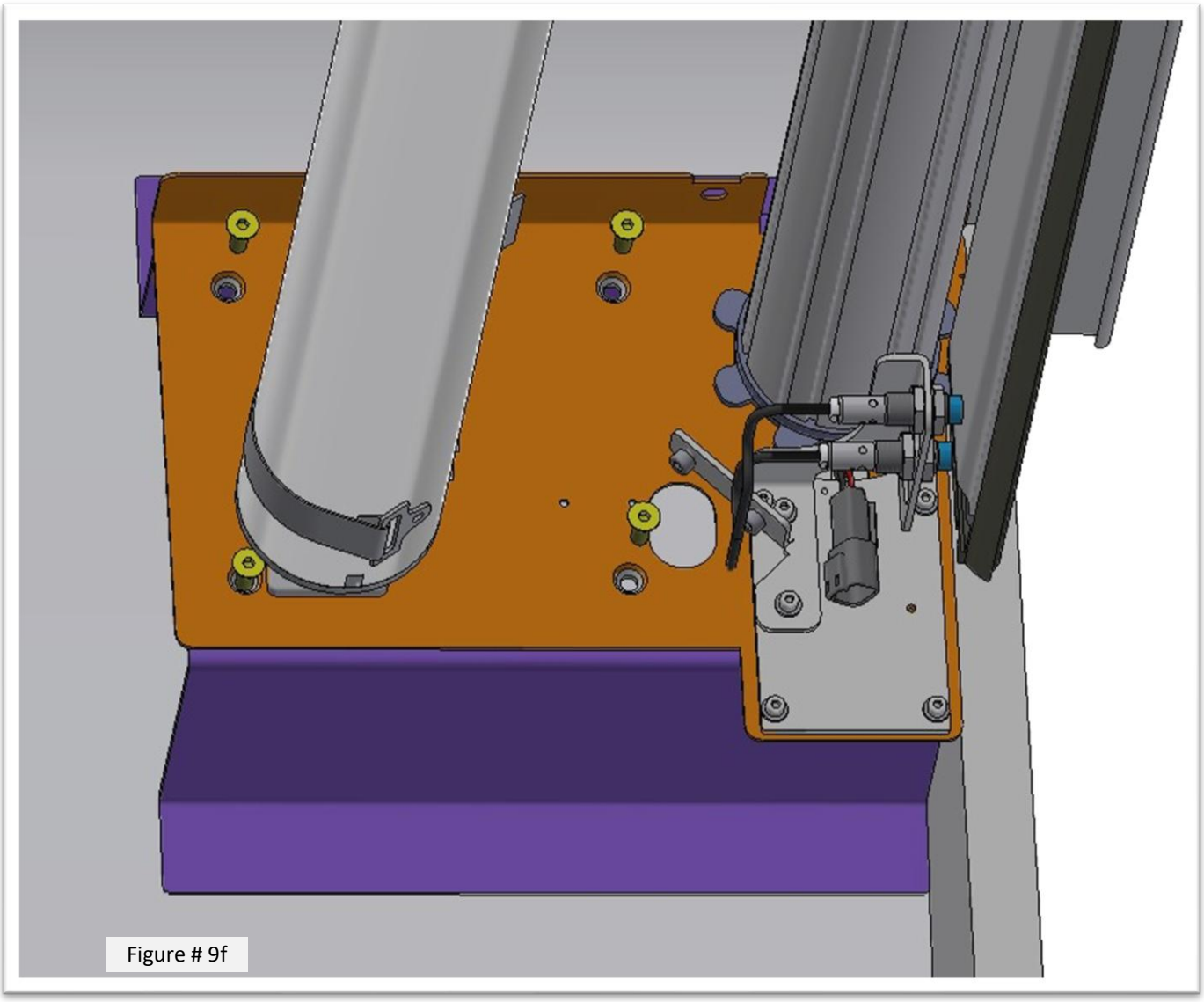

Figure # 9f

g) Fasten the pennant plates to each side of the compartment. The standard pennant plates have (4) mounting hole locations (Figure 9b). Use the appropriate fasteners supplied by the installer. These must be flat–head fasteners (typically ¼-20 or M6) to minimize interference with the door shade. The installer may use any appropriate thread-locking technology to ensure the hardware does not back out due to vibration.

h) The grey cross member (shown in Figure 9a) is included for some header rigidity through shipping and mounting. This may be removed during/after installation if it creates interference.

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10. MANUAL CLUTCH BYPASS

a) The section is an overview only – **no installer actions required in this education section.**

b) Dynatect's Powered Roll Up Doors feature a manual clutch bypass. This manual clutch bypass uncouples the motor from the drive drum to allow **manual operation during commissioning** or due to a power loss (door release).

c) The factory installed manual clutch is always on the opposite side of the motor wiring (Figure 10a). The motor/clutch configuration was specified at time of order (Figure 10b)

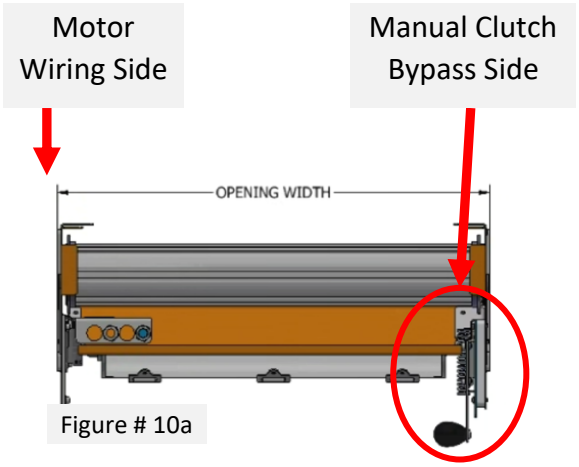


Figure # 10a

Figure # 10b

d) Activation is available from inside the vehicle/compartment and features a knob. Pull down on the knob to disengage the clutch and simultaneously operate the door manually (Figures 10c & 10d). This knob is accessible even with the anti-pinch guard installed. The clutch is spring loaded and will automatically re-engage when the knob is released.

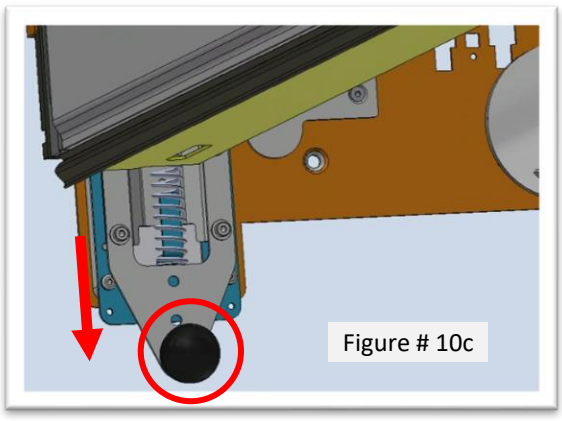


Figure # 10c

e) This video includes an overview of operating the manual clutch bypass
https://youtu.be/4aFc7qaDO3c?si=4-zK1-v-KGvPPVdX&t=350

Bypass Video

f) For the standard offering, this manual clutch bypass can only be accessed from inside the compartment with the knob. Activation from outside the compartment requires the optional Locked Paddle Handle for Power Loss Bypass (see SECTION 20. EXTERIOR MANUAL OVERRIDE).

g) Dynatect provides this sticker: “Bypass for Power Loss Only” (Figure 10d)

Figure # 10d

h) If the door is very tall, the installer may consider fabricating an extension for shorter operators. That extension could be connected to any combination of the three lowest holes circled in red on the plate shown in Figure 10e.

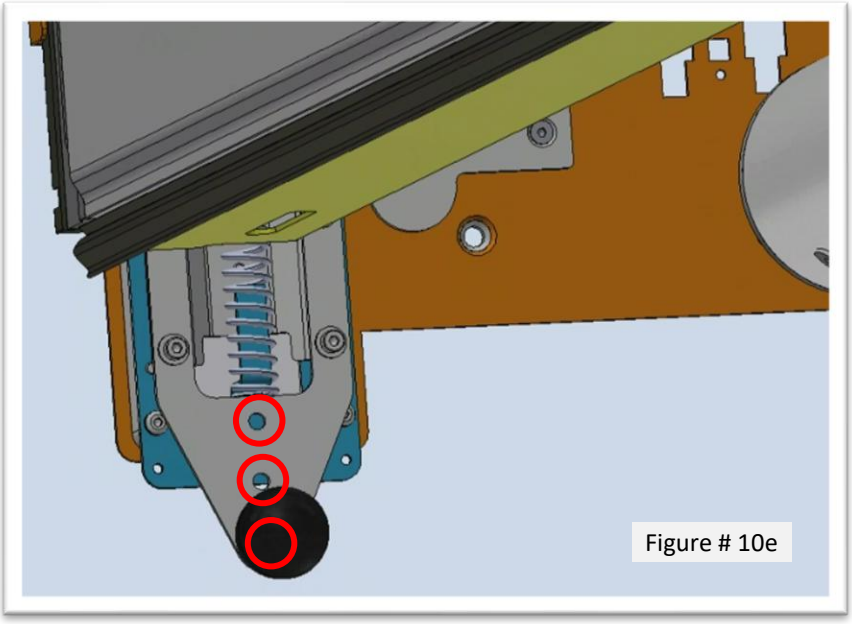


Figure # 10e

11. SHADE MOUNTING

a) Install the shade with straps over the drive tube (Figure 11a). Insert the attachment clips into the mounting slat (circled in red)

Figure # 11a

b) Before sliding the shade endcaps over the cogs of the drum drive, ensure the manual clutch bypass is pulled down allowing the drum drive to rotate freely (illustrated in Figure 10a)

c) Rotate the roller clockwise to relieve pressure on the hairpin and remove the hairpin. (Figure 11c)

