DEH41560 R05

GE
Industrial Solutions

# EntelliGuard* RE Retrofill Circuit Breakers 800-5000A

## Replacements for the original iron frame EntelliGuard Circuit breakers used in Entellisys 3.0, 4.0 and 4.5 switchgear

General Electric Entellisys Switchgear is a free-standing assembly of metal-enclosed power circuit breakers. It uses EntelliGuard type ANSI Low Voltage Power Circuit Breakers. These iron frame circuit breakers had no on-board trip unit and were fully controlled by redundant CPU's and the EntelliGuard Messengers located in the Entellisys switchgear. The Retrofill circuit breaker has an on-board trip unit for some functions.

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# Preface

### *Hazards*

The following important highlighted information appears throughout this document to warn of potential hazards or to call attention to information that clarifies a procedure. Carefully read all instructions and become familiar with the devices before trying to install, operate, service, or maintain this equipment.

### Danger

This indicates a hazardous situation which, if not avoided, results in death or serious injury. A variety of electrical hazards warnings are displayed here and are applied to installation manuals. These are standard or generic alerts and labels that must be taken quite seriously when installing Retrofill circuit breakers in Entellisys switchgear and when working with potentially dangerous electrical equipment (*Table 1*). There are also dangers, pertaining to product safety, that need to be custom-written for particular or specific circumstances (*Table 2*).

**Table 1. Generic Danger Alerts and Labels Used for Documentation and Dangerous Equipment**

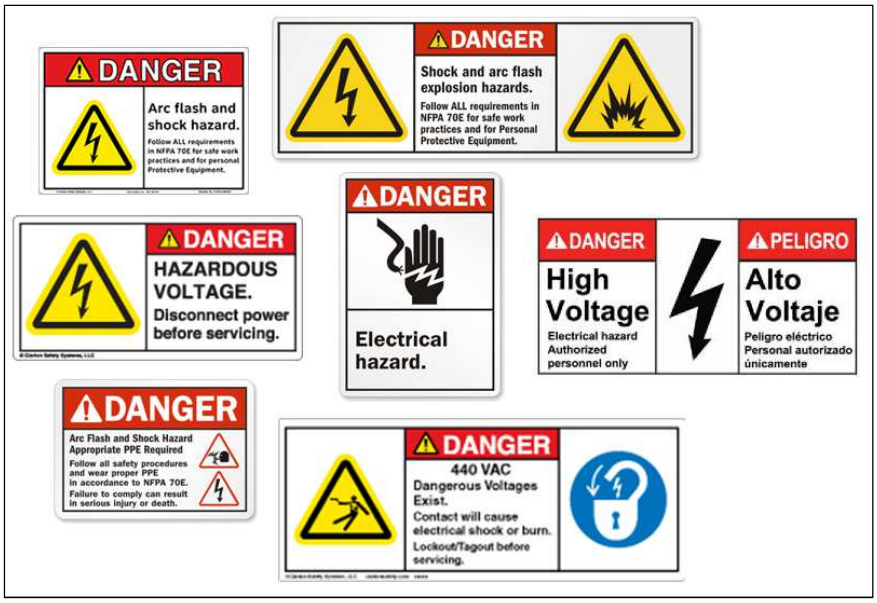
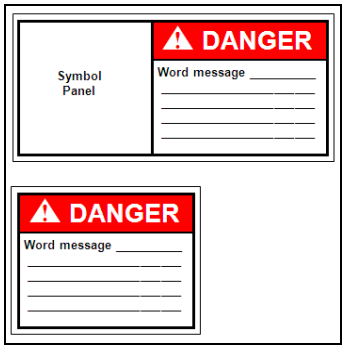



**Table 2. Custom Danger Alerts and Labels Used for Documentation and Dangerous Equipment**

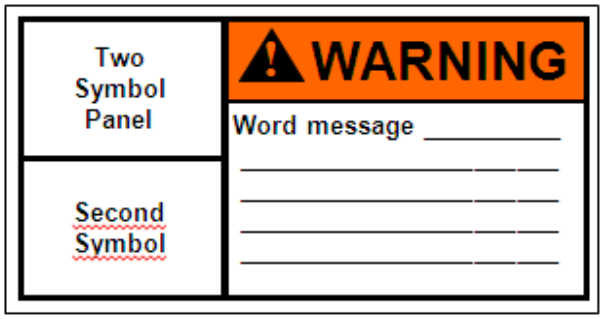


## Warning

This indicates a hazardous situation, which, if not avoided, would result in death or serious injury. A variety of electrical hazards warnings are displayed here and are applied to installation manuals. These are standard or generic alerts and labels that must be taken quite seriously when installing Retrofill circuit breakers in Entellisys switchgear and when working equipment that can cause injury, but may not be necessarily fatal (*Table 3*). There are also warnings, pertaining to product safety, that need to be custom-written for particular or specific circumstances (*Table 4*).

**Table 3. Generic Warning Alerts and Labels Used for Documentation and Dangerous Equipment**

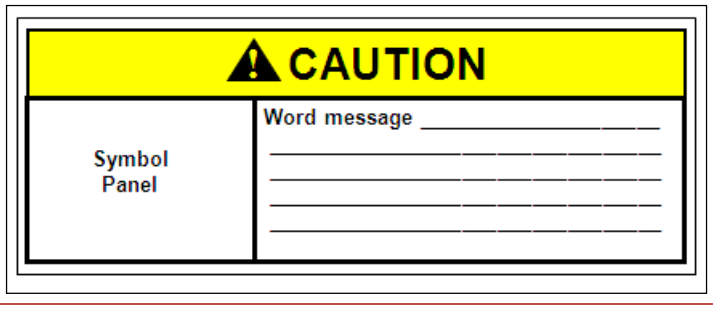

**Table 4. Custom Warning Alerts and Labels Used for Documentation and Dangerous Equipment**




## Caution

This pertains to a hazard that has a low level of risk, which means that if not avoided, it could result in minor or moderate injury. It also indicates that failure to comply with instructions may result in product damage. The label here requires a specific message that targets a special product or procedure (*Table 5*).

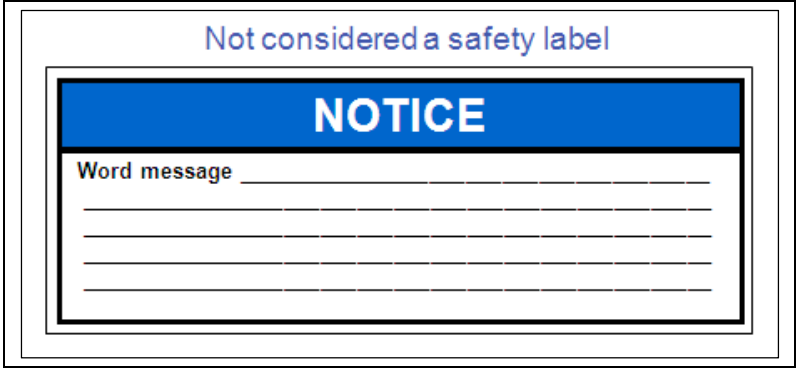
**Table 5. Custom Caution Alerts and Labels Used for Documentation and Operating Equipment**



## Notice or Note

This indicates important information in that it aids in job performance, that is, a notice or note is used to notify practices not related to personal injury (*Table 6*).

**Table 6. Custom Notice Alerts and Labels Used for Documentation and Operating Equipment**




### *Warranty*

This document is based on information available at the time of its publication. While efforts have been made to ensure accuracy, the information contained herein does not cover all details or variations in hardware and software, not does it provide for every possible contingency in connection with installation, operation, and maintenance.

Features may be described herein that are not present in all hardware and software systems. GE Energy assumes no obligation of notice to holders of this document with respect to changes subsequently made. GE Energy makes no representation or warranty, expressed, implied, or statutory, with respect to, and assumes no responsibility for the accuracy, completeness, sufficiency, or usefulness of the information contained here-in. No warranties of merchantability or fitness for purpose shall apply.

Contact your local sales office if further information is required concerning any aspect of EntelliGuard R Circuit Breaker operation or maintenance.

### *Trademarks and Patents*

EntelliGuard* R
EntelliGuard* TU
EntelliGuard* TripUnit
EntelliGuard* G
EntelliGuard*Messenger

### *Standards*

| Agency Certification | |
|---|---|
| **Standard Number** | **Title** |
| ANSI C37.13,16,17,20.1,50,51,59 | Low-Voltage AC Power Circuit Breakers |
| NEMA SG 3&5 | Low-Voltage Power Circuit Breakers & Switchgear Assemblies |
| UL 1066 | Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures |

### *Document Conventions*

Topics and text are divided into primary, secondary, and tertiary paragraph headings.

### *Related Publications*

| Publication | Publication Number |
|---|---|
| Brochure | DEA-532 |
| Snapshot | DEE-543 |
| Entellisys LV switchgear | DEH-237 |
| Installation Manual AKD-10 | DEH-41550 |
| Accessory: Door Interlock (Door Interlock Kit) | DEH-41529 |
| Accessory Retrofill Doors Assembly | DEH-41563 |
| Accessory: Finger Clusters (Cluster Assemblies) | DEH-41533 |
| Accessory: Secondary Disconnects | DEH-41534 |
| FAQ | DEQ-171 |
| Application Guide | DET-753 |
| Guideform Spec | DET-754 |
| Spare/Renewal Parts Guide | DET-755 |

### *Service and Support*

Service and support always available from GE Energy.

### *Estimated Time to Complete Tasks*

It takes about 20 minutes to install the assembly, but the time for getting 120V AC Power Supply to the secondary disconnect in the gear is not included in 20 minutes.

# Description

### *Product Specs*

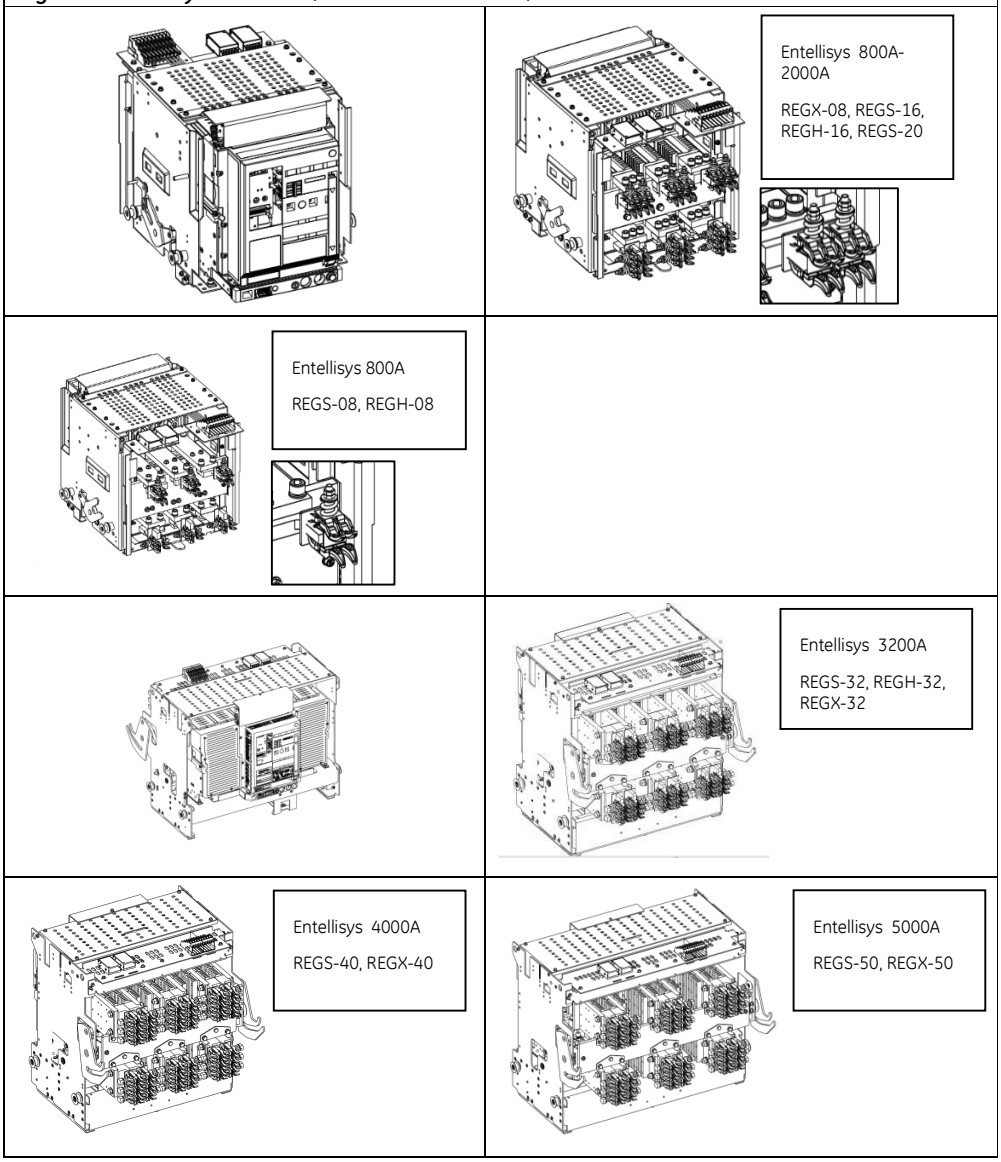
**Weight (lbs.)**

| Retrofill Breaker | Weight | Box Weight 10101655P1 | Pallet 10101650P1 Wt. | Accessories Wt. | Total Weight |
|---|---|---|---|---|---|
| REGS-08, REGH-08 | 230 | 11 | 24 | 2 | 267 |
| REGX-08, REGS-16 REGH-16, REGS-20 | 270 | 11 | 24 | 2 | 307 |
| REGS-32, REGH-32, REGX-32 | 600 | 15 | 30 | 2 | 647 |
| REGS-40,REGX-40 | 625 | 15 | 30 | 2 | 672 |
| REGS-50,REGX-50 | 700 | 15 | 38 | 2 | 759 |

## Views

General Electric Entellisys Switchgear is a free-standing assembly of metal-enclosed units of power circuit breakers and other auxiliary power circuit protective devices. The EntelliGuard R Retrofill breaker for Entellisys is a draw-out breaker it has an on-board trip unit only for Hi IC, MCR and Bell alarm lockout functions. *Figure 1* (front and back views with finger clusters) presents an EntelliGuard R Retrofill breaker, permanently encased in a cassette-like structure.

**Figure 1. Entellisys—Breaker (Front and Back View)**




The EntelliGuard R Circuit Breaker is suitable for application on power systems up to 635 VAC 50/60 Hz.

# History and Types

***Entellisys—REGS-08, REGH-08, REGX-08, REGS-16, REGH-16, REGS-20 REGS-32/REGH-32/REGX-32/REGS-40/REGX-40/REGS-50/REGX-50***

The original Entellisys switchgear was manufactured in Burlington, IA from 2005 to 2015. The switchgear compartment sizes and main & vertical bus arrangements are the same as AKD-10. The compartments have pull-out rails. Entellisys uses EntelliGuard iron frame circuit breakers mechanically based on the WavePro designs. All breakers have 4 rollers which align with the compartment rails. The secondary control wiring for all functions is connected thru a single 36 point secondary disconnect with gold plated contacts. Secondary control wiring terminates at fixed standard locations on the 36 point disconnect. Each breaker has a pump style manual charging handle and manual push OPEN and Push CLOSE buttons. The front escutcheon is 5" deep with a sliding picture frame, but is wide enough so the yellow bell alarm lockout reset button is visible thru the front door of the switchgear. EntelliGuard R breakers with a catalog number beginning with **REG** will replace an EntelliGuard (iron frame circuit breaker) with a catalog number beginning with **EG**.

All EntelliGuard R breakers of this Cat #REG... type are fully wired at the factory to the secondary disconnects. This Retrofill breaker type has (2) 24 Vdc power supplies that were not present on the original breaker. See **Modify Entellisys –Switchgear Compartment** section for details on connecting these power supplies to UPS A & B.

# Retrofill Breaker-(Entellisys Version)

***Mechanical Drawings***

The following engineering or assembly drawings describe the layout and dimensions of breaker (*Figure 2*, *Figure 3*).

**Figure 2. 800A Retrofill Breaker (Entellisys Version) Dimensioning (REGS-08, REGH-08)**

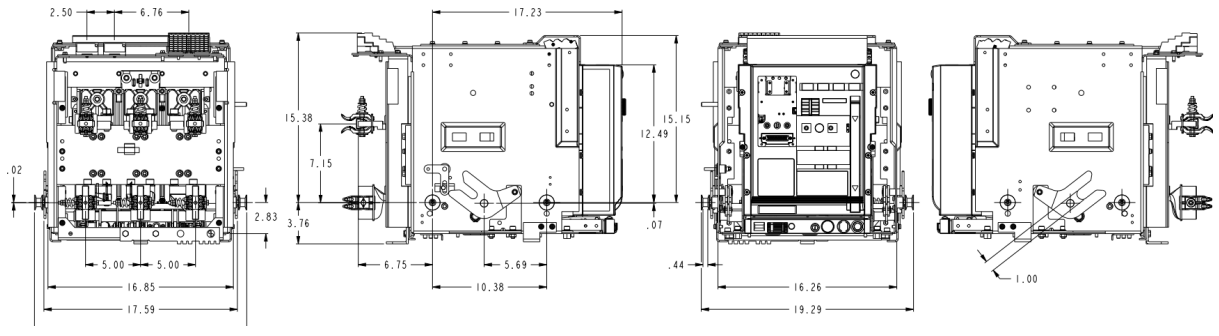


Figure 3. 800-2000A Retrofill Breaker (Entellisys Version) Dimensioning (REGX-08, REGS-16, REGH-16, REGS-20)

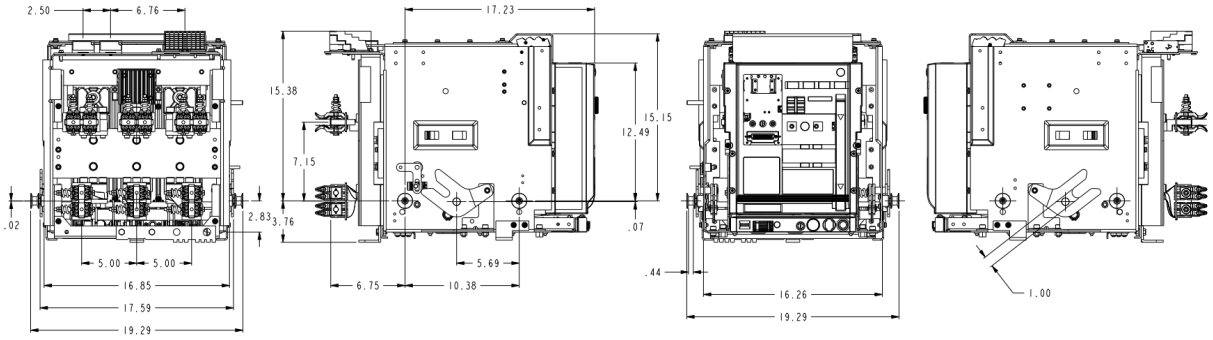



Figure 3A. 3200-4000A Retrofill Breaker (Entellisys Version) Dimensioning (REGS-32,REGH-32,REGX-32, REGS-40,REGX-40)

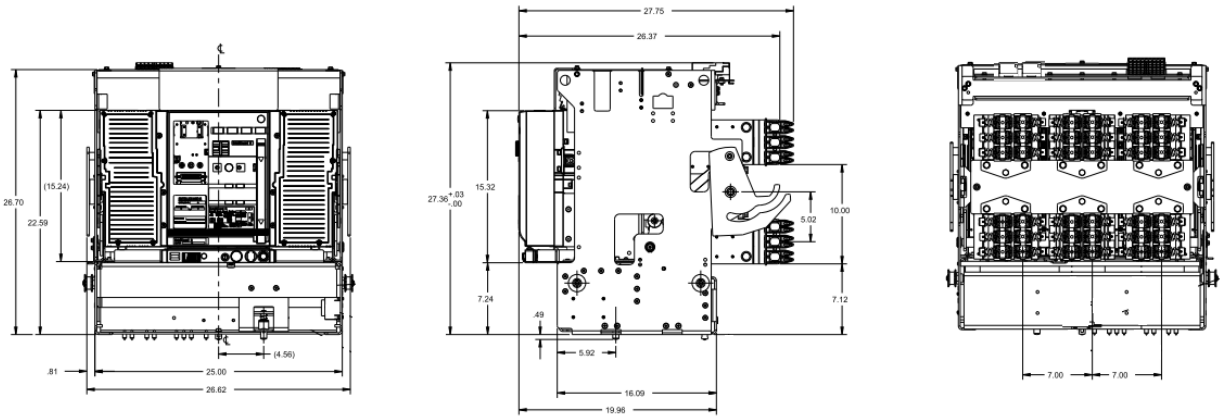
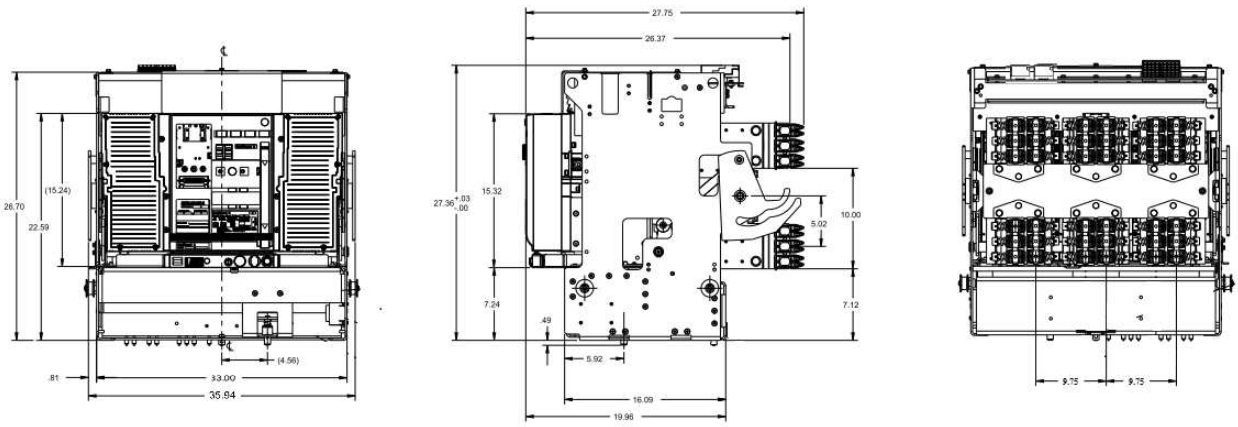


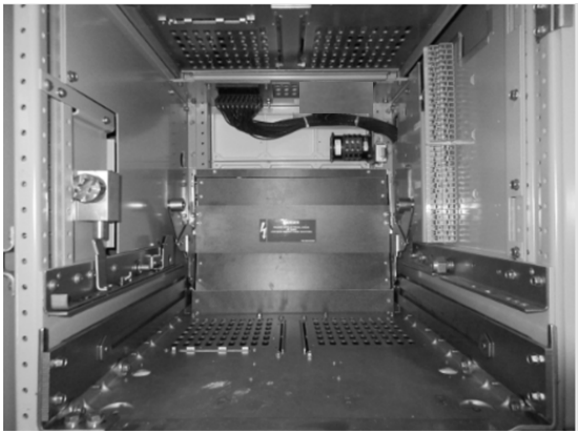
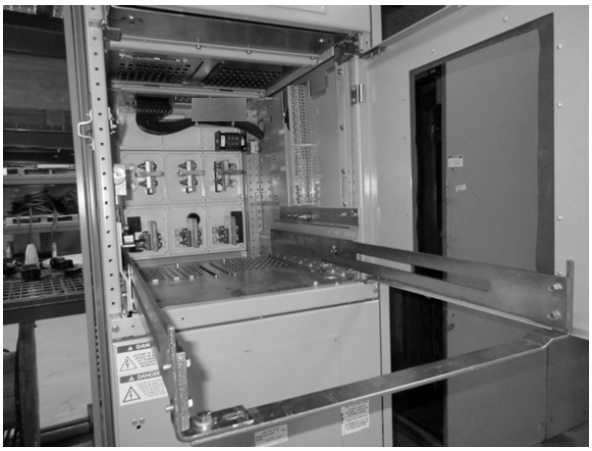
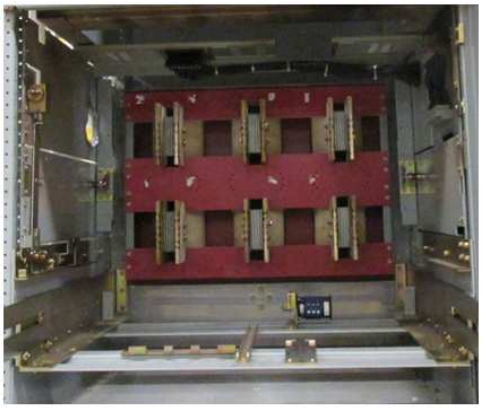
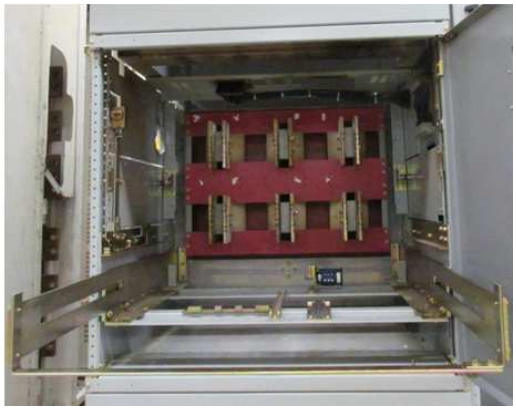