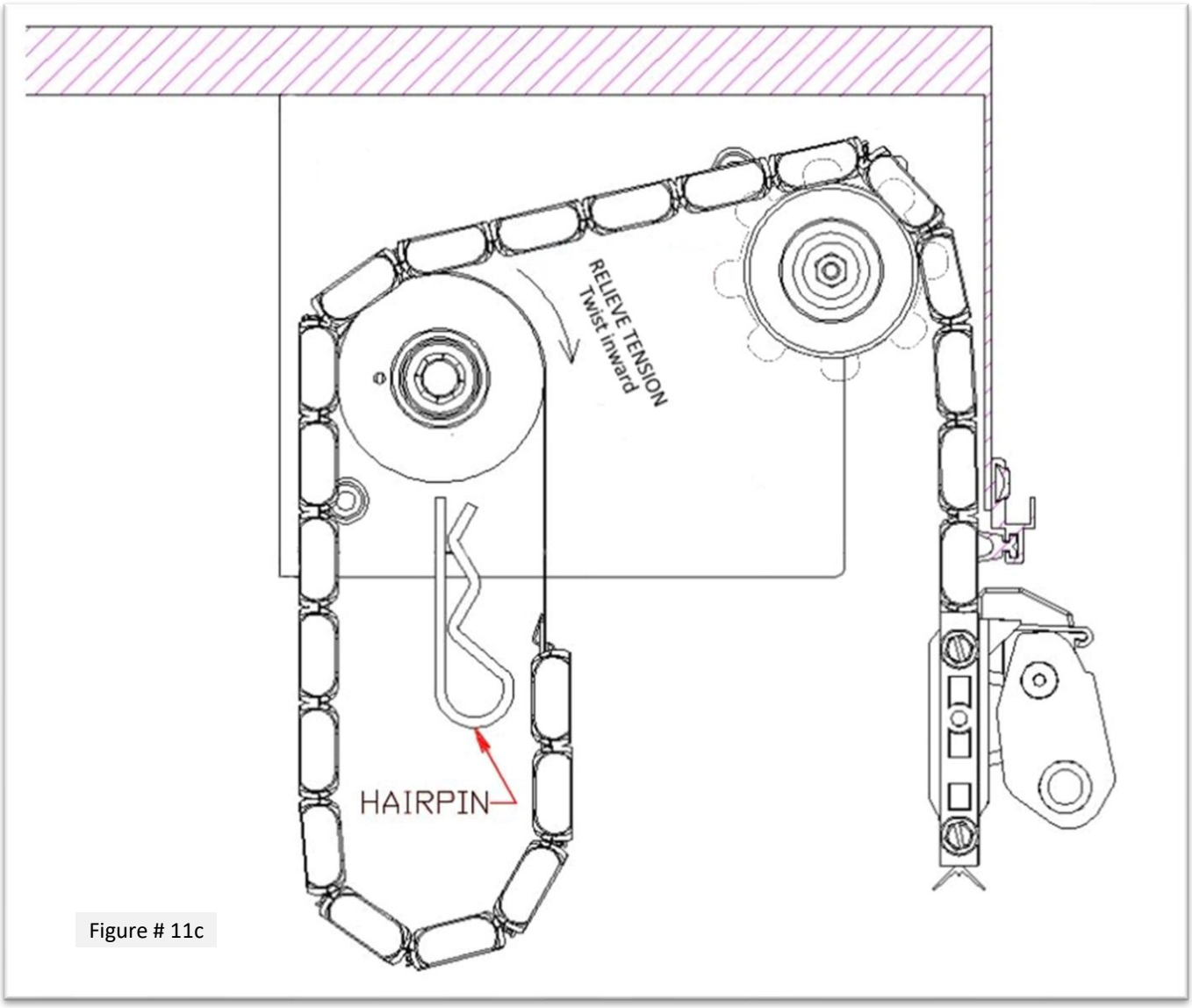


Figure # 11c

d) The pennant plates include integral shade retainers on the horizontal and vertical planes, circled in red, Figures 11d & 11e.

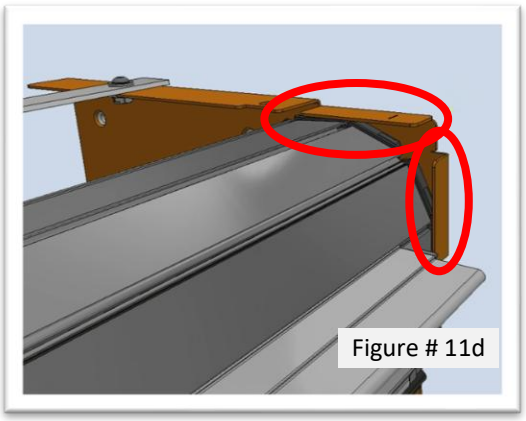


Figure # 11d

e) As shown in Figure 11e, slide the shade endcaps over the cogs of the drive drum and under the shade retainers. Continue feeding the shade over the roller assembly. Ensure that the drive drum cogs engage into the driven endcaps of the door assembly (both sides of the door). Ensure the shade assembly is parallel and square from left side to right side so it is even.

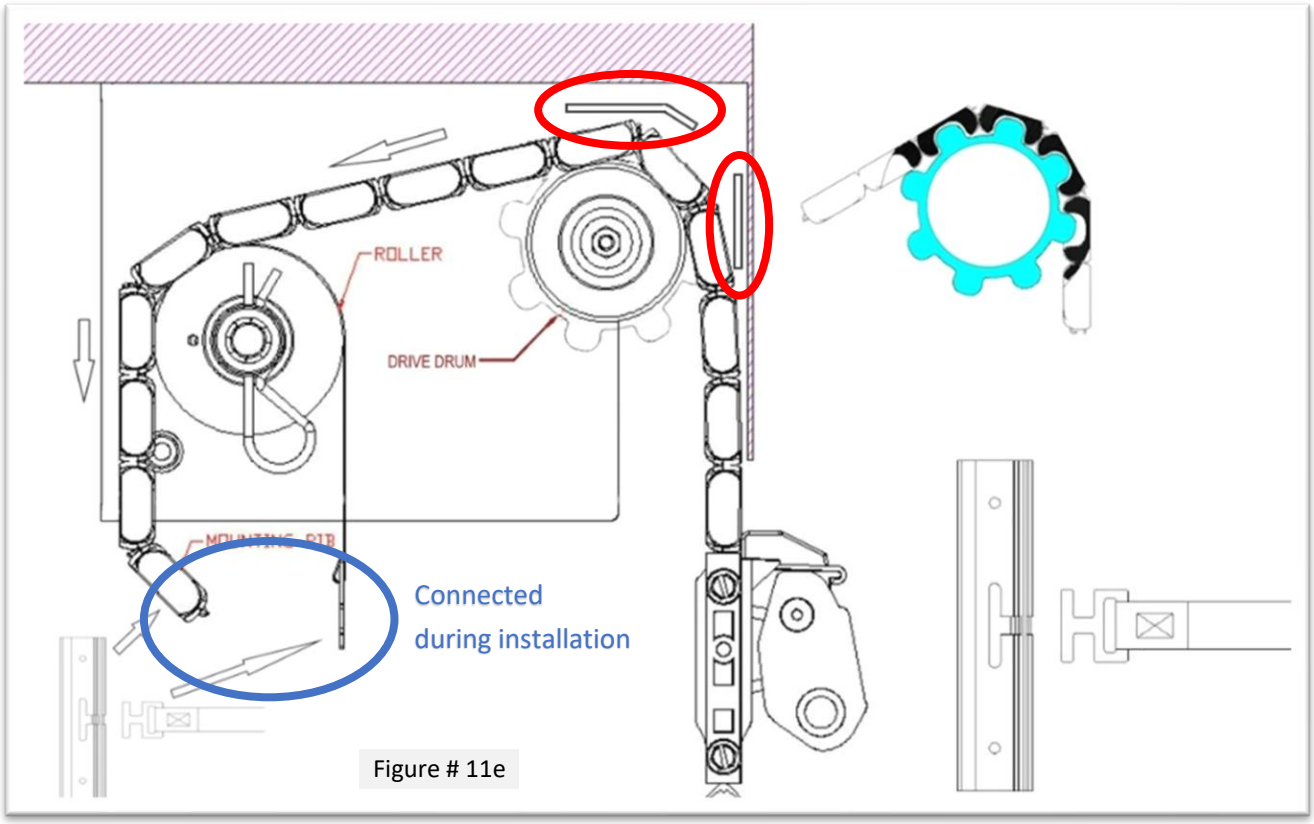


Figure # 11e

After sliding the shade endcaps over the cogs of the drum drive, ensure the manual clutch bypass returns to the up position (engaged) so that the drum drive does not rotate freely (circled in red on Figure 10a)

f) Install the Side Rail: slide the siderail around the bottom shade extrusion and rotate the rail so it aligns with the frame of the door. Align the holes (predrilled only) and attach to the compartment using fasteners of choice. The installer may use any appropriate mounting hardware and any thread-locking technology to ensure the hardware (NOT INCLUDED) does not back out due to vibration (self-tapping, split washers, adhesives, etc.). (e.g. #10 Self-tapping sheet metal screws.) See Figure #11f

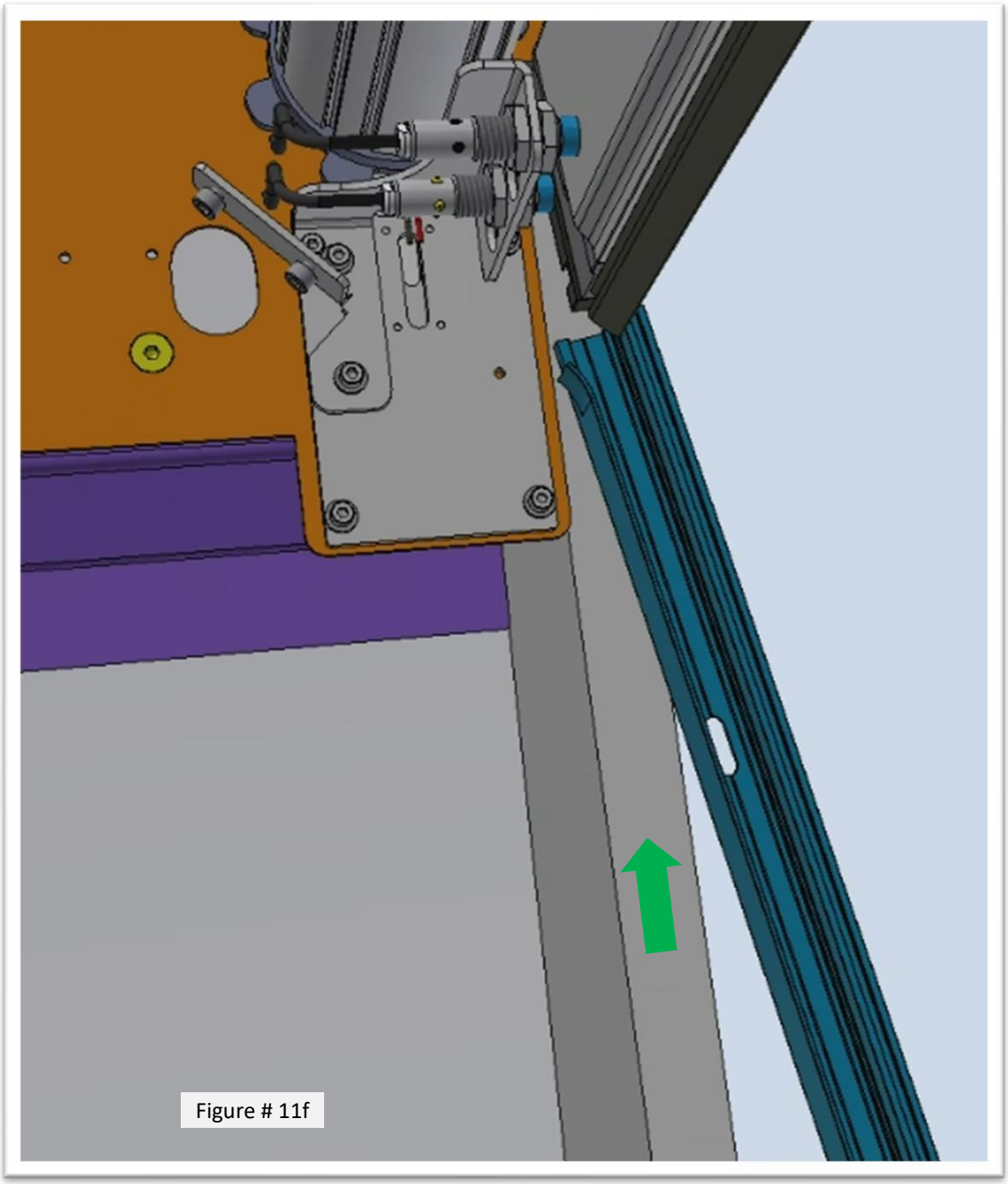


Figure # 11f

g) To secure the siderail: as needed, drill 11/64” holes ~12” apart and use fasteners of your choice. (e.g. #10 Self-tapping sheet metal screws). See example in Figure 11g.