Figure 3B. 5000A Retrofill Breaker (Entellisys Version) Dimensioning (REGS-50,REGX-50)



# Entellisys Compartment

### *Interior View*

The figures (*Figure 4*) and (*Figure 5*) below present a Entellisys compartment, with one photo showing the rails extended.

| Figure 4. Entellisys—Empty Compartment with Shutters | Figure 5. Entellisys—Empty Compartment with Racks/Rails Extended |
|---|---|
|  |  |
| **Figure 4A. Entellisys —Empty Compartment** | **Figure 5A. Entellisys—Empty Compartment with Racks/Rails Extended** |
|  |  |

### *Interior Components*

*Figure 6 points out the major components of an Entellisys compartment.*

**Figure 6. Entellisys-Circuit Breaker Compartment for EntelliGuard iron frame circuit breaker (800-2000A)**

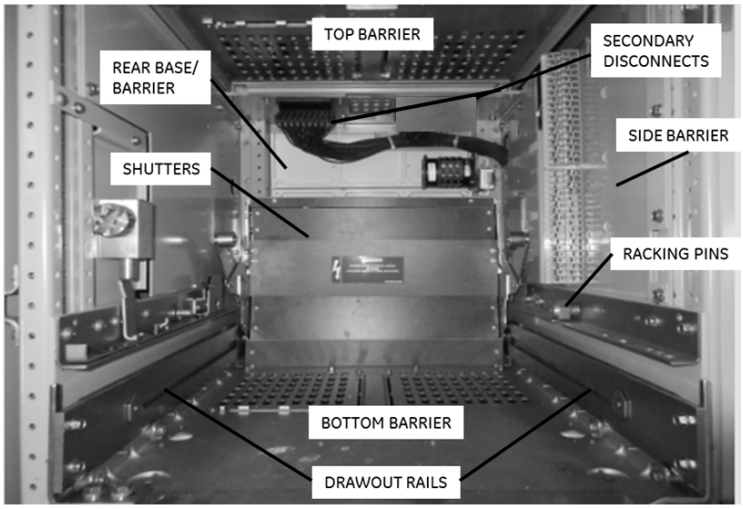
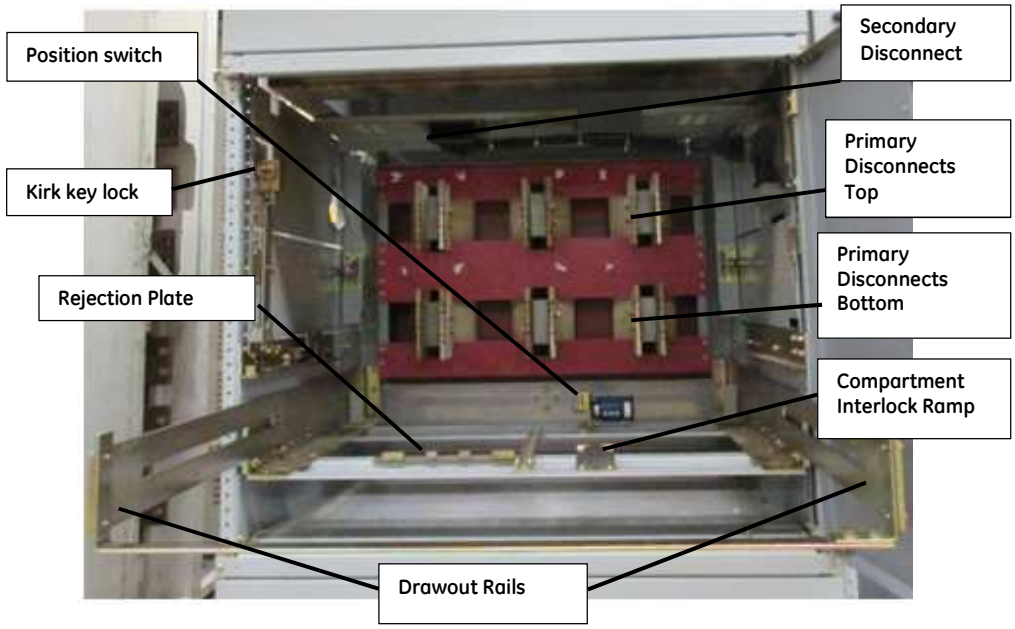



**Figure 6A. Entellisys-Circuit Breaker Compartment for EntelliGuard R circuit breaker (3200-5000A)**



## Unpack CB


- Turn off all power to switchgear. Tagout and lockout main source, up-stream or main breaker.
- Failure to comply with these instructions will result in death or serious injury from severe burns caused by arc flashing that has exceedingly high temperatures.
- Always wear personal protection equipment according to OSHA standards and appropriate to the severity of potential burns.

- Ensure only qualified personnel install, operate, service, and maintain all electrical equipment.


Falling Object

- Do not walk or remain under any heavy assembly while hoisted above head as the chains securing the assembly may give way
- Ensure lifting equipment has capability for device being lifted.
- Wear hard hat, gloves, and safety shoes.
- Failure to comply with these instructions could result in serious injury.


PRODUCT DAMAGE

- Ensure circuit breaker and its accessories are always used within their designated ratings.
- Do not allow the circuit breaker to hit a hard surface while handling.
- Do not drag or slide the circuit breaker across a hard or rough surface

- A factory-installed rejection feature prevents mismatching circuit breakers and compartments, preventing the insertion of a circuit breaker with a lower rating into a higher rated compartment.

By following the procedures below, you should be able to install the breaker with minimum effort and time.

### *Quality*

All EntelliGuard R circuit breakers have been designed and manufactured to ANSI standards. The design was based on the original requirements of the Entellisys switchgear and breaker. The product is manufactured in Burlington, Iowa; and is inspected using some of the same master gauges used on the legacy WavePro/EntelliGuard iron frame legacy breakers to confirm electrical and mechanical performance, including rejections-features.

### *Information Label*

On the side wall of each circuit breaker there is a factory-assembled label that details all features included on both the circuit breaker.

### *Product Catalog and Serial Numbers*

Product catalog and serial numbers should be used when communicating about the circuit breaker. Each circuit breaker has a unique serial number located on the left side (viewed from front) of the front fascia.

### *Remove Circuit Breaker from Container*

### *Inspect*

1. Inspect the shipping container for obvious signs of rough handling and/or external damage incurred during transportation.
2. Record any observed damage for reporting to the carrier. Ensure all recorded reports and claims include the order number and name plate information.
3. Remove the banding straps and lift the top cover.
4. Remove all packaging material.
5. Remove all product documentation and store properly.
6. Unscrew the mounting screws that fasten the circuit breaker to the bottom of the shipping pallet and remove the circuit breaker.

### Use Lifting Truck

1. Use a lifting truck to lift and mount the assembly to avoid personal injury and damaging the breaker.
2. Uses a proper overhead lifting device to mount the breaker into the switchgear, refer to Page 18
3. Contact the nearest sales office for availability of a hoisting device.

## Store Circuit Breaker

| | |
|---|---|
| NOTICE | **PRODUCT DAMAGE**<br>• **Do not store circuit breaker in corrosive environments above LC1 (sea salt mist) and G1 as per ANSI/ISA-S71.04-1985.**<br>• **Ensure circuit breakers are stored in a clean, dry location, in their original packaging.**<br>• **Failure to comply with these instructions may result in product damage.** |

If you decide not to install the Retrofill breaker until a later time:

1. Store the circuit breakers in a clean, dry location in an upright position.
2. Make sure that the breakers are properly supported to prevent bending of the studs or damage to any of the breaker parts. Do not remove any protective grease until the assemblies are ready to be installed.
3. If breakers are not to be placed in service at once, remove them from their shipping cartons and thoroughly inspect them.
4. If everything is in satisfactory condition, replace the breakers in their shipping cartons for storage. If it is necessary to store the equipment for any length of time, use the following precautions to prevent corrosion or deterioration:
   - Uncrate the equipment and check thoroughly for damage
   - Store in a clean, dry, rodent-free location with moderate temperature and provide protective coverings to prevent dirt, water, or other foreign substances from entering the breaker.
   - If dampness or condensation is encountered in the storage location, heaters can be used to prevent moisture damage.

## Check Before Installing



- **It must be ensured that the supply power to the compartment is turned off/ compartment is de-energized for all the incoming and outgoing circuits of the LVS prior to any work being conducted on it.**
- **During the installation and related work on the equipment, it must be ensured that the operator is using the prescribed PPE for the specified tasks.**

- **Ensure only qualified personnel install, operate, service, and maintain all electrical equipment.**

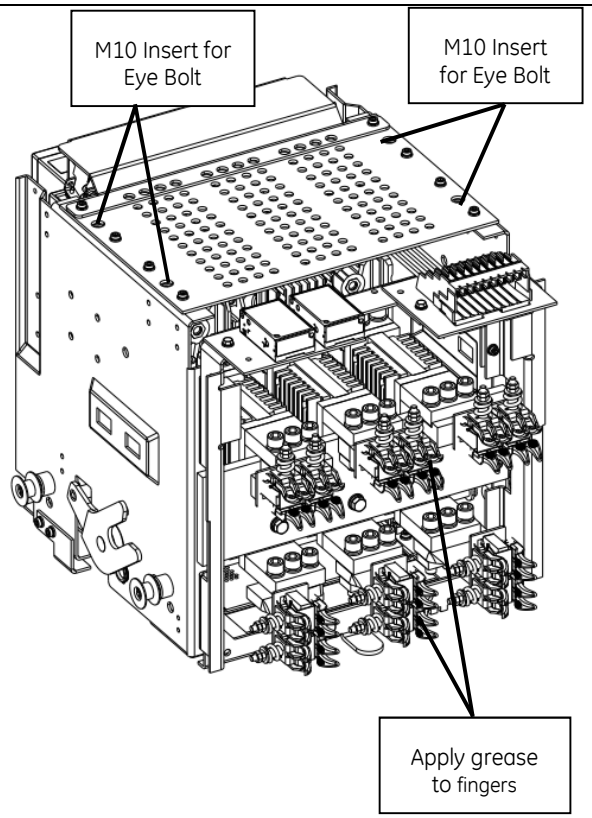
These breakers are supported on a rollout track; each breaker has four rollers. Racking arms on both sides of the breaker frame engage the drawout mechanism pins fastened to both sides of the compartment.

1. Check to see that the breaker or breakers match their respective compartments. Look on the breaker summary sheet, the front view drawings, breaker nameplate, and on the identification card on the breaker shipping carton.

## Clean and Grease Breaker

1. Before installing or operating a breaker, refer to the breaker instruction manual for pre-operation inspection and test.
2. Check thoroughly for any damaged or loose parts and for any dirt or foreign matter which may be in the breaker.
3. Clean those areas if necessary with a clean, lint-free rag and isopropyl alcohol or acetone.
4. Be sure to apply a thin film of grease DH0HD38 (Mobilgrease 28) to the primary disconnect fingers (*Figure 7*). GE part #193A1751P1 is a 1 oz. tube of Mobilgrease 28.