Figure # 11g

12. BOLT COVER INSTALLATION*

*Optional (if ordered)

a) If the door was ordered with an optional bolt cover (for covering the top-rail, P-series side-rail, or universal side-rail), then the bolt cover may be snapped into place or slid into place. Any excess or overhanging bolt cover may be trimmed away flush. For additional security, but not required, a drop of Permabond® 910 under one end of the bolt cover permanently secures the bolt cover in place.

Figure # 12a

13. CONNECTING THE CONTROLLER

a) Voltage Tolerances:

a. 12 VDC controller range: 9.3 - 14.4 VDC
b. 24 VDC controller range: 20 - 28 VDC
c. The controller has a low voltage cutoff and will stop operating when the voltage dips below the low-voltage thresholds shown above. If the voltage returns from a low voltage back to nominal voltage, the controller will not automatically restart. In those exceptional circumstances, the controller will only operate again when the voltage is completely removed (disconnected) and re-applied.
For applications which may suffer from exceptional low voltage conditions, the installer may want to insert an inline disconnect/switch to the controller power for convenience of resetting the controller.
d. For applications which may suffer from exceptional loss of voltage, when the voltage goes to zero and returns to nominal, the controller will automatically restart.

b) Each wire harness on the controller has a unique connector.

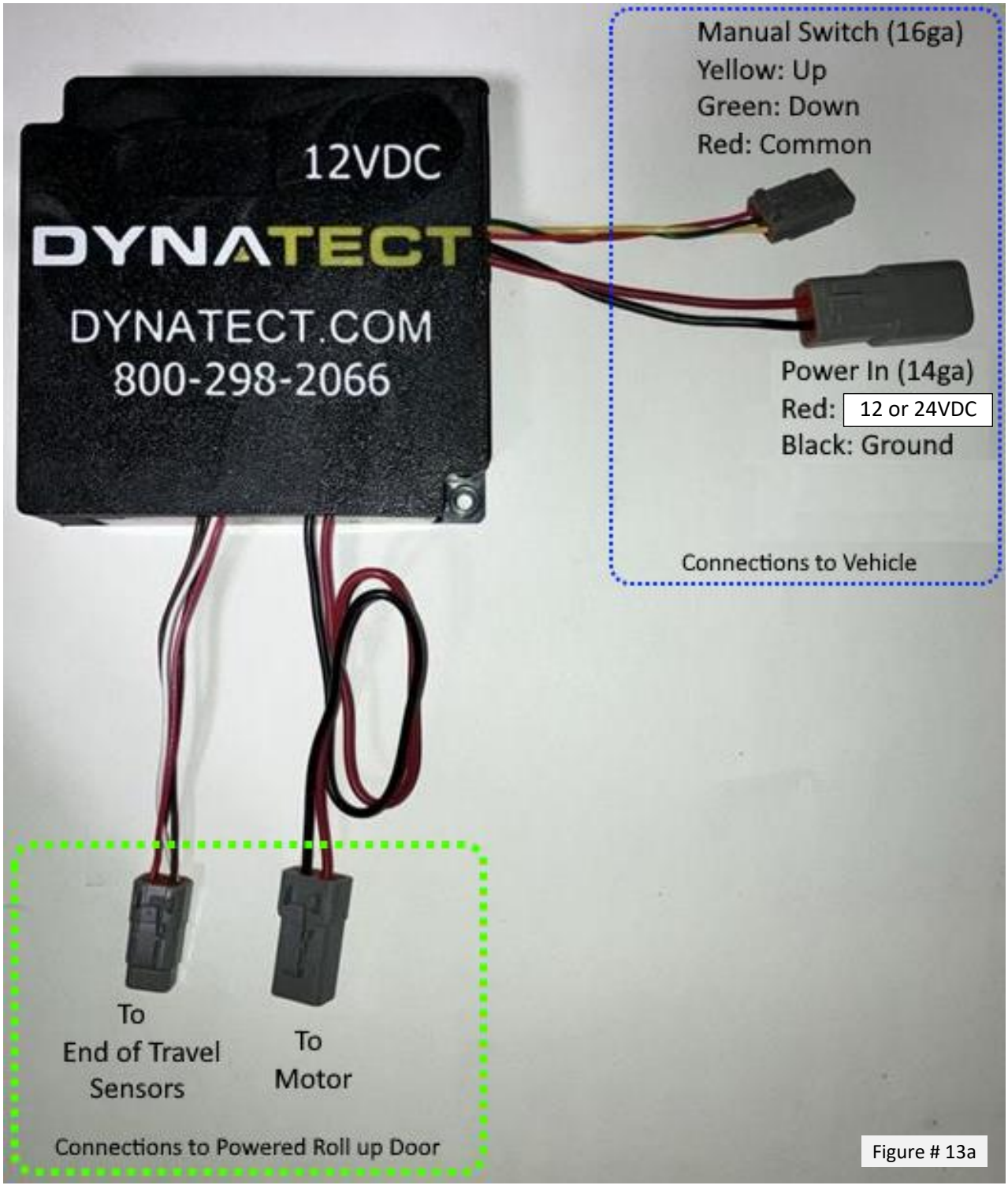


Figure # 13a

c) The installer should use any appropriate wire-ties and wire-mounts to secure wiring, minimize friction points, and avoid any mechanical interference (including moving parts).
d) The wires/connectors to the factory-supplied Powered Roll Up Door components all exit the same side of the controller and match pre-crimped connectors for the sensors and motor.
e) The wires/connectors to the vehicle-supplied power and manual switches all exit the same side of the controller. They will require matching connectors shown with asterisk in Figure 13b. These connectors are supplied loose by factory or supplied by installer using industry-standard Deutsch-style connectors.
f) All controller cables are 6" long. Any additional cable extensions/connectors are the responsibility of the installer (see Section 26. EXTENDING CABLES).
g) More information on manual switches in Section 14. MANUAL SWITCHES
h) The vehicle 12 or 24 VDC supplied power should only be applied in Section 18. ACTIVATING THE CONTROLLER

Function	Power In***	Manual Switch (Door-Up / Door-Down)**	End of Travel Sensors (Door-Opened/ -Closed)	Motor
Connector Positions	2	3	4	2
Controller Connector	DTP04-2P	DTM06-3S	DTM06-4S	DTP06-2S
Controller Pins/Sockets	1060-12-0166	1062-20-0122	1062-20-0122	1062-12-0166
Mating Connector	DTP06-2S*	DTM04-3P*	DTM04-4P	DTP04-2P
Mating Pins/Sockets	0462-203-12141*	0462-202-20141*	0462-202-20141	0460-204-12141
Wire Gauge	14GA	20GA	20GA	14GA
Pin1	Red/+12or 24 VDC	Red/+12 or 24 VDC	Red/+12 or 24 VDC	Red/+12 or 24 VDC
Pin2	Black/Ground	Green/Down	Black/Ground	Black/Ground
Pin3	NA	Yellow/Up	White/Opened Limit	NA
Pin4	NA	NA	Brown/Closed Limit	NA

*This connector and associated pins/sockets are supplied by Dynatect for installer to wire to the 12 or 24VDC source and two switches/contactors. Should the installer require additional connectors or pins/sockets, these are standard industry available parts that any installer/upfitter can access. The installer may require specialty tools for applying the Deutsch-style connectors Dynatect provides. Alternately, the installer may remove the existing connectors and replace with connectors compatible with the installer's standard.

** The door up and down conductors should be capable of conducting <0.1A at 12 or 24VDC (momentary contact).

*** The power conductors should be fused and capable of delivering at least 15A at 12 or 24 VDC.

Deutsch-Style Connector suffix:
P = Pin connector
S = Socket connector

Figure # 13b

14. MANUAL SWITCHES*

*Optional (if provided by installer)

a) The Dynatect Powered Roll Up Door can be operated by Up/Down commands from:
   a. Dynatect FOBs (one included with every Dynatect controller)
   b. Installer provided manual switches (switches are optional since FOB is included)
   c. Both Dynatect FOB and installer manual switches

b) The manual switch harness from the Dynatect controller contains +12 or 24 VDC (Pin 1) which should integrated through installer-provided normally open dry contacts. Each contact would close to activate the respective command for “UP/OPEN” (green wire), or “DOWN/CLOSE” (yellow wire). These dry contacts could be a switch or relay possibly controlled by the Body Control Module. The door up and down contacts should be capable of conducting <0.1A at 12 or 24VDC (momentary contact). Momentary signals must be at least 50 ms.

c) If switches are used, they are provided and wired by the installer. Typically they are momentary switches, either:
   a. Separate momentary buttons/switches
   b. One momentary, spring return to center three-position switch

   No changes are required to the Dynatect controller for either of the above options.

   If a sustained switch is used, the Controller must be used in the “Discrete Door Movement” mode outlined below.

d) Regardless of switch or contacts used, there is a 0.5 second delay that must be met after the motor turns off to activate the motor in the opposite direction.

e) The Controller can be factory programmed or field programmed for two different styles of door control outputs:
   a. **Full Travel Door Movement** (typical for vehicle applications):
      i. The door will move to full-open or full-close after the corresponding input signal is momentarily applied (pulse).
         1. Example: The door will move to the fully closed position when the FOB close button is pressed and immediately released.
      ii. The input signal can be from the hardwire input, the FOB, or the 12-button keypad.
      iii. The door movement is still limited by any one of three safety conditions (end of travel sensors, maximum current, and max time).

   b. **Discrete Door Movement** (exceptionally used for specialty applications):
      i. The door will only move as long as an input signal is applied. When the input signal is released, the door will stop moving.
         1. Example: The door only moves while the manual switch or FOB button is pressed and held, then immediately stops when the button is released.
      ii. The input signal can be from either the hardwire input manual switch or the FOB. This mode does not work with a 12-button keypad.
      iii. The door movement is still limited by any one of three safety conditions (end of travel sensors, maximum current, and max time).