**Figure 7. Entellisys Retrofill—Primary Contacts or "Fingers" (Apply Grease)**




## Install Entellisys Retrofill Breaker



- **It must be ensured that the supply power to the compartment is turned off/ compartment is de-energized for all the incoming and outgoing circuits of the LVS prior to any work being conducted on it.**
- **During the installation and related work on the equipment, it must be ensured that the operator is using the prescribed PPE for the specified tasks.**
- **Ensure only qualified personnel install, operate, service, and maintain all electrical equipment.**

After the existing breaker is removed and the compartment modified the pre-wired Retrofill breaker can be installed in the Entellisys switchgear. **See Modify Entellisys Switchgear Compartment page 28.**

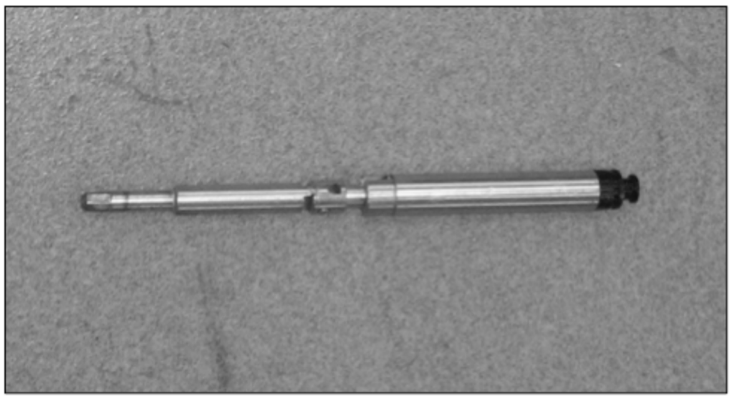
1. Verify that the breaker is in the disconnected and OPEN position before mounting it on rails.
2. Pull out the cubicle rails, horizontal to the ground.
3. The rails can now support and secure the Retrofill breaker in the switchgear.
4. Insert eyebolts in the eye bolt weld nuts as shown in *Figure 7*. Use a chain and hook to lift the breaker from above (OR)
5. Use GE part number 0247B8961G002 lifting bar and suitable hoist to lift from above as shown in *Figure 8*.

**Note:** If the lifting bar is not available, the breaker can be lifted with at least (2) 10mm eyebolts attached to the points shown in fig 7 and a suitable lifting chain rated at least 500lbs

**Figure 8. Entellisys Retrofill—Using GE Lifting bar and hoist**

6. Make sure that the lifting bar is secured and locked in place on the breaker. Check that the breaker is free from obstruction inside the compartment.
7. When the breaker is lined up with the compartment, raise the breaker only slightly higher than the compartment floor.
8. Keep the breaker steady. Continue to guide the breaker, while checking both sides and underneath, so that both sets of rollers are lined up with the rails.
9. Once the breaker is resting on the rails, unhook the lifting hooks from the circuit breaker. Move the hoisting apparatus out of the way.
10. Push the breaker in until the compartment racking pins engage with the breaker racking cams.
11. Remove the racking tool (*Figure 9*) from the storage location on the breaker front panel and extend the torque bar from inside the handle.

**Figure 9. Retrofill—Racking Tool**



12. Use a blade-type screwdriver in the slot or rack out lock of the breaker (*Figure 10*), and turn it clockwise to the right so that the racking handle shutter opens

**Figure 10. Retrofill—Racking Tool and Screwdriver Inserted**

Inserting the racking handle:

- First, insert a blade screwdriver in the right-hand slot and rotate it to the right.
- Then, while holding the screwdriver torqued to the right, insert the racking tool in the left slot until it engages with the machanism inside.
- After the racking tool engages, remove the screwdriver.

13. While turning the screwdriver to the right with the shutter open, insert the racking tool in the handle insertion hole so that it engages with the racking mechanism, and remove the screwdriver (*Figure 10*).
14. With the racking tool inserted, crank clockwise so that the Retrofill starts to move in, slowly sliding forward into the compartment. Rotating clockwise racks the circuit breaker into the enclosure.

15. Rotating clockwise ~37 turns racks the circuit breaker all the way into the enclosure.
16. As the breaker approaches the TEST position, check the alignment of the fixed and moving parts of the secondary disconnects. If a spring charging motor is installed, these may operate when approaching the TEST position.
17. Continue rotating the racking handle clockwise until the position indicator first shows TEST, then CONNECTED. (There will be a sharp snap sound as the secondary disconnect detent cam releases).
18. When approaching the CONNECTED position, more torque for turning the racking handle is normal as the primary finger clusters engage with the Entellisys primary bus stabs.
19. At the end of 37 rotations, the breaker is in its maximum travel position. At this point, the primary disconnect fingers have completely engaged with the primary bus stabs.
20. Remove and store the racking handle in its storage location.

***Entellisys—Racked-In***

The photo below shows one example of a racked-in EntelliGuard R Retrofill circuit breaker (*Figure 11*).

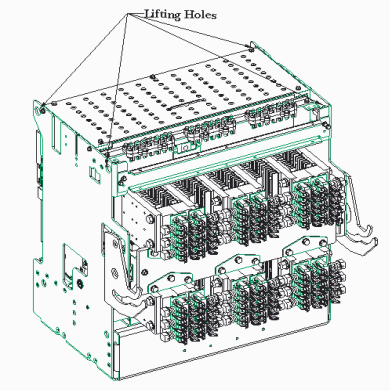
**Figure 11. Retrofill— Racked-In CB**

## Install Entellisys & substructure type 3200, 4000 & 5000A Retrofill Breaker.

To remove the exiting breaker follow instructions provide with the legacy breaker and or Entellisys switchgear/ switchboard. Notice how the rejection pins underneath the legacy breaker align with rejection on the floor of the switchgear compartment. Verify the correct breaker is being used. Compare the rejection pin arrangement on the new breaker to those on the old breaker

After the existing breaker is removed and the compartment updated with the power supply wiring and any added features, the pre-wired breaker can be installed in the GE Entellisys Switchgear.

1. Verify that the new breaker is in the disconnected and OPEN position.
2. For REGS-32/REGH-32/REGX-32/REGS-40/REGX-40/REGS-50/REGX-50 Retrofill Breaker.
   A. It is best to use Lifting Bar GE Part number **0247B8961G001** for 3200-4000A and **0247B8961G003** for 5000A and a suitable hoist to lift from above as shown in Figure 12A. (These lifting bars have been tested to 200% of their 700 lb ratings.)
   B. Alternate method, use a lifting chain and hooks rated at least 1400 lbs to lift the breaker from above as shown in Figure 12B. (chains must not be at an angle less than 45 degrees from the horizontal plane.) Installation in upper compartments may not be possible with limited overhead space or the GE switchgear hoist.

| Figure 12. Entellisys —Location of Hooks | Figure 12A. Entellisys —Using GE Lifting bar and hoist | Figure 12B Entellisys—Using Chain And Hook |
|---|---|---|
|   |   |  |

3. Make sure that the lifting bar or generic chain-hooks are secured and locked in place. ***Dropping a breaker can result in injury or death.***
4. Line up the breaker in front of the compartment where it will be installed; then raise it slightly above the height of the drawout Rail assembly.
5. Pull out the Rail assembly beneath the breaker.
6. Lower the breaker down on the Rails. .
7. Remove the lifting bar and or chains.
8. Push the breaker into the compartment slowly while observing the alignment of the secondary disconnects and opening of the optional shutter. A compartment interlock rod in the right front will ride over a cam and drop into position in the DISCONNECT position.
9. When fully installed to the DISCONNECT position, the racking cams will stop on the racking pins in the compartment and the breaker will be ready to rack in.

10. Remove the racking tool. *(Figure 9*) from the storage location on the breaker front panel and extend the torque bar from inside the handle.
11. Use a blade-type screwdriver in the slot or rack-out-lock of the breaker *(Figure 10)*, and turn it clockwise (to the right) so that the racking handle shutter opens.
12. While turning the screwdriver to the right with the shutter open, insert the racking tool in the handle insertion hole so that it engages with the racking mechanism, and remove the screwdriver *(Figure 10)*.
13. Rotating clockwise ~37 turns racks the circuit breaker all the way into the compartment.
14. As the breaker approaches the TEST position, a spring charging motor or undervoltage release if installed may operate. (~ 9 racking turns).
15. Continue rotating the racking handle clockwise until the position indicator first shows TEST; then CONNECTED.
16. When approaching the CONNECTED position, more torque for turning the racking handle is normal as the primary finger clusters engage with the primary bus stabs.
17. At the end of 37 to 37-1/2 rotations, the breaker is in its maximum travel position. At this point the primary disconnect fingers have completely engaged with the primary bus stabs.
18. Remove and store the racking handle in its storage location.

***ENTELLISYS Retrofill Breaker Racked-In***

The photo below shows one example of a racked-in ENTELLISYS Retrofill (*Figure 13*).

**Figure 13. ENTELLISYS—Racked-In CB**

### *Entellisys—Secondary Disconnects*

This section shows the wiring of the legacy secondary disconnect assembly on the EntelliGuard R breaker.

- 36 Point secondary disconnect assembly (*Figure 14*, *Figure 15*, *and Figure 16*).
- Wiring (*Table 8* shows the Entellisys secondary disconnect terminals).

The EntelliGuard R Retrofill Breaker has one secondary disconnect installed:

**Figure 14. Entellisys Secondary Disconnect View 1**

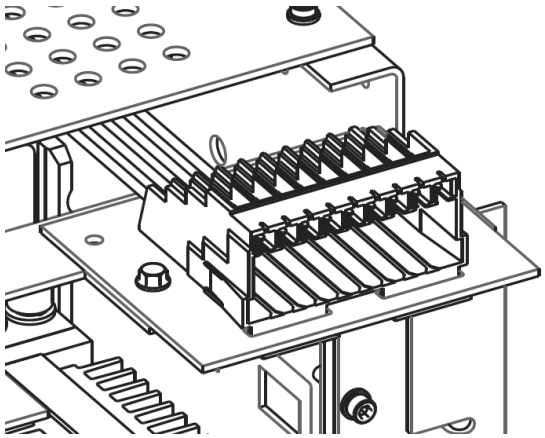


**Figure 15. Entellisys Secondary Disconnect View 2**

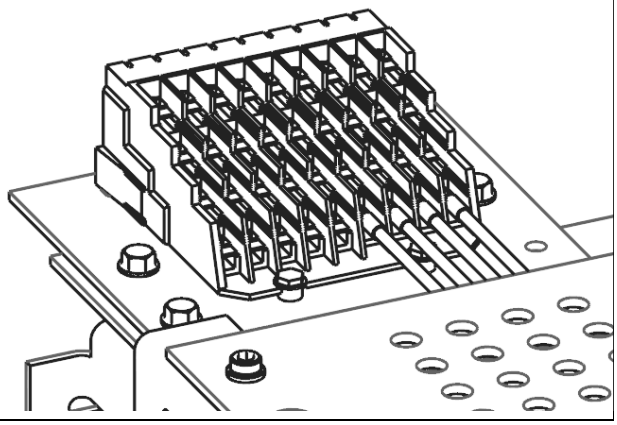
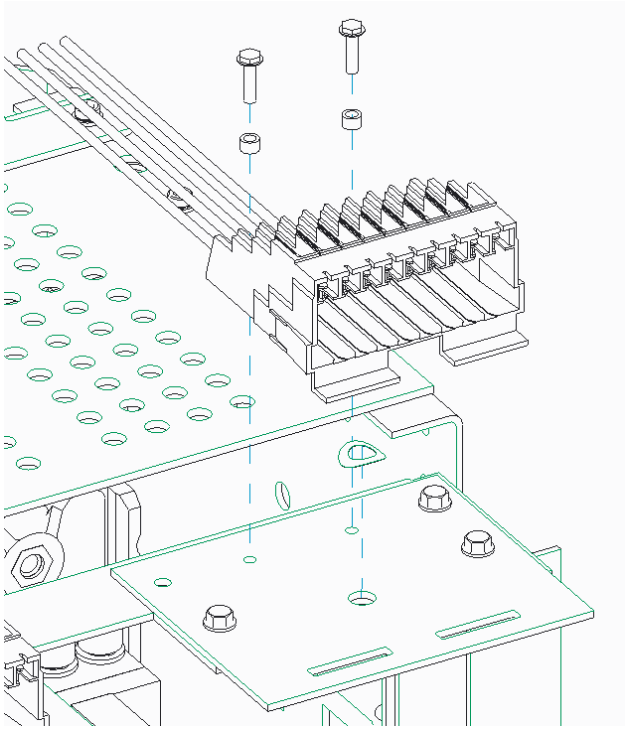


**Figure 16. Entellisys— Secondary Disconnect Exploded View**



Inputs and outputs to the circuit breaker are wired through secondary disconnects located on the top of the breaker. The plug-style secondary disconnects engage mating disconnects in the breaker cubicle when the breaker is in the TEST or CONNECT position

*Table 8* shows the EntelliGuard secondary disconnect terminals and standard connections. Refer to *Table 9* for an example showing wiring from Entellisys switchgear to the EntelliGuard breaker.