Programming the controller for each mode does not need to be addressed at this stage, and is covered in section 18. ACTIVATING THE CONTROLLER

15. ANTI-PINCH GUARD INSTALLATION

a) Dynatect is the only Powered RUD offering which offers an anti-pinch guard by default (shown in yellow, Figure 15a). This protects from incidental contact with the motorized tube and cogs that raise and lower the door.

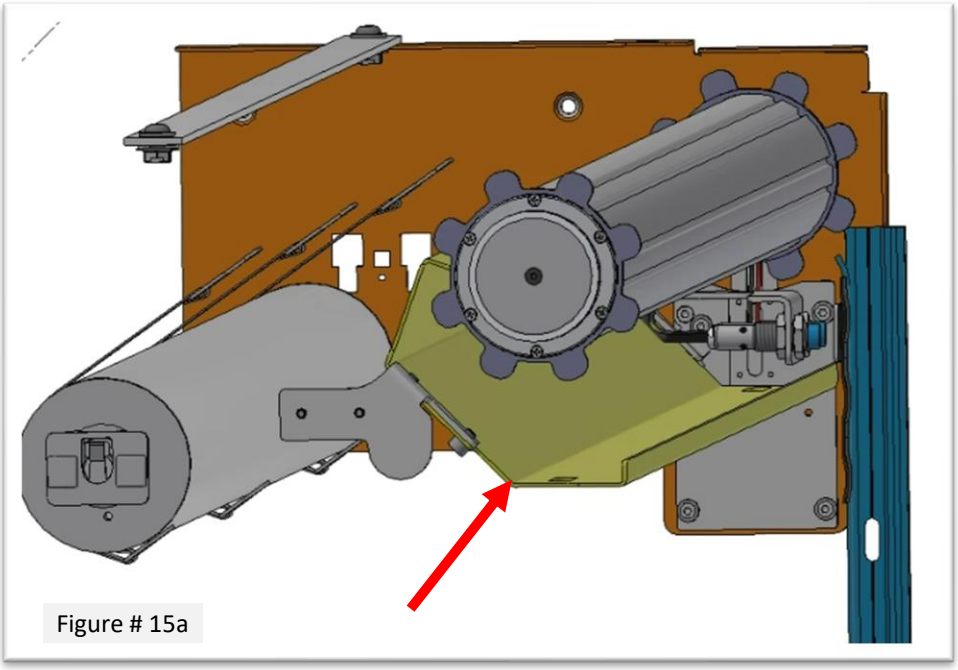


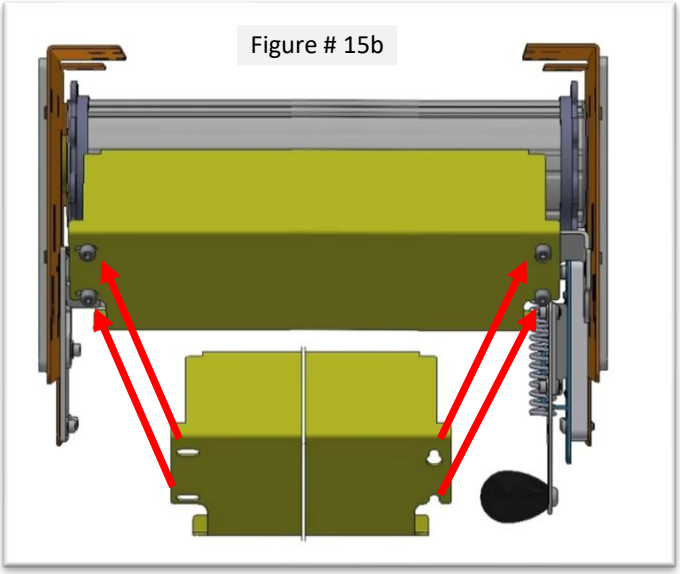
Figure # 15a

b) A brief video of the anti-pinch guard being installed can be seen here: https://youtu.be/4DPyw2fCtf8?t=95

Guard Video

c) There are (4) factory-installed bolts in the header (2 per side). Remove these (4) bolts, then align the (4) connection points of the anti-pinch guard with the exposed tapped holes, and re-apply the (4) bolts to secure the guard (red arrows, Figure 15b).

Figure # 15b



16. END-OF-TRAVEL SENSORS AND TARGETS OVERVIEW

a) The section is an overview only – **no installer actions required in this education section.**
b) This page outlines the sensor functions to facilitate any exceptional troubleshooting.
c) Every door has two factory-installed end-of-travel sensors (proximity sensors) and metal end-of-travel targets. One sensor/target combination measures that the door is fully open, and one sensor/target combination measures that the door is fully closed. When either sensor sees the end-of-travel target, the door quickly stops moving, subject to the weight and inertia of the door.
    a. This two-sensor system is illustrated in this video: https://youtu.be/4DPyw2fCtf8?t=74
    b. The system is wired through the normally closed contacts, any wire-break also results in a door stop.

Sensor Video

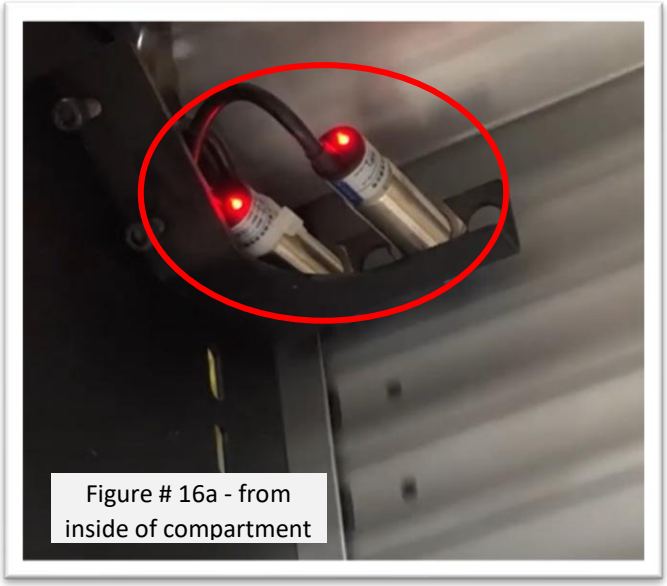


Figure # 16a - from inside of compartment

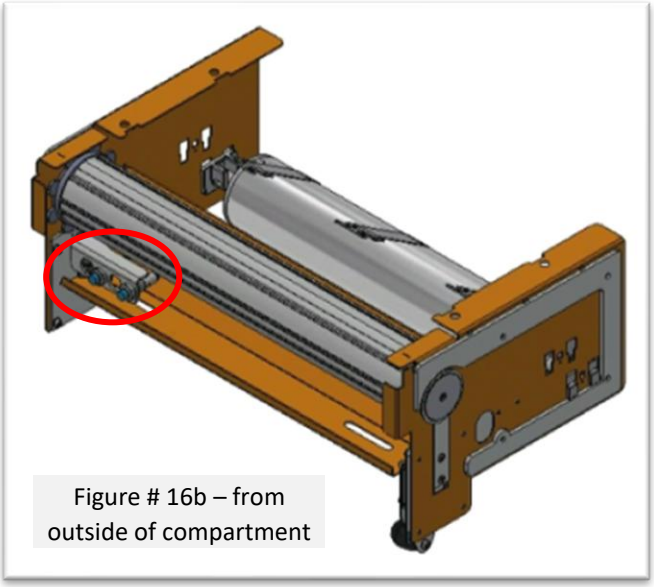


Figure # 16b – from outside of compartment

d) The targets are affixed using hook/loop fasteners. These are applied and tested at the factory before shipping and should not require field modification. In the unlikely case that the door is not closing at the desired location, there is a strip of hook/loop pads applied across several slats of the shade (Figures 16c, 16d, 16e). The target can be removed from one location and moved anywhere along the fasteners, even across two slats.

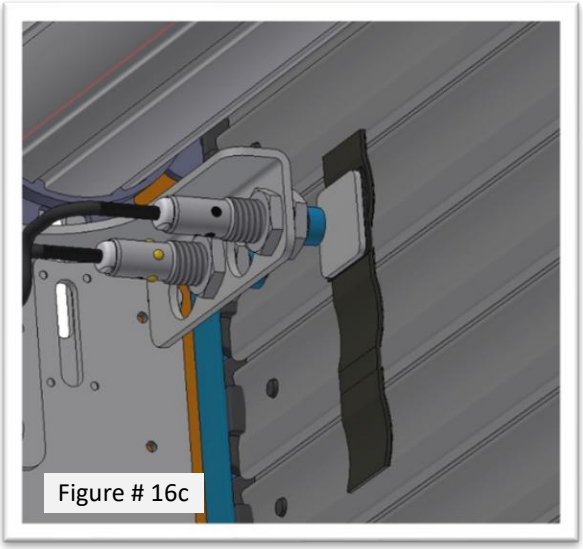


Figure # 16c

Figure # 16d

Figure # 16f

e) In the unlikely event that further field modification is required, a new adhesive hook/fastener could be applied. As with any adhesive, it is important to prep the surface with rubbing alcohol or equivalent and use new adhesive for a permanent connection that will last the life of the door.

f) In the unlikely event that the sensor positions have been changed from the factory tested positions, it is CRITICAL that the sensors positions be re-calibrated and secured in the field.
    a. Each sensor should be powered and evaluated for both:
        i. Position where the sensor does see the target (sensor diagnostic light off)
        ii. Position where the sensor doesn't see the target (sensor diagnostic light on)
    b. This may span several millimeters for the sensor
    c. The sensor should then be re-secured at the mid-point of those two positions for reliability with varying field conditions
    d. The sensor is secured with two threaded nuts. These nuts must be tightened with a tool to minimize loosening due to application vibration, possibly using a threadlocker product

17. TRAVEL FAILSAFE OVERVIEW

a) The section is an overview only – **no installer actions required in this critical education section.**

b) The controller (Figure 17a) has a removable configuration cover to access settings only used in the commissioning of the door. This cover is friction fit, can be removed by gently prying with a small flat blade screwdriver at the far right or left side of the widest dimension.

c) NOTE: The controller on motorized bed covers may be mounted upside down for most efficient wire routing. The relative positions of the switches remain the same, but the orientation may be rotated. (Figure 17b)

Figure # 17a

Figure # 17b

d) If there is an obstruction (like a box or misalignment) preventing the door from fully closing, there are two additional safety systems that will turn off the motor:
   a. Maximum Current – when reached, the motor stops and reverses
   b. Maximum Time – when reached, the motor stops

e) If there is an obstruction (like misalignment) preventing the door from fully opening, there are two additional safety systems that will turn off the motor:
   a. Maximum Current – when reached, the motor stops
   b. Maximum Time – when reached, the motor stops

f) Maximum Current (Figure 17a):
   a. This feature is a safeguard that senses if the door motor is drawing too much current, an indication that the door may have interference in the form of a blockage or obstruction. **If the current draw exceeds the Maximum Current switch setting while closing, then the door will stop and reverse to the full-open position.** If the current draw exceeds the Maximum Current switch setting while opening, then the door will stop.
   b. The 16-position rotary hex switch ranges from 0.5 - 15 Amps (labeled 0-9, and A-F) in ~1 Amp increments.