***Table8.Retrofill (Entellisys) Secondary disconnect terminals and standard connections***

**36 POINT SECONDARY DISCONNECT**

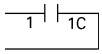
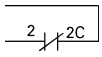
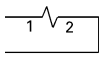
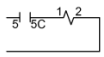
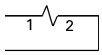
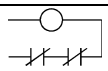
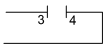
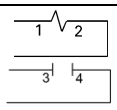
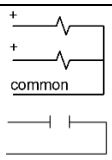
| | | |
|---|---|---|
| 10<br>1 | Aux Switch (NO contact)<br>Aux Switch |  |
| 2<br>11 | Aux Switch<br>Aux Switch (NC contact) |  |
| 13<br>12 | Flux Shifter<br>Flux Shifter Common |  |
| 5<br>7 | Shunt Trip<br>Shunt Trip Common |  |
| 9<br>18 | Close Circuit<br>Close Circuit Common |  |
| 8<br>17 | Closing Spring Charging Motor<br>Closing Spring Charging Motor Common |  |
| 3<br>4 | Remote Charge Indicator<br>Remote Charge Indicator |  |
| *14<br>* 6<br>16<br>19 | Bell Alarm Trip<br>Bell Alarm Trip Common<br>Bell Alarm Status<br>Bell Alarm Status Common |  |
| 15<br>20<br>21<br>16<br>19 | Network Interlock Set<br>Network Interlock Reset<br>Network Interlock Set/Reset Common<br>Network Interlock Status<br>Network Interlock Status Common |  |
| 28<br>29<br>30<br>31<br>32<br>33<br>34<br>35<br>36 | L<br>N 120 VAC To Power Supply From UPS A<br>L<br>N 120 VAC To Power Supply From UPS B<br>Spare<br>Spare<br>Spare<br>Spare<br>Spare | |

Table 8: Secondary disconnect terminals with standard and optional connections

* Doesn't get any input. Trip unit has built in bell alarm.

**Table 9 : Retrofill – Secondary Disconnects Example Wiring diagram**

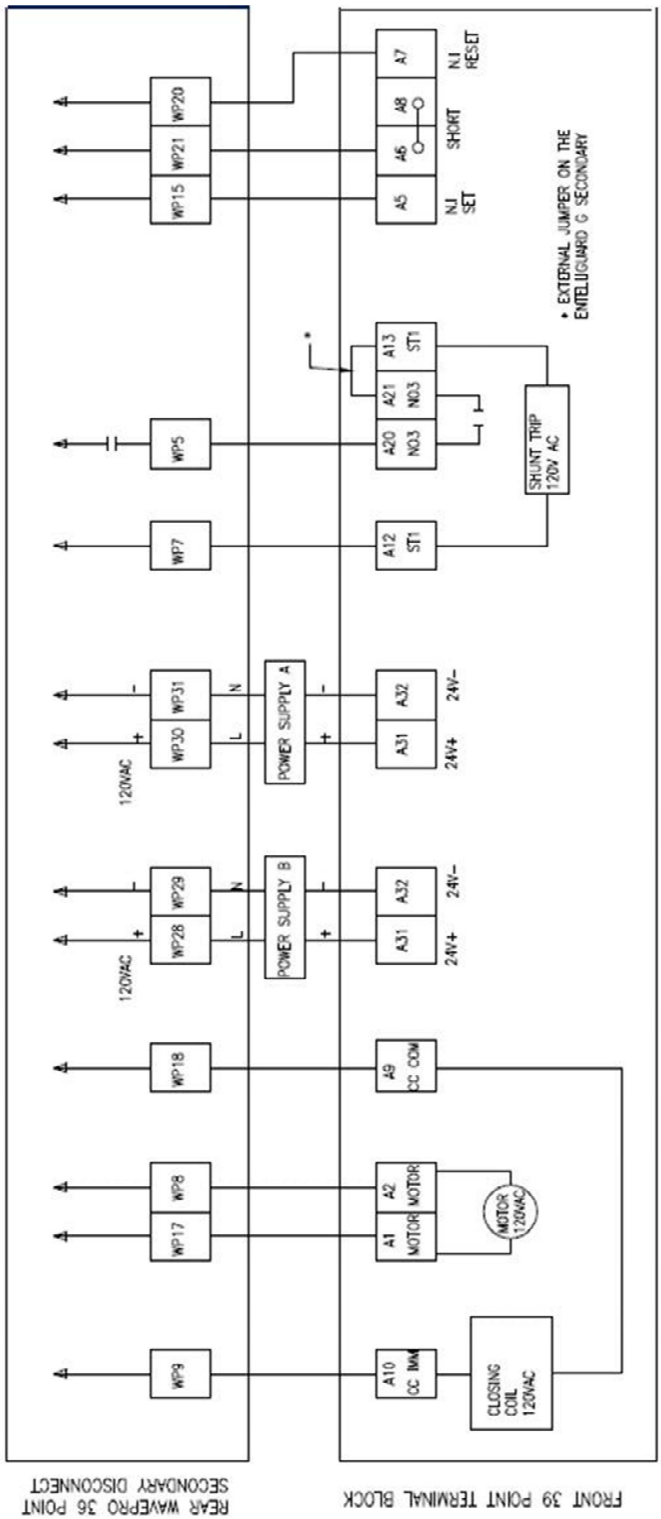
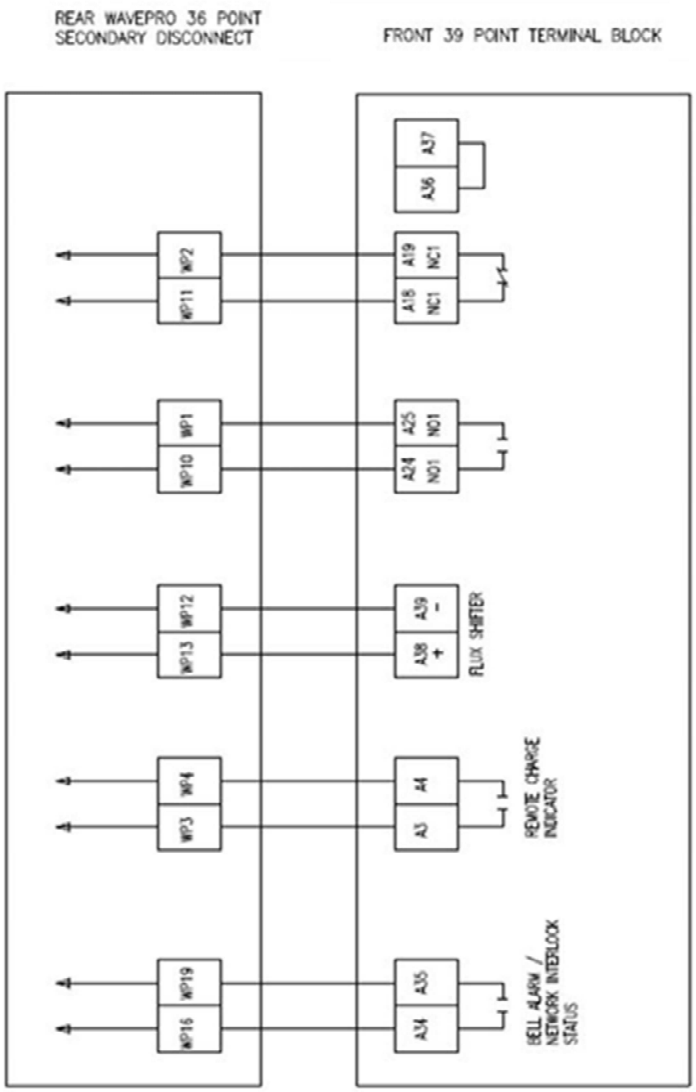


Table 9...Wiring Diagram Continued




**NOTE:**

A37 and A36 are repurposed and different than all other EntelliGuard R breakers. A37 to A36 must be jumpered on breaker side. A37 tells the messenger the Sec Dis'c are connected and A36 is a system Common

**Retrofill Secondary disconnect wiring diagram for Entellisys Breaker**

**Note: "Rear WavePro 36 Point Secondary Disconnect" wiring applies only to the original iron frame EntelliGuard breakers and EntelliGuard R Retrofill breakers used in Entellisys 3.0, 4.0 & 4.5 switchgear. This is a WavePro style/Power Break II style 36 point disconnect with circuits labeled WP1 thru WP31. This wiring does NOT apply to WavePro breakers used in AKD-10 or OEM switchgear.**

| NOTICE | WIRING<br>• Do not pinch/damage the wires while installing the secondary disconnect blocks. |
|---|---|

***Entellisys—Primary Disconnects (Contacts) or "Fingers"***

The *Finger Clusters Accessory Manual DEH-41533* covers the primary disconnects or fingers.

The primary disconnects are flexible connections between the breaker line and load terminals and between the equipment line and load terminals. All primary disconnect fingers are factory-installed and are assembled on EntelliGuard R Retrofill circuit breakers. Use this instruction sheet if damaged fingers need to be replaced. It takes about 5 minutes to install a finger cluster, defined as a double pair of fingers on a breaker.

*Figure 17* shows finger clusters or primary disconnects on a Retrofill circuit breaker. *Figure 18* details the finger-cluster assembly.

**Figure 17. Circuit Breaker Removed, Featuring Primary Disconnects "Fingers" (Contacts)**

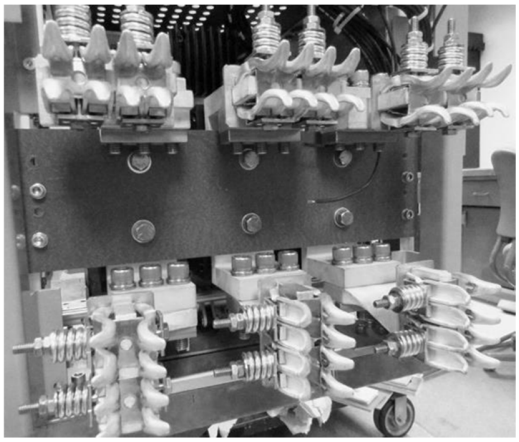
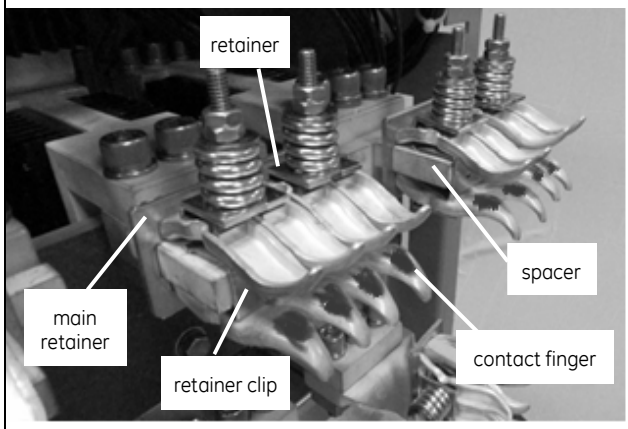


**Figure 18. Circuit Breaker, Finger Details**



## Remove and Replace

The primary disconnect assembly is factory-adjusted with a gage to apply a 95 ± 10 lb. force to a 1/2-inch thick copper bar, inserted between the upper and lower fingers. Set this force range, in the field, by tightening the nuts to set the spring dimension shown in *Figure 19*. Note that this dimension is measured between the top of the retainer and the underside of the washer. Also note that no bar is inserted between the fingers when setting this dimension. *Figure 20* shows the cluster components.