Maximum Current Rotary Switch Settings	
"0" = 0.5 Amps	"8" = 8 Amps
"1" = 1 Amp	"9" = 9 Amps
"2" = 2 Amps	"A" = 10 Amps
"3" = 3 Amps	"B" = 11 Amps
"4" = 4 Amps	"C" = 12 Amps
"5" = 5 Amps	"D" = 13 Amps
"6" = 6 Amps	"E" = 14 Amps
"7" = 7 Amps	"F" = 15 Amps

   c. The lowest Amp setting results in the least force needed for obstruction detection/door-reverse
   d. Dynatect factory tests the door and applies the operable setting that worked with the factory test to this switch

g) Maximum Time (Figure 17a):
   a. This feature is a safeguard that limits the time the door continuously tries to close even if the door is blocked and the Maximum Current has not activated. **If the time exceeds the Maximum Time switch setting while opening or closing, then the door will stop.**
   b. The 16-position rotary hex switch ranges from 2 - 18 seconds (labeled 0-9, and A-F) in varying increments.

Maximum Time Rotary Switch Settings	
"0" = 2 Seconds	"8" = 8 Seconds
"1" = 2.5 Seconds	"9" = 9 Seconds
"2" = 3 Seconds	"A" = 10 Seconds
"3" = 3.5 Seconds	"B" = 11 Seconds
"4" = 4 Seconds	"C" = 12 Seconds
"5" = 5 Seconds	"D" = 14 Seconds
"6" = 6 Seconds	"E" = 16 Seconds
"7" = 7 Seconds	"F" = 18 Seconds

   c. Dynatect factory tests the door and applies the operable setting that worked with the factory test to this switch

18. ACTIVATING THE CONTROLLER

a) Read this entire section before taking the actions, as several steps are time dependent.

Figure # 18a

Figure # 18b

b) Descriptions:

a. Controller: Black square box with small removable panel to adjust rotary switches and pairing button (Figure 18a). The controller accommodates input through hardwire signal, the remote/FOB, or a 12-button keypad

i. Cover: The controller has a removable configuration cover to access settings only used in the commissioning of the door. This cover is friction fit, can be removed by gently prying with a small flat blade screwdriver at the far right or left side of the widest dimension.

ii. Diagnostic LED – Education only – No installer Actions – located beneath the cover

1. Power On: Light flashes once
2. Motor On: Light steady on
3. Obstruction Interference (Maximum Current) and Door is Reversing to open position: Light flashes during reverse motion
4. Program FOB Synchronization: Light steady on

b. FOB: Black rectangular remote with two pushbuttons (Figure 18b).

i. Every controller comes with 1 remote control FOB.

ii. Up/Open button on left

iii. Down/Close button on right

c) The Controller can be factory-programmed or field-programmed for two different styles of door control outputs:
   a. **Full Travel Door Movement** (typical for vehicle applications):
      i. The door will move to full-open or full-close after the corresponding input signal is momentarily applied (pulse).
         1. Example: The door will move to the fully closed position when the FOB close button is pressed and immediately released.
      ii. The input signal can be from the hardwire input, the FOB, or the 12-button keypad.
      iii. The door movement is still limited by any one of three safety conditions (end of travel sensors, maximum current, and max time).

   b. **Discrete Door Movement** (exceptionally used for specialty applications):
      i. The door will only move as long as an input signal is applied. When the input signal is released, the door will stop moving.
         1. Example: The door only moves while the manual switch or FOB button is pressed and held, then immediately stops when the button is released.
      ii. The input signal can be from either the hardwire input manual switch or the FOB. This mode does not work with a 12-button keypad.
      iii. The door movement is still limited by any one of three safety conditions (end of travel sensors, maximum current, and max time).

d) To pair the FOB(s) to the controller:
   a. NOTE: **When the controller enters program mode (FOB pairing button), all previous FOB addresses that were programmed will be erased from the receiver's memory.** Each FOB has a unique internal address to pair with one or more controllers. The controller needs to be programmed to respond only to the specific FOB(s) it is intended to operate with.
   b. Disconnect vehicle power to the controller
   c. To prevent any unintended operation, disconnect the wiring harness between the controller and the motor
   d. Connect vehicle power to the controller
   e. Detach the removable configuration cover and **put in a safe place to re-apply**.
      i. The controller has a removable configuration cover to access settings only used in the commissioning of the door.
      ii. This cover is friction fit and can be removed by gently prying with a small flat blade screwdriver at the far right or left side of the widest dimension.
   f. On the controller, press and hold the FOB pairing button until the red diagnostic LED is steady on, then release the button. Typically press and hold for 3 seconds to enter program mode.
   g. To pair FOB(s) and configure EITHER of the desired door movement (definitions above):
      i. **Discrete Door Movement**:
         1. Press and release the FOB UP button **once** (blue FOB light will illuminate)
         2. Verify that the controller red diagnostic LED extinguishes and then illuminates (blinks off once)
         3. Proceed to Step-h

ii. **Full Travel Door Movement:**
    1. Press and release the FOB UP button **twice** in quick succession (blue FOB light will illuminate with each press)
    2. Verify that the controller red diagnostic LED extinguishes and illuminates several times (blinks rapidly)
    3. Proceed to Step-h

h. Quickly repeat Step-g for pairing any additional remotes (up to 30). The controller will wait ~5 seconds for any additional remote pairing before automatically exiting the pairing mode.
    i. If pairing a 12-button-keypad, execute the keypad pairing before the FOB pairing.
    ii. NOTE: Discrete or Full Travel Door Movement is determined by the last FOB that is programmed to the controller.

i. With no remote input for ~5 seconds, the controller light will rapidly blink dimmer then off. The FOB(s) and controller are paired for operation. The controller is now in the normal mode of operation. The remote pairing is persistent, even if the controller loses power.

j. Disconnect vehicle power to the controller

k. Reconnect the wiring harness between the controller and the motor

l. Connect vehicle power to the controller

m. **DO NOT ACTIVATE DOOR MOTION until instructed to do so in Section 19. CONFIGURING DOOR TRAVEL [step 19 a) c]**

n. Additional details about the FOB are included in Section 22. FOB Q&A

19. CONFIGURING DOOR TRAVEL

a) Verifying Door-Movement:

a. Dynatect factory assembles and tests all power roll up doors before shipping and sets the "Maximum Time" and "Maximum Current" switches to settings that worked in the factory environment.
   i. See Section 17. TRAVEL FAILSAFE OVERVIEW
   ii. Dynatect establishes the minimum settings of each switch for that exact door using our factory test station with a DC power supply and applied to a square/plumb installation.
   iii. To account for field installation variability, field voltage variability, or misalignments that may evolve during the life of the product, Dynatect further increments both the Current and Time setting +1 position.
   iv. The door controller ships with these Current and Time settings from the factory. These settings normally work without adjustment for field door installation.
   v. When signaled to open or close, if the door doesn't move at all, verify if power polarity to the controller is reversed from intended polarity and apply correction. See SECTION 11. CONNECTING THE CONTROLLER.

b. **For the next steps, use the manual clutch bypass to release and manually open or close the door.** This may require using another hand to move the roller. See Section 10. MANUAL CLUTCH BYPASS

c. Note that "Door Open" or "Door Close" movements can be manually halted mid-travel by sending the opposite signal (example: pressing the opposite button on the FOB).

d. Use the manual clutch bypass to ensure the door is fully closed. Then press the FOB up/open button.
   i. The door should fully open. **If the door stops before reaching fully open, advance to section 19.c) Adjusting Door Movement.**

e. Use the manual clutch bypass to ensure the door is fully open. Then press the FOB down/closed button.
   i. The door should fully close. **If the door stops and/or reverses, advance to section 19.c) Adjusting Door Movement.**

f. Cycle the door open and close several times to ensure consistent operation.

b) Door Obstruction Detection:

a. This video illustrates how the door should respond to an obstruction: https://youtu.be/4DPyw2fCtf8?t=56

b. With the door fully open, place a disposable object like a box squarely in the path of the door. For initial testing, an object over 6" tall is ideal.

c. Signal the door to close. The door will impact the object momentarily, then reverse.
   i. If the door does not stop and reverse, or if there are concerns about closing force, read all of **Section 19.d) Adjusting Controller Settings** before making changes to the settings.

Obstruction Video

d. Consider recording the positions of the "Maximum Time" and "Maximum Current" switches for future reference.

e. Reinstall the removable configuration cover.

f. If the controller has not already been mounted, now mount the controller (see Section 4. MOUNTING THE CONTROLLER. Ensure that all power and control wiring is appropriately secured to prevent snagging. Cover with sleeving/looms as needed.

g. This completes standard door installation/commissioning the remainder of this manual is optional/reference.

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c) **Adjusting Door Movement** (Optional – Exceptional):
   a. If the previous door open and close actions work well, then this section is not needed.
   b. If the door does not execute full open and close travel when installed, re-evaluate if:
      i. Corrections or adjustments need to be made to ensure the door is square/plumb. Check and correct any alignment or friction points.
      ii. The voltage at the input of the controller remains a nearly steady 12 or 24VDC. If the voltage dips more than 1-volt during operation, consider:
         1. Supplying power with larger conductors to minimize voltage drop.
         2. If supplied by a DC power supply, ensure that power supply is sized correctly for the current drawn. Power supplies may have an adjustment to incrementally increase the voltage so there is 12 or 24VDC at the input of controller.
   c. If these field installation countermeasures have been exhausted, and if the door still will not execute full travel in either direction, proceed to **19.d) Adjusting Controller Settings**,
   otherwise return to **19.a) Verifying Door-Movement**

d) **Adjusting Controller Settings** (Optional – Exceptional):
   a. If the previous door open and close actions work well, then this section is not needed.
   b. Understanding door travel (no action in this step):
      i. “End-of-travel sensors”, “Maximum Time”, and “Maximum Current” are redundant systems, and any one threshold being reached may cause the door to stop.
      ii. While closing, if the door stops and reverses, then the Maximum Current setting has been triggered. There may be obstructions (including side rail friction), or the setting may need to be increased.
      iii. While closing, if the door stops without reversing, then the Maximum Time setting has been triggered. There may be obstructions (including side rail friction), or the setting may need to be increased.
      iv. “Door Open” or “Door Close” movements can be manually halted mid-travel by sending the opposite signal (example: pressing the opposite button on the FOB)
      v. Before each retesting of door closing, return the door to the fully open position using either the door open command or the manual clutch bypass.
   c. Understanding End of Travel Sensors:
      i. The door will stop with one of the end-of-travel sensors aligned with the end-of-travel target. It is possible that when stopping, due to the weight the door, the end-of-travel target will drift slightly past the end-of-travel sensor. This can be normal, and the controller logic compensates for this. This additional travel also helps seal the door to the sill plate. If the door and sill plate do not seal (exceptional condition), then move the end-of-travel target to a new location as outlined in **Section 16. END-OF-TRAVEL SENSORS AND TARGETS OVERVIEW**
      ii. The controller “remembers” the last sensor input. If the door has been moved using the manual clutch bypass, and is no longer fully open, the operator will still need to send a “door close” signal again, before a “door open” signal is recognized.

d. The rotary hex switches include a small arrow indicating the setting (Figure 19a). Seeing these small letters and numbers recessed in the controller may require a flashlight.

Figure # 19a

e. **Before adjusting either of the hex switches, record the positions of the factory settings.** This provides a future troubleshooting baseline for switch positions.
f. Use the manual clutch bypass to ensure the door is fully open. Using a small screwdriver, adjust the 16-position Maximum Current rotary hex switch in a **single** increment (1A) clockwise (increasing). Signal the door to close.
    i. If the door does not fully close (stops and/or reverses), use the FOB or the manual clutch bypass to return the door to fully open, increment the Maximum Current switch an additional **single** increment, and retest.
    ii. It is exceptional, but possible that the door will take longer (more seconds) to open than the factory settings. If during the close action the door stops and does NOT reverse, then the maximum time has been reached. The Maximum Time switch can also be increased in **single** increments to achieve full travel.
    iii. Repeat single increments as necessary to achieve full close movement.
g. With full door-close movement achieved, test full door-open movement, adjusting the switches as needed to achieve full close movement.
h. Execute the instructions for **19.b) Door Obstruction Detection**, adjust the Maximum Current switch as needed, then advance to the next step below.

i. Once the door fully open, fully closed, and obstruction detection features are all working, the two rotary hex switches have been tuned to their minimum operating value. Due to variations in operating conditions during the life of the door (knocked out of plumb, varying voltages, varying temperatures, etc.), some installers choose to increase both rotary hex switches an additional **single** increment to minimize nuisance door stoppage. Considerations:
    i. The maximum time is a backup to the end-of-travel sensor. By adding a single increment, the Maximum Time limit will only deactivate the motor if the door is stalled beyond the normal travel time, plus ~1 second.
    ii. Closing Force:
        1. As outlined above, the installer has full adjustability of the Maximum Current settings to conform with their own objectives (closing force vs. nuisance tripping).
        2. The effective impact force varies by the surface area being applied. There is a polymer bumper on the bottom of the door which disperses the force. The effective force is a unique combination of door size/weight, installation alignment, wear/resistance changes over time, and the Maximum Current setting.
        3. If the door, rails, or vehicle/application frame are knocked out of alignment, the current required to operate the door may increase. It is possible that this increased current demand exceeds the Maximum Current setting established during commissioning. The increased motor current consumption could create a false trigger (stop/reverse) on Maximum Current overload. Under these exceptional circumstances, the Maximum Current setting could be further adjusted by an authorized technician. This Maximum Current rotary switch is enclosed in the controller case and is not intended for modification by the vehicle/application operator.

j. Record the positions of the "Maximum Time" and "Maximum Current" switches for future reference.

k. Reinstall the removable configuration cover.

l. If the controller has not already been mounted, now mount the controller (see **Section 4**. MOUNTING THE CONTROLLER. Ensure that all power and control wiring is appropriately secured to prevent snagging. Cover with sleeving/looms as needed.

20. EXTERIOR MANUAL OVERRIDE*

*Optional (if ordered)

a) Install this feature after all other portions of the installation (including configuring door travel) are complete. The external manual override and cables are geometrically sensitive. Ensure the door is fully working so that any remaining troubleshooting is limited to lock/cable geometry.
b) Before manufacturing, Dynatect recommends installer engagement and approval drawings on where they intend to mount the external manual keyed paddle handle for power loss bypass
c) The Exterior Manual Override option includes:
    a. (1) keyed paddle handle
        i. With four mounting through holes shown on front image (Figure 20a)
        ii. Cable/eyelet shown on rear (Figure 20b)
    b. (1) extension cable and (2) ratcheting cable adjusters (Figure 20c)

Figure # 20a front

Figure # 20b rear

Figure # 20c

d) The Exterior Manual Override is shipped loose. The mounting location is selected by the installer and is field mounted by the installer. Consider the location of the paddle handle and the ability for the operator to simultaneously lift the door. Depending on the size of the door, the power-loss bypass operation may require two operators.
e) The extension cable needs to connect the existing manual clutch bypass (Section 10. MANUAL CLUTCH BYPASS) and the paddle handle
    a. Installer needs to consider the routing of the extension cable, and any adjustable length of the extension cable
    b. Depending on position, routing may include drilling through walls of the vehicle body
    c. If routing the extension cable through holes in the vehicle body, consider hole grommets/guards to protect the cable from friction. Note that use of the Exterior Manual Override for Power Loss Bypass is an exceptional use system, just for when the vehicle loses power AND the compartment must be accessed. This is not used for regular access, only very exceptional access.

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f) Establish the mounting location for the paddle handle that joins with the extension cable
   a. Paddle handle installation will always require drilling mounting holes for the paddle handle, and (4) pilot holes to secure the paddle handle (Figure 20d).
   b. Mount the paddle handle and secure using fasteners selected/provided by the installer

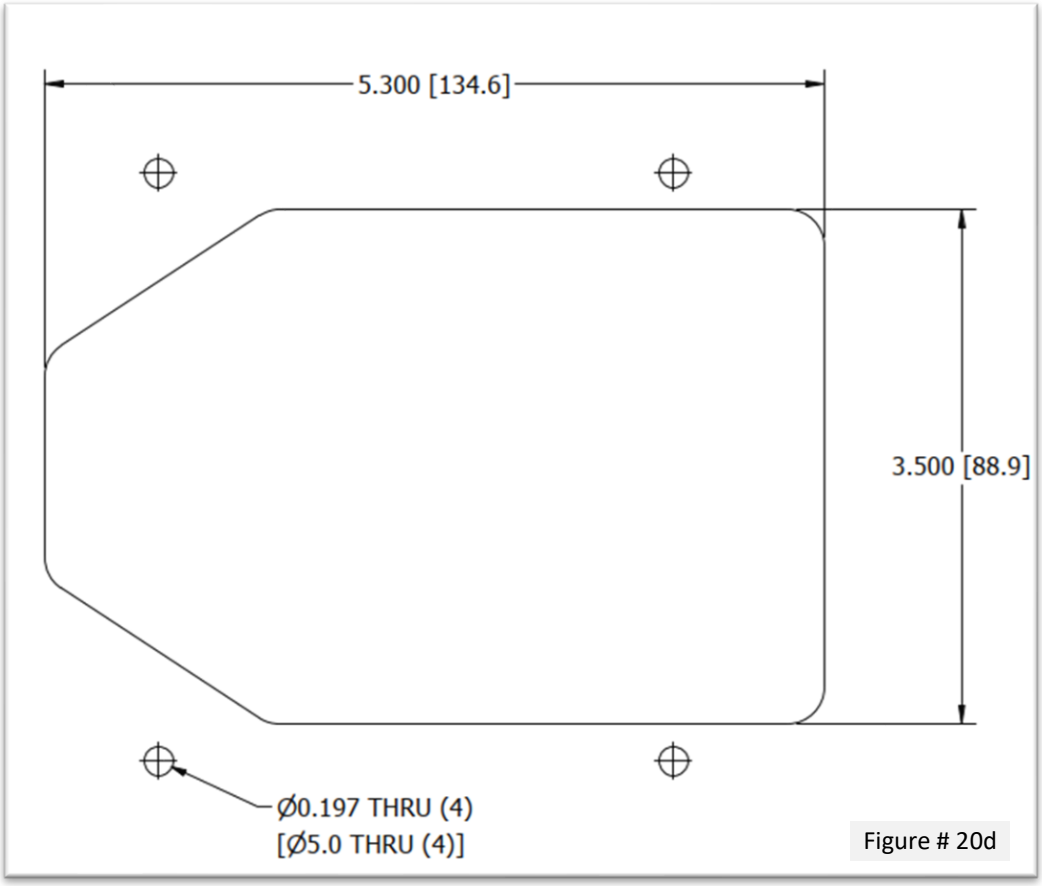

Figure # 20d

g) Connecting bypass system
    a. Route the extension cable, connecting each end to:
        i. The bypass cable sticking out from the paddle handle (Figure 20b)
        ii. The manual clutch bypass (Figure 20e)
            1. Either affixed around knob shown in black
            2. Or affixed through the pull bracket shown in grey

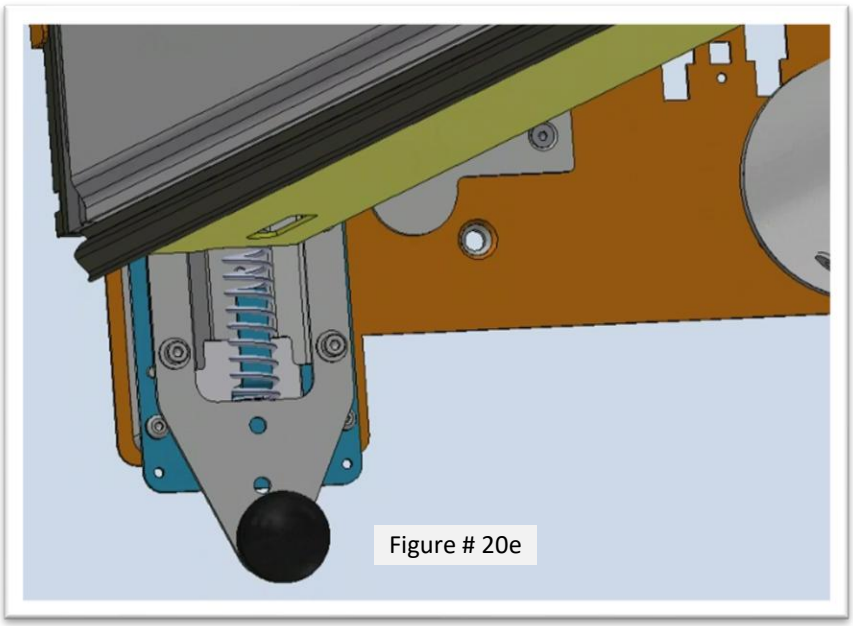

Figure # 20e

h) Facilitate connecting the extension cable through around attachment points using the ratcheting cable adjuster in Figure 20f and Figure 20g (cable attached to knob)