**Figure 19. Adjustment**

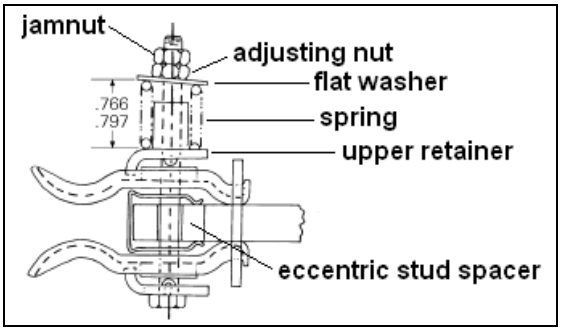
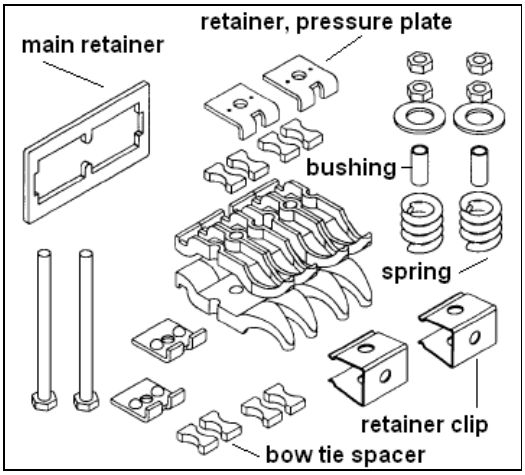



**Figure 20. Components**

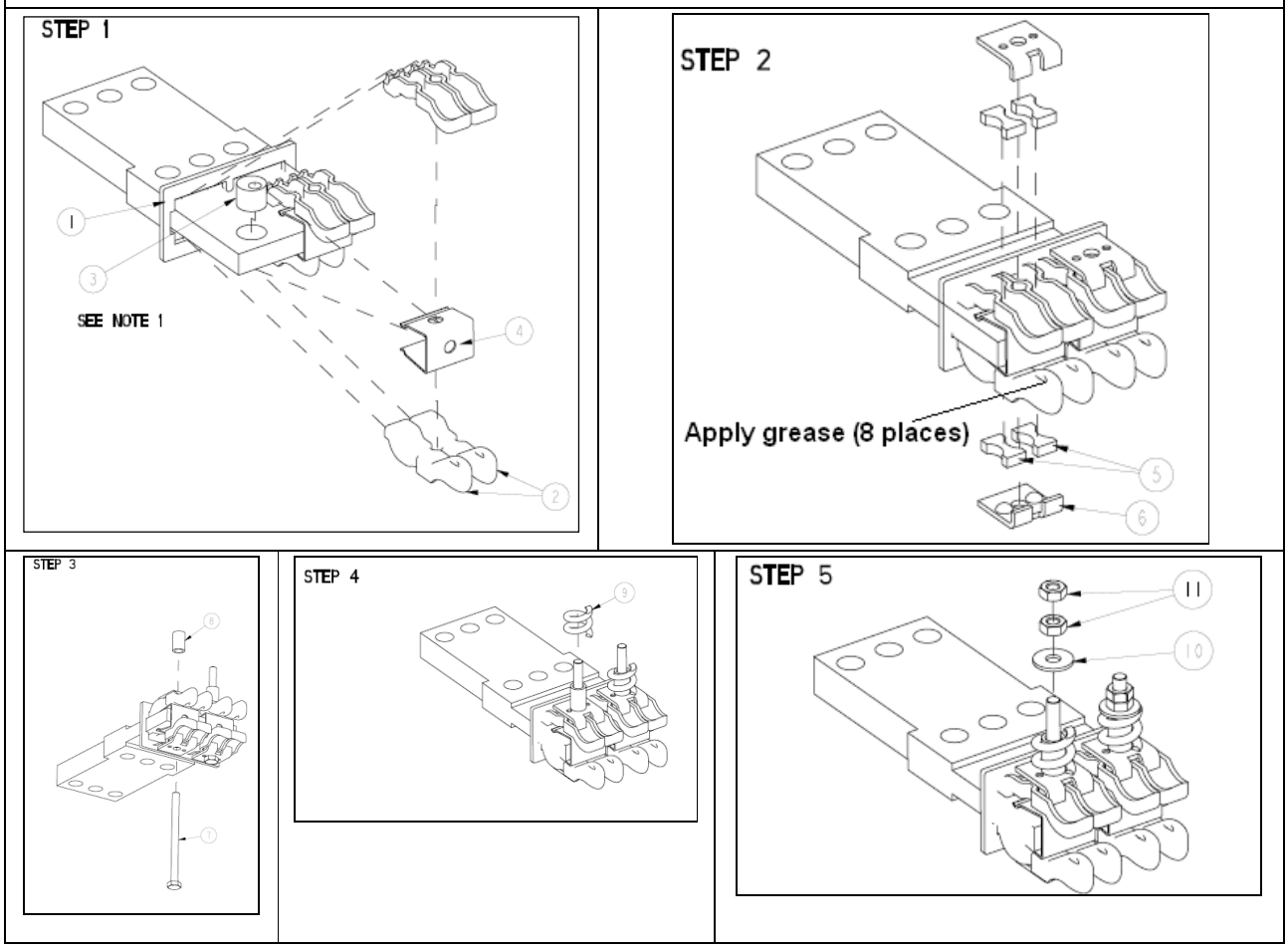



1. Using proper safety procedures and wearing required Personal Protective Equipment (PPE), remove breaker from compartment, and place it on a solid work surface in a well-lit location.
2. To uninstall the primary disconnects, remove the two nuts from one of the long bolts holding the primary disconnect assembly together.
3. Carefully slide out the bolt while removing the flat washer, spring, bushing, upper retainer, bow-tie spacers, lower retainer, and fingers from the bottom of the assembly.
4. Do the same for the other assembly bolt and components.
5. Slide off the retainer clips.
6. Take off the main retainer from the stud.
7. Slide the main retainer over the stud.
8. Install eccentric spacer and position spring clips on the stud.
9. Set a pair of bow-tie spacers into a pair of fingers, place a pressure plate retainer over the spacers to hold them in position, and then turn the subassembly over. Hook them into the main retainer.
10. Slide a long bolt through the hole in the retainer, between the finger, and then through the clip and eccentric stud spacer.
11. Hold the bottom finger subassembly in place.
12. Place two fingers around the bolt from the top, hooking the fingers into the main retainer. Then place a bow-tie spacer in each finger and hold them in position with a pressure plate retainer.
13. Place a spring, bushing, and flat washer over the bolt, then secure with the two nuts.
14. Repeat Steps 7 through 13 for each set of fingers.

15. Adjust the nut to get a spacing of 0.766—0.797 inch between the top of the upper retainer and the bottom of the flat washer.
16. Tighten the jam nut to lock in the adjustment.
17. Clean finger assemblies, if necessary, with a clean, lint-free rag and isopropyl alcohol or acetone.
18. Be sure to apply a thin film of Mobilgrease 28 (D50HD38) to the contact areas which slide onto the switchgear stabs (See *Figure 21*, Step 2). This product is available in a 1-oz tube, GE Part #193A1751P1.

*Figure 21* summarizes the steps for working with the primary contacts.

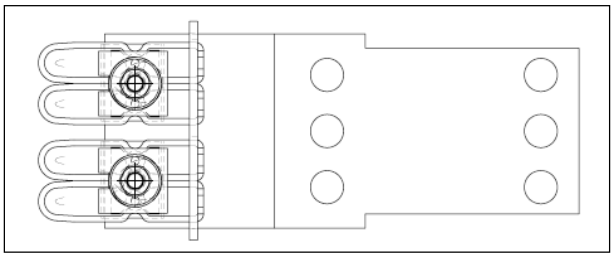
**Figure 21. Steps in Exploded Views**

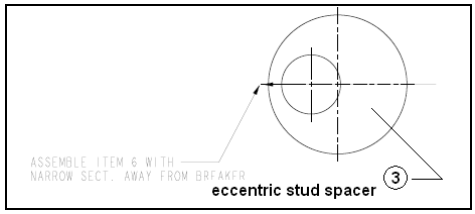


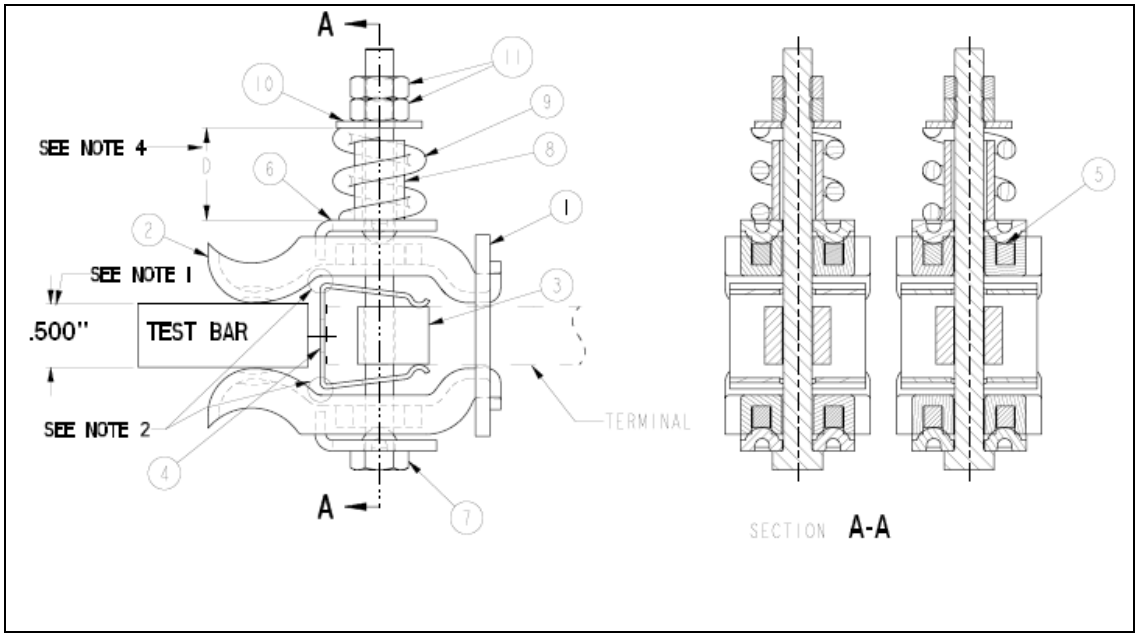
## Mechanical Views

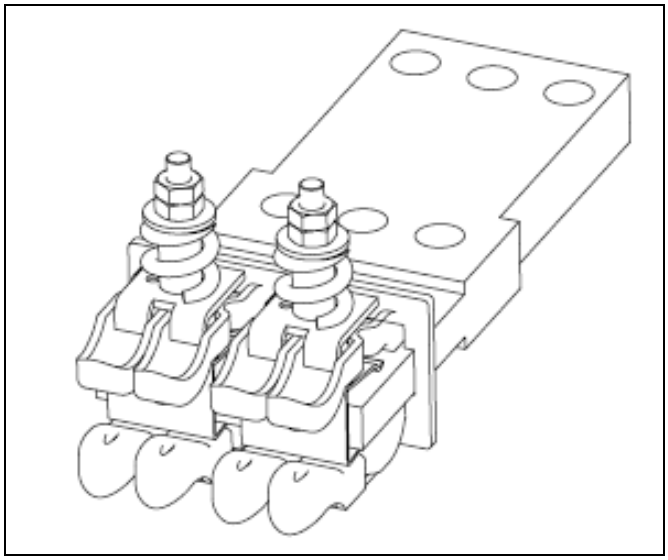
*Figure 22* provides further details.

**Figure 22. Fingers or Clusters, Mechanical View, and Notes**





## Remove and Replace- REGS-32/REGH-32/REGX-32/REGS-40/ REGX-40/REGS-50/REGX-50

The primary disconnect assembly is factory-adjusted to apply a 95 ± 10 lb. force to a 1/2-inch thick copper bar, inserted between the upper and lower fingers. Set this force range, in the field, by tightening the nuts to set the spring dimension shown in *Figure 23A/23B*. Note that this dimension is measured between the top of the retainer and the underside of the washer. Also note that no bar is inserted between the fingers when setting this dimension. *Figure 24A* /24B shows the cluster components.

**Figure 23A. Adjustment-3200A (Double Spring)**

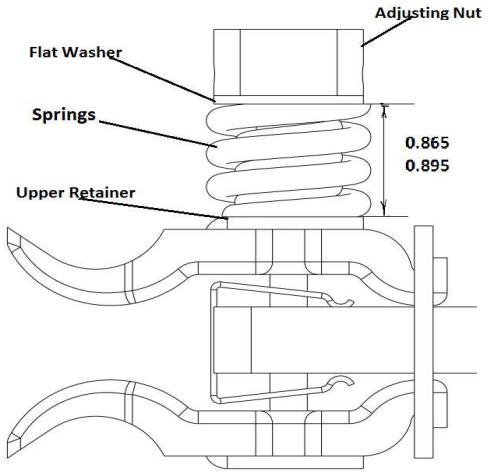



**Figure 24A. Components-3200A**

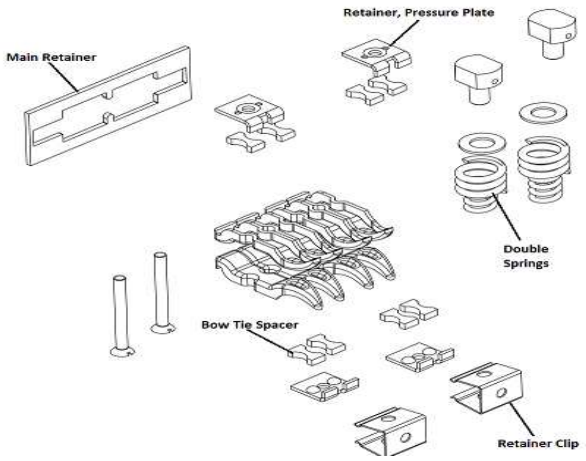



**Figure 23B. Adjustment-4000A/5000A**

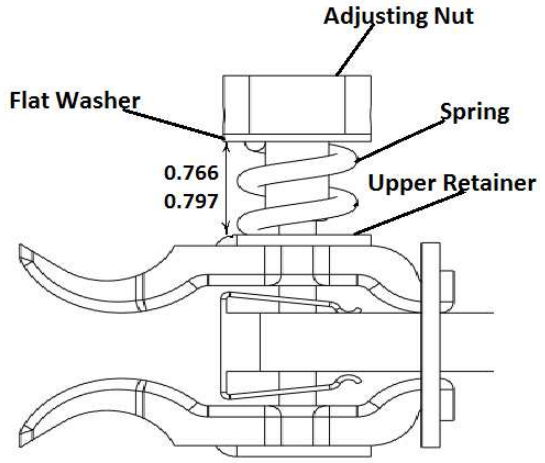
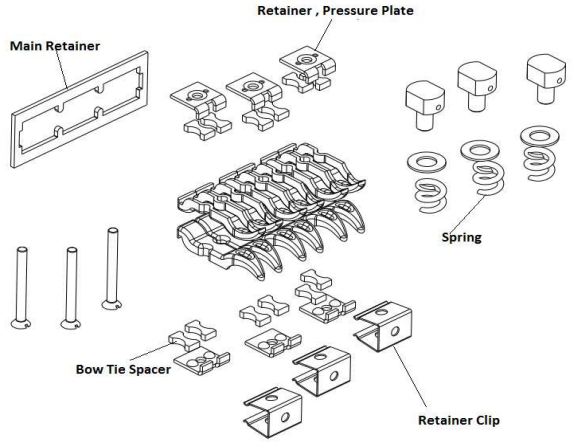