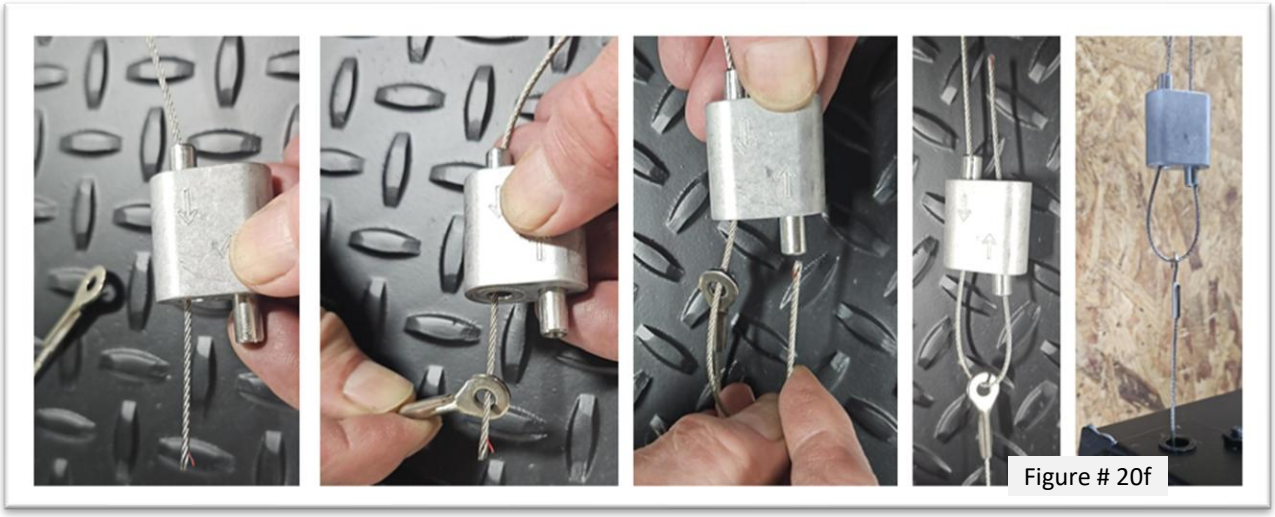

Figure # 20f

Figure # 20g

a. Adjust the length of the extension cable as needed to ensure the cable is under continuous tension, and will release the bypass clutch when the paddle handle is activated
b. Secure the extension cable along the length of the routing using fasteners selected/provided by the installer – typically a P-type cable clamp fastener or an eye bolt that allows smooth travel of the extension cable

i) Testing bypass system

a. Unlock, pull, and hold the paddle handle to release the bypass clutch
b. Ensure the door moves when the handle is pulled, and does not move when the handle is not pulled
c. If the above operations are not sufficiently easy or repeatable, re-evaluate the routing of extension cable and any associated cable length/tension. Adjust until sufficient.
d. Ensure ratcheting cable adjusters are tightened and secure or trim excess extension cable

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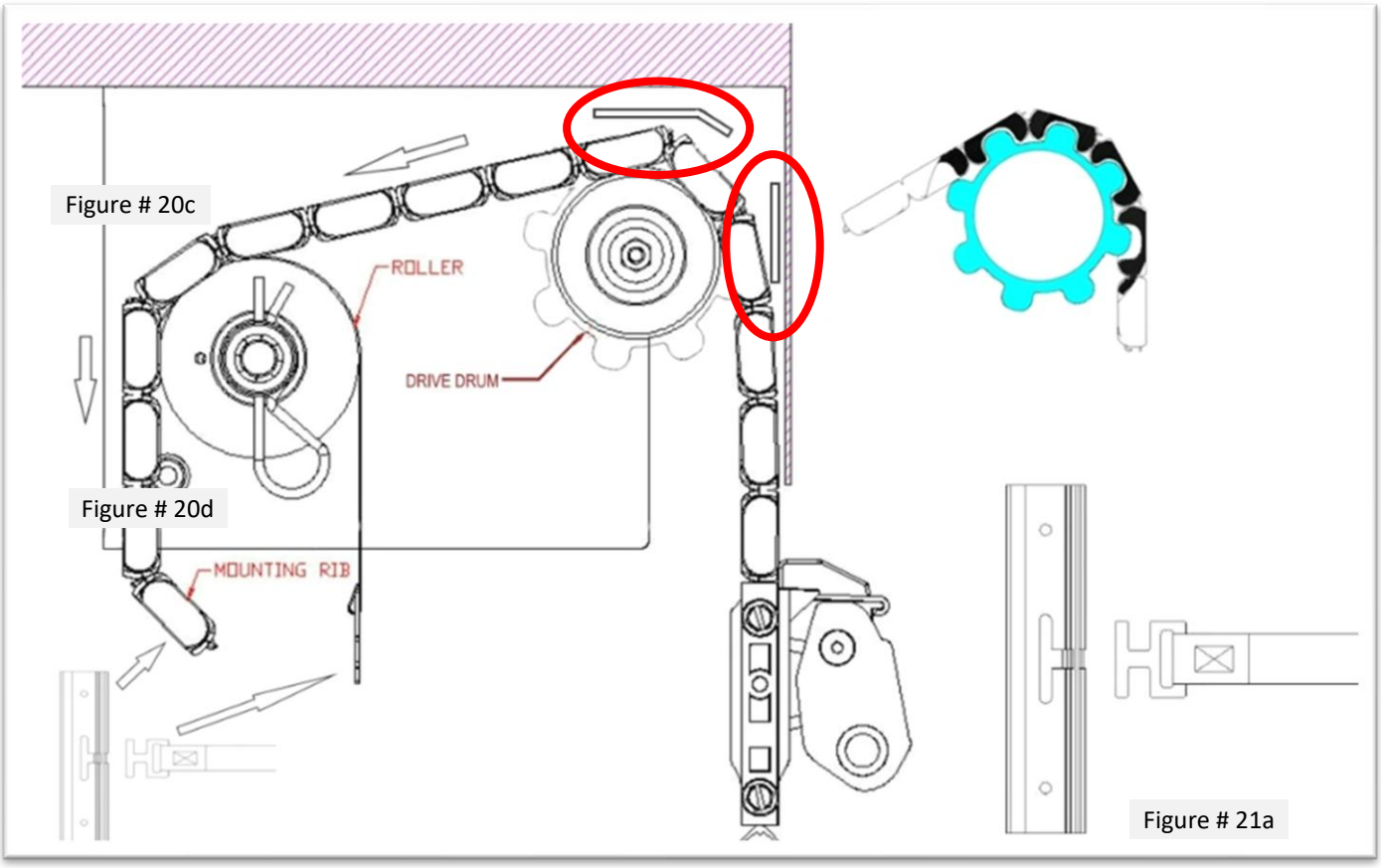
21. AUTO-LOCK Q&A

a) Since Q3 2024, the powered roll up door utilizes a braked motor which functions as an autolock. Whenever the motor is not powered, the brake automatically engages. The shade retainers (circled in red in Figure 21a) prevent the shade from coming off the drive drum. The combined geometry of the braked motor AND the shade retainers make the door resistant to force open without tools. With tools, any door can be opened.



22. FOB Q&A

Figure # 22a

a) Pairing Remote(s) (FOB or Keypad)
   a. See section 18. ACTIVATING THE CONTROLLER [step c]
   b. If also pairing a keypad, pre-read Section 23. 12-BUTTON KEYPAD

b) Q: How many FOBs can be synchronized to a single controller?
A: Up to 30 FOBs. Dynatect provides 1 FOB with each controller. Additional FOBs are also available for purchase directly from Dynatect. Repeat the programming process for each FOB being added.

c) Q: Can one FOB be linked to multiple door controllers?
A: Yes, one FOB can be linked to multiple door controllers (no functional limitation). Each controller needs to be linked through an independent process and requires access to the “program button” on each controller.

d) Q: What are the Dynatect FOB technical specifications?
A:
- Two button FOB @ 340 MHz
- Blue LED indicating transmission
- Uses (1) A23 12V battery. Lasts 45 minutes of continuous press. Typical usage is 1 year. FOB does not require re-pairing when replacing the battery.
- Typical transmit distance is 100’ – with some variation based on vehicle body material
- Dimensions: ~3”H x ~1.5”W x ~0.5”D (with antennae)

e) Q: Can installers provide their own FOBs that include other buttons?
A: Installers could implement their own FOB interface through the vehicle’s Body Control Module (BCM) which would then use relay outputs to the Powered Roll Up Door controller through the conductors used for “manual switch”.

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23. 12-BUTTON KEYPAD*

*Optional (if ordered)

a) The Keypad is suitable for mounting inside or outside the vehicle.

b) To the controller, there is no difference between the RF signal from FOB or Keypad. The keypad is subject to the same Q&A outlined in Section 22. FOB Q&A. Exception:
   a. The FOB will send a signal as long as a button is held (momentary pulse or sustained).
   b. The keypad will only send a momentary pulsed signal.
   c. This CAN impact the functionality of the door, see section 18. ACTIVATING THE CONTROLLER

c) All 12 buttons have a backlight. All button lights with illuminate when any key is pressed.

d) If Stop/Close button is pressed, the controller interprets this as a close command (there is no code needed to close the door).

e) If the 4-digit pass code is entered, the controller interprets this as an open command.
   a. When the correct 4-digit pass code is entered, all the buttons will flash off, then on, confirming that the open command has been transmitted.
   b. If the wrong 4-digit pass code is entered, press “Clear” before re-entering the correct pass code.

f) BEFORE PAIRING the Keypad to the Controller
   a. Step A: Select and enter the desired 4-digit pass code
   b. Step B: All button lights will flash briefly, then off – confirming the 4-digit code is programmed.
   c. Step C: Proceed with “Pairing Remotes” as outlined in section 18. ACTIVATING THE CONTROLLER
      i. During the pairing sequence for the keypad, only press the Stop/Close button for pairing
      ii. If in the future a different 4 -digit passcode is required, then repeat Steps A-C above. This requires re-pairing ALL desired remotes.

g) Q: What are the Dynatect 12-button keypad technical specifications?
   A:
   - 12 button FOB @ 340 MHz
   - Each button illuminates when pressed
   - Uses (1) A23 12V battery, typically lasting 1 years based on average use. Keypad does not require re-pairing when replacing the battery.
   - Dimensions: ~4.5”H x ~2.5”W x ~0.75”D (excluding flanges)
   - Supports 4-digit passcode

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24. MECHANICAL Q&A

a) Q: Can the Dynatect's traditional "manual key lock" or "power lock" be combined with the Powered RUD option?

- **Manual Key Lock** – Choice of standard cam locks – types: J236, B1250, CH751, CH501, J210. Lock is raised to allow easy access. Heavy-duty locks are available for large doors

- **Power Lock –** Compact design. Manual override in the event of a power failure.

Figure # 24a

A: No. These options are specifically left off the Powered RUD RFQ. The Powered RUD includes an electrical auto-lock. This lock is engaged at all times, except during the time the motor activates. Use of any other independent locking system risks having the lock engaged while the door is attempting to move, creating a motor-stall condition.

b) Q: Can the Powered RUD be added to a breadbox door?
A: No, the geometry of the standard Powered RUD is not currently compatible.