**Figure 24B. Components-4000A/5000A**




1. Using proper safety procedures and wearing required Personal Protective Equipment (PPE), remove breaker from compartment, and place it on a solid work surface in a well-lit location.
2. To uninstall the primary disconnects, remove the Adjusting nut from one of the long bolts holding the primary disconnect assembly together.
3. Carefully slide out the bolt while removing the flat washer, spring, upper retainer, bow-tie spacers, lower retainer, and fingers from the bottom of the assembly.
4. Do the same for the other assembly bolt and components.

5. Slide off the retainer clips.
6. Take off the main retainer from the stud.
7. Slide the main retainer over the stud.
8. Set a pair of bow-tie spacers into a pair of fingers, place a pressure plate retainer over the spacers to hold them in position, and then turn the subassembly over. Hook them into the main retainer.
9. Slide a long bolt through the hole in the retainer, between the finger, and then through the clip and stud spacer.
10. Hold the bottom finger subassembly in place.
11. Place two fingers around the bolt from the top, hooking the fingers into the main retainer. Then place a bow-tie spacer in each finger and hold them in position with a pressure plate retainer.
12. Place a spring, bushing, and flat washer over the bolt, then secure with the Adjusting nut.
13. Repeat Steps 7 through 13 for each set of fingers.
14. Adjust the nut to get a spacing of **0.865-0.895** inch for REGS-32/REGH-32/REGX-32 with Double springs and **0.766—0.797** inch for REGS-40/ REGX-40/REGS-50/REGX-50 between the top of the upper retainer and the bottom of the flat washer.
15. Clean finger assemblies, if necessary, with a clean, lint-free rag and isopropyl alcohol or acetone.
16. Be sure to apply a thin film of Mobilgrease 28 (D50HD38) to the contact areas which slide onto the switchgear stabs (See *Figure 23/24*, Step 2). This product is available in a 1-oz tube, GE Part #193A1751P1.
17. *Figure 25 (*REGS-32/REGH-32/REGX-32*) and figure 26 (*REGS-40/ REGX-40/REGS-50/REGX-50*)* summarizes the steps for working with the primary contacts.

**Figure 25. Steps in Exploded Views (REGS-32/REGH-32/REGX-32)**

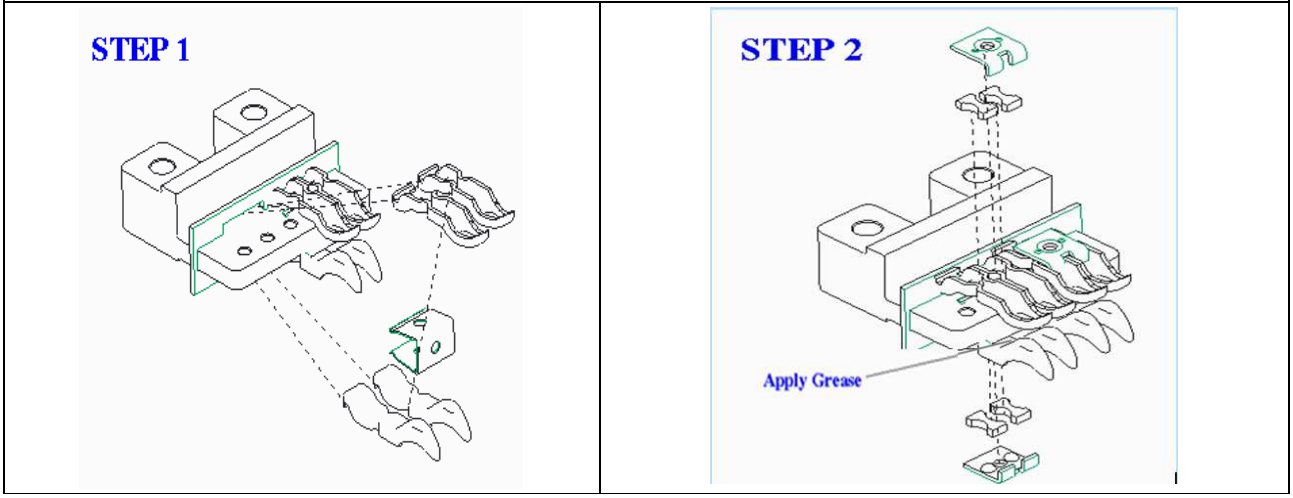


Figure 25. Steps in Exploded Views (REGS-32/REGH-32/REGX-32)

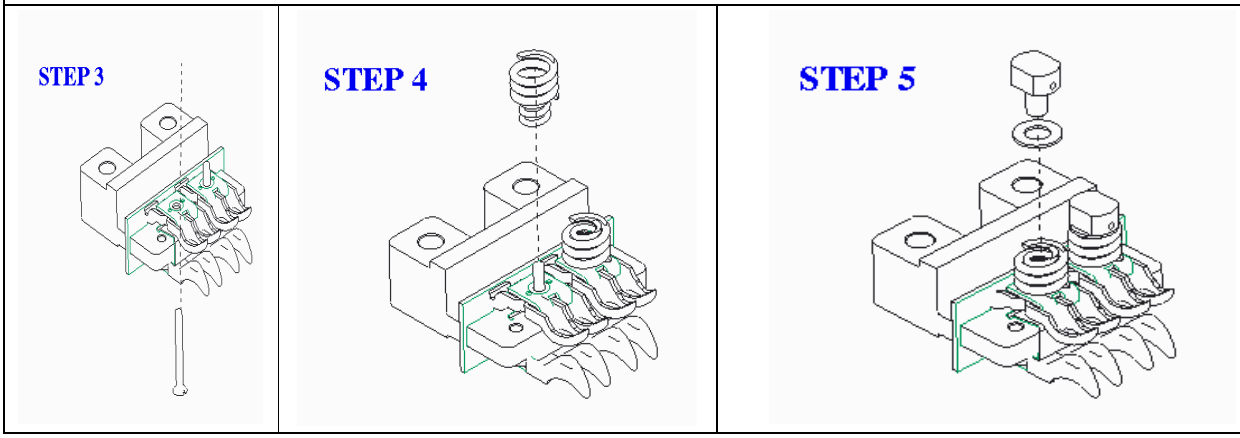
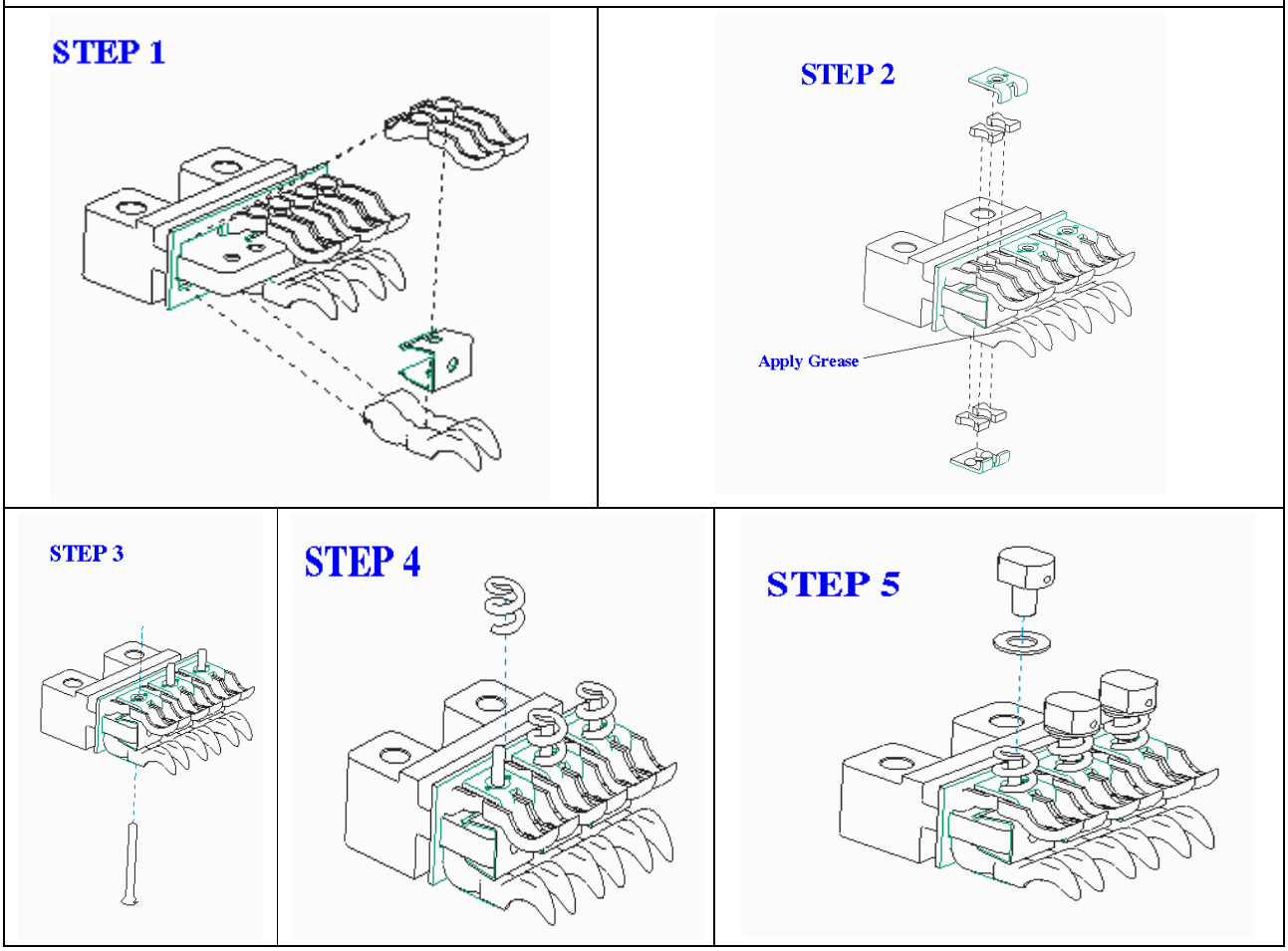


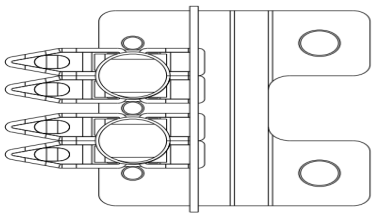
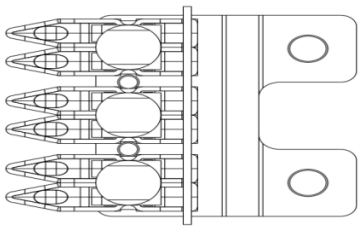
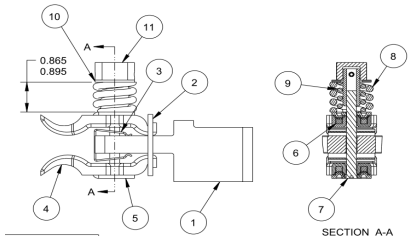
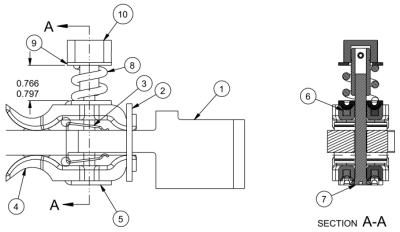
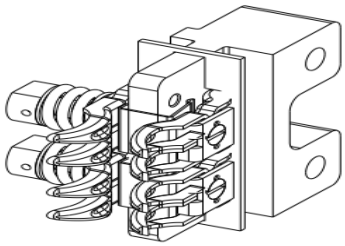
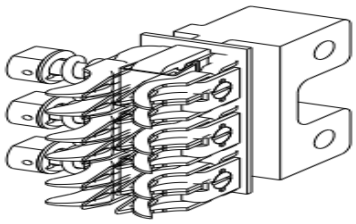

Figure 26. Steps in Exploded Views ( REGS-40/ REGX-40/REGS-50/REGX-50 )



## Mechanical Views

*Figure 27* provides further details.