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25. ELECTRICAL Q&A

a) Q: What if the 12/24VDC inputs are reversed going into the controller?
A: The control has reverse polarity protection in the event the power is reversed when it is connected.

b) Q: Can Dynatect's controller operate on other DC voltages?
A: Controller will work over the standard automotive voltage compatibility range of
   i. 12 VDC controller range: 9.3-14.4 VDC
   ii. 24 VDC controller range: 20-28 VDC
- The controllers feature brownout protection and will not draw operate when the battery is below the minimum voltage (~9.3V or 20V) as this can cause erratic operation of the relays and other components).
- If the power to the controller goes below minimum voltage, then the controller will stop responding. Cycle the power off and on for the controller to resume normal operation.

c) Q: What is the idle current of the controller (power draw when not activating the motor)?
A: The controller idle current is 0.01 amps. Parasitic power draw for most vehicles is between 0.01 and 0.08 amps (retain radio memory, respond to key FOB, etc.) without adverse battery impact. Installers may choose to connect the controller as an accessory (powered when the vehicle is on), and the alternator can support the motor draw (up to 15 amps). The controller will accept commands <1 second after power-on. Installers may choose to leave the controller connected on electric vehicles with greater battery capacity.

d) Q: Is the PCB in the Controller potted?
A: Yes

e) Q: What is the IP rating of the controller?
A: The controller/enclosure is intended to be mounted inside the vehicle. It is designed to meet IP67, "dust tight and protected against water splash". Dynatect adds a branded cosmetic cover to the IP67 controller which has no impact on the controller IP rating.

f) Q: Is there an encoder to know the position of the door beyond full-open or full-close?
A: There is no standard encoder option. There are only three known states of the door: open, closed, neither.

g) Q: If the motor gets too hot, Is there a thermal overload protection mechanism?
A: No, the controller current overload is the overload protection mechanism.

h) Q: Can one controller control multiple doors?
A: No, the controller only has motor outputs and sensor inputs to support a single door

i) Q: Can the network options be installed or activated in the field?
A: No, the network option must be specified at time of order for volumes 100+.

j) Q: Does the controller perform any logging?
A: No

26. EXTENDING CABLES

a) All controller cables are 6” long. Any additional cable extensions/connectors are the responsibility of the installer.

b) If the installer chooses to remove the factory installed connectors, the table below (Figure 26a) includes a list of Controller Pins/Sockets (green text) that will work with the tools outlined in Section 2 TOOLS & EQUIPMENT

Function	Power In***	Manual Switch (Door-Up / Door-Down)**	End of Travel Sensors (Door-Opened/ -Closed)	Motor
Connector Positions	2	3	4	2
Controller Connector	DTP04-2P	DTM06-3S	DTM06-4S	DTP06-2S
Controller Pins/Sockets	0460-204-12141	0462-201-20141	0462-201-20141	0462-203-12141
Mating Connector	DTP06-2S	DTM04-3P	DTM04-4P	DTP04-2P
Mating Pins/Sockets	0462-203-12141	0462-202-20141	0462-202-20141	0460-204-12141
Wire Gauge	14GA	20GA	20GA	14GA
Pin1	Red/+12 or 24 VDC	Red/+12 or 24 VDC	Red/+12 or 24 VDC	Red/+12 or 24 VDC
Pin2	Black/Ground	Green/Down	Black/Ground	Black/Ground
Pin3	NA	Yellow/Up	White/Opened Limit	NA
Pin4	NA	NA	Brown/Closed Limit	NA

** The door up and down conductors should be capable of conducting <0.1A at 12 or 24 VDC (momentary contact).

*** The power conductors should be fused and capable of delivering at least 15A at 12 or 24 VDC.

Deutsch-Style Connector suffix:

P = Pin connector

S = Socket connector

Figure # 26a

27. CLEANING & MAINTENANCE

a) Cleaning: Any door with a painted surface should not be aggressively cleaned for 30 days from the time of shipment. When cleaning the anodized shade (door slats), use only a mild non-abrasive soap and water. The side channels should also be inspected and cleaned periodically. Use the same type of soap as above and remove the dirt and grime from inside the channels. Cleaning any friction spots will help ensure smooth door operation.

b) Lubrication: After cleaning, a dry silicone spray can be applied to the side channels and any friction spots to ensure smooth operation. Do not use lithium or grease to lubricate the track (these lubricants only attract dirt).

c) Inspection: Inspect the plastic endcaps at the end of each slat for any damage, beyond normal wear, that may hinder the door operation. Replace with factory originals as needed (P/N: K25801). These endcaps engage metal cogs in the drive mechanism and are critical to consistent operation. In lab testing of 400k cycles, these plastic end caps showed some wear, but no cracking, and did not require replacement. Field conditions may vary.

28. REFERENCE DRAWINGS

Actual configuration may be different due to application specific options

Item:	Description:
1	SCREW, STL, M3 x 6, FHS
2	SCREW, STL, M4 x 6, FHS
3	SCREW, STL, M4 x 6, SHCS
4	SCREW, STL, M5 x 6, SHCS
5	SCREW, S STL, 1/4 - 20 x 1/2, BHCS
6	FLAT WASHER, SS - 1/4 - Narrow - Type A
7	FLAT WASHER, STL, 4 N
8	BARREL PROXIMITY SWITCH, M12, 44MM
9	NUT, STL,1/4-20, CLIP ON
10	RELEASE MECHANISM, KNOB
11	SENSOR BRACKET-B
12	COVER MOUNTING BRACKET-B
13	IDLER MOUNTING PLATE
14	SIDE WELDMENT-B
15	SIDE WELDMENT-C
16	CANISTER STRAP
17	COVER, FULL WIDTH
18	DRIVE DRUM

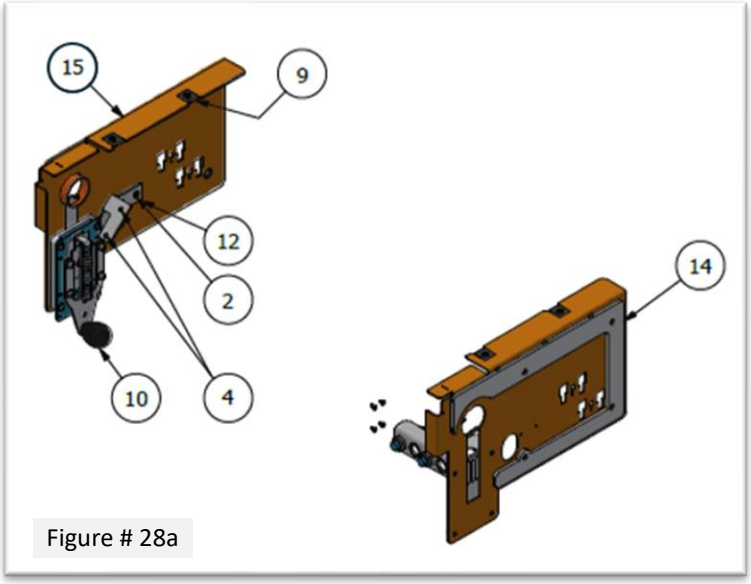

Figure # 28a

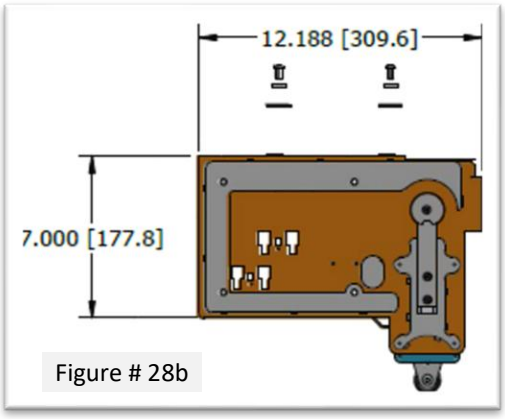

Figure # 28b

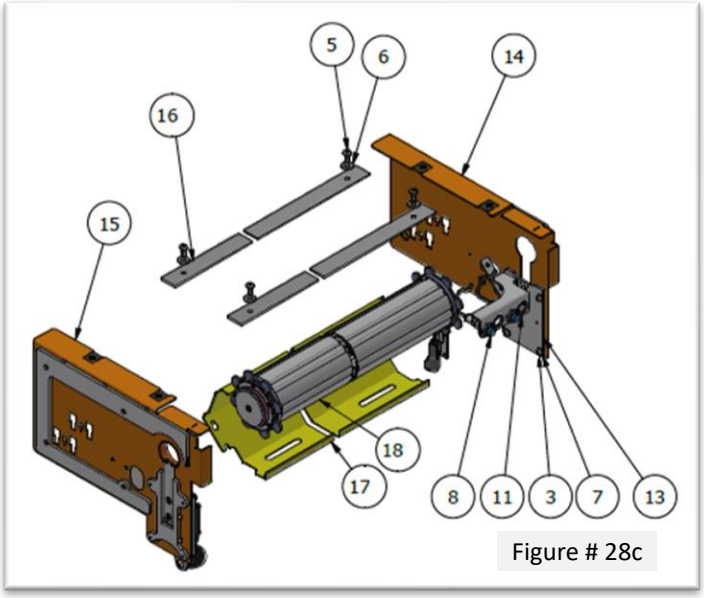

Figure # 28c

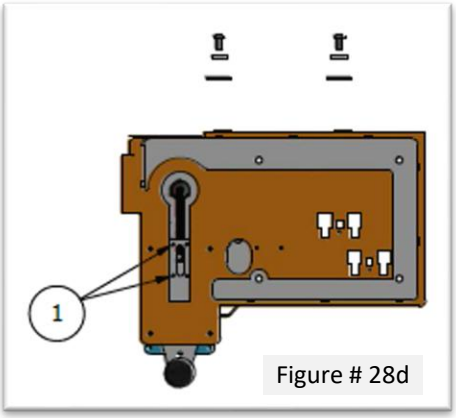

Figure # 28d

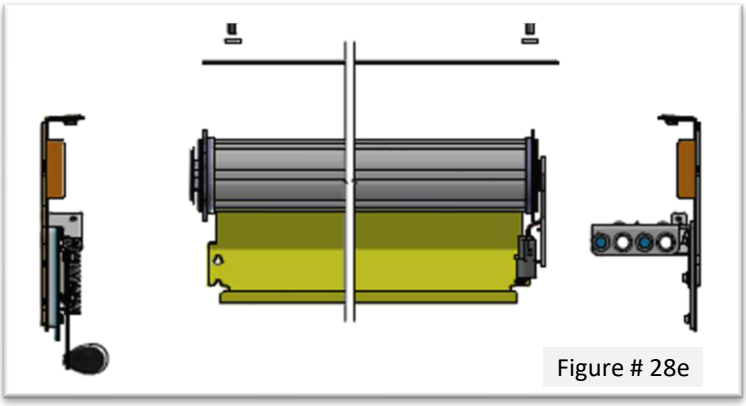
Figure # 28e