**Figure 27. Fingers or Clusters, Mechanical View, and Notes**

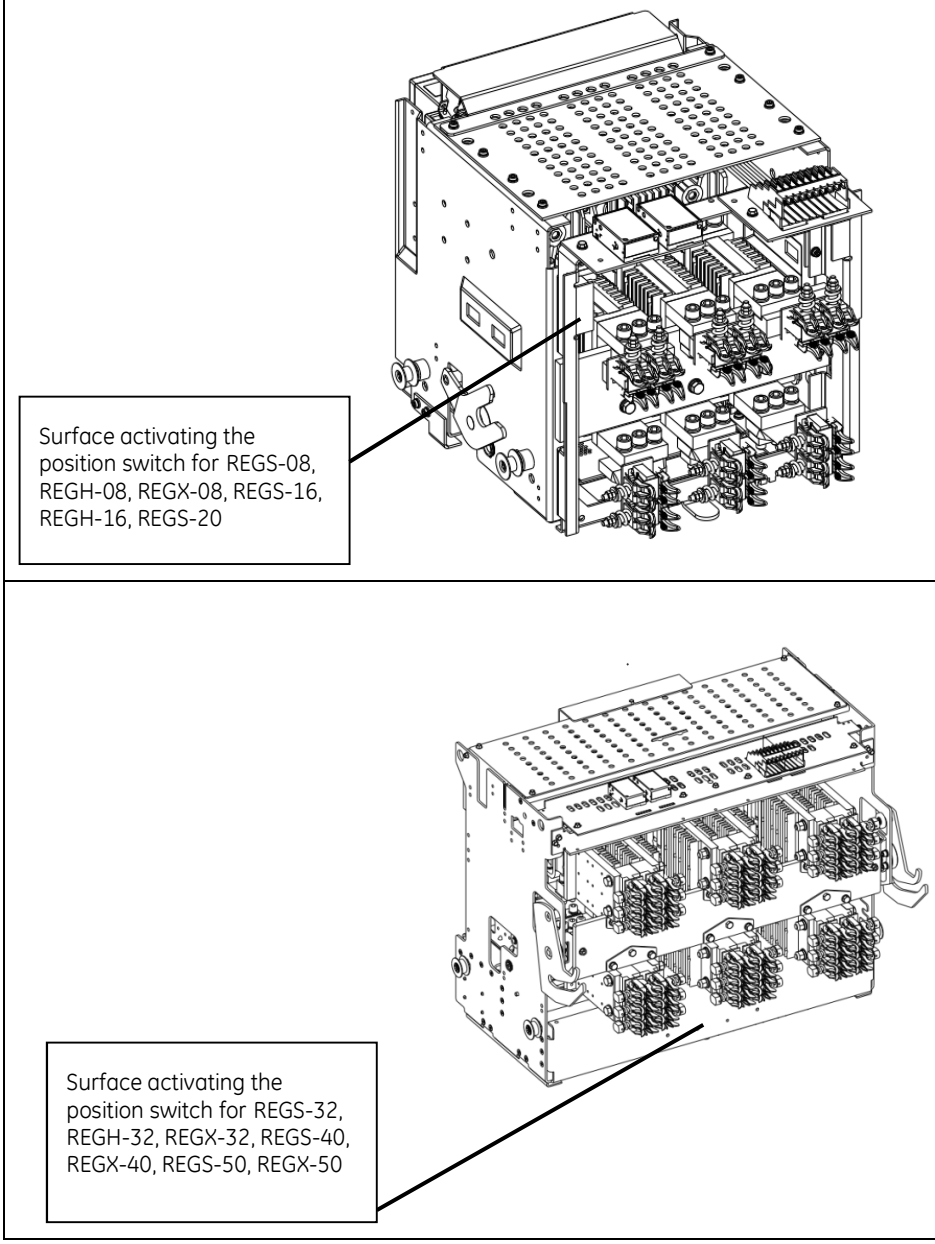
| REGS-32/REGH-32/REGX-32 | REGS-40/ REGX-40/REGS-50/REGX-50 |
|---|---|
|  |  |
|  |  |
|  |  |

### *Entellisys—Position Switch Actuator*

Position switch actuator comes pre-installed on all versions of Retrofill EntelliGuard ACB. Hence, no installation is required. Retrofills provide the same electrical indication scheme as the original EntelliGuard breaker.

- A customer can choose to install a position switch if it's not already installed, although this is infrequent, or if the existing assembly is damaged.
- *Figure 28* shows the surface on the Retrofill which activates the position switch.

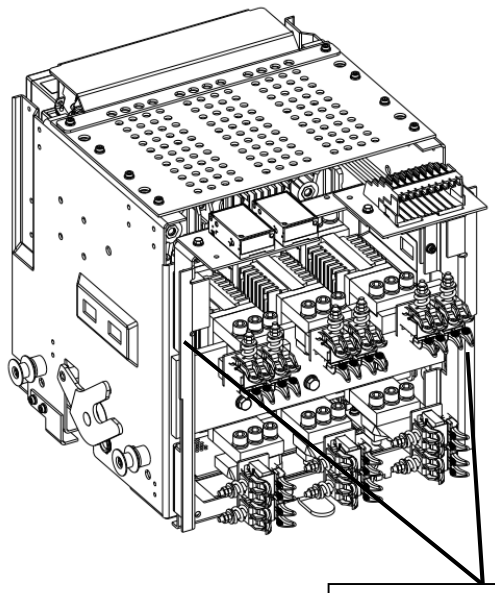
**Figure 28. Entellisys Retrofill Breaker Surfaces Activate Position Switch.**



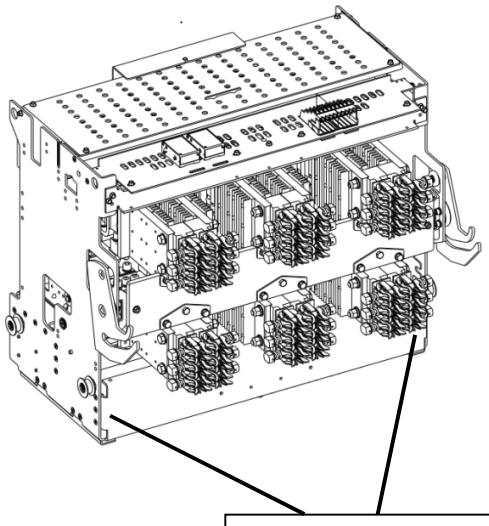
### *Entellisys—Shutter Actuation*

Entellisys switchgear may have shutter assemblies for protection of the live bus bars. EntelliGuard R breakers come with shutter actuators which operate the opening arms of the shutter as shown in *figure 29*.

**Figure 29. Entellisys Retrofill—Breaker Surfaces Activate Shutter.**



Surfaces activating the shutters for REGS-08, REGH-08, REGX-08, REGS-16, REGH-16, REGS-20



Surface activating the shutters for REGS-32, REGH-32, REGX-32, REGS-40, REGX-40, REGS-50, REGX-50

## Door Interlock System



- **It must be ensured that the supply power to the compartment is turned off/ compartment is de-energized for all the incoming and outgoing circuits of the LVS prior to any work being conducted on it.**
- **During the installation and related work on the equipment, it must be ensured that the operator is using the prescribed PPE for the specified tasks.**

- **Ensure only qualified personnel install, operate, service, and maintain all electrical equipment.**

Details regarding installation of the door interlock system are shown below in *Figure 30*.

**Figure 30.Entellisys—Door Interlocking Components**

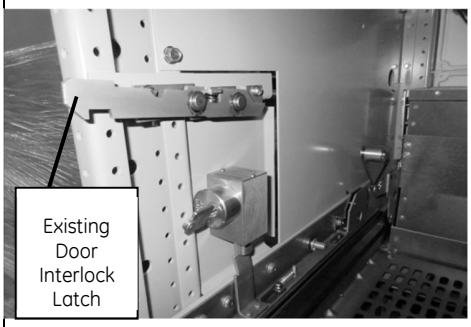
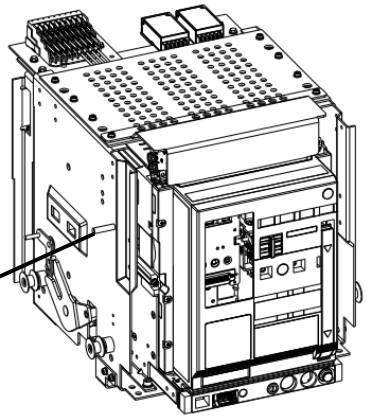
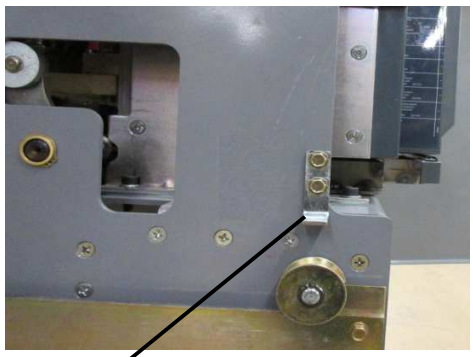



Figure to the left shows the components that make up the Entellisys retrofill door interlocking system


Figure to the right shows the Door Interlock Actuator mounted on REGS-08/REGH-08/REGX-08/REGS-16/REGH-16/REGS-20 breaker



Door Interlock Pin



Door Interlock Bracket REGS-32, REGH-32, REGX-32, REGS-40, REGX-40, REGS-50, REGX-50

***Entellisys—Key Interlock***

The EntelliGuard RE retrofill circuit breakers provided as replacements for 800-5000A EntelliGuard iron frame circuit breakers have a trip interlock feature which will function using the Entellisys compartment mounted Key Interlock. A label is provided with full instructions on how to operate the Legacy Key Interlock. It is suggested to apply the label on the inside of the compartment door. Following is a brief summary of how the Key Interlock system is operated.

To activate the key interlock:

1. OPEN the breaker.
2. Rotate the screw on the lower front panel of the breaker which normally allows access to the racking screw. This will hold the breaker trip free.
3. While the screw is held rotated Clockwise, the Key Interlock slide in the switchgear is pushed inward, elevating a pin on the left side of the breaker.
4. Turn the key to the key removal position, extending the bolt and locking the breaker in the OPEN position.

## Modify Entellisys—Switchgear Compartment

***Cut Power to Entellisys—Switchgear***



- **It must be ensured that the supply power to the compartment is turned off/ compartment is de-energized for all the incoming and outgoing circuits of the LVS prior to any work being conducted on it.**
- **During the installation and related work on the equipment, it must be ensured that the operator is using the prescribed PPE for the specified tasks.**
- **Ensure only qualified personnel install, operate, service, and maintain all electrical equipment.**

1. Before modifying the switchgear compartment, de-energize/switch off the breaker. If the circuit breaker is ON and the springs are charged, to turn it off, press the OPEN button on the circuit breaker fascia, and ensure that the circuit breaker contacts are open.

***Rack Out Entellisys—Legacy/Existing CB***

1. To rack-out legacy (old or original) breaker from compartment, refer to your legacy-breaker's manual on how to remove the existing breaker.

***Check, Clean, Grease Entellisys—Compartment***

1. Inspect the compartment for damage or rework.
2. Check the cabinet for suitability of the EntelliGuard R Retrofill breaker.
3. Check each breaker compartment for bolted joints in the primary disconnect bars. Where such joints exist, check the bolts for tightness.

4. Inside the compartment, check the contact areas on each primary disconnect bar or cluster of fingers for foreign matter that may have accumulated. Clean those areas if necessary with a clean, lint-free rag and isopropyl alcohol or acetone.
5. Be sure to apply a thin film of red Mobilgrease 28 to the primary disconnect contact areas for better electrical connections inside the compartment. This is available in 1 oz. tubes, GE part # 193A1751P1.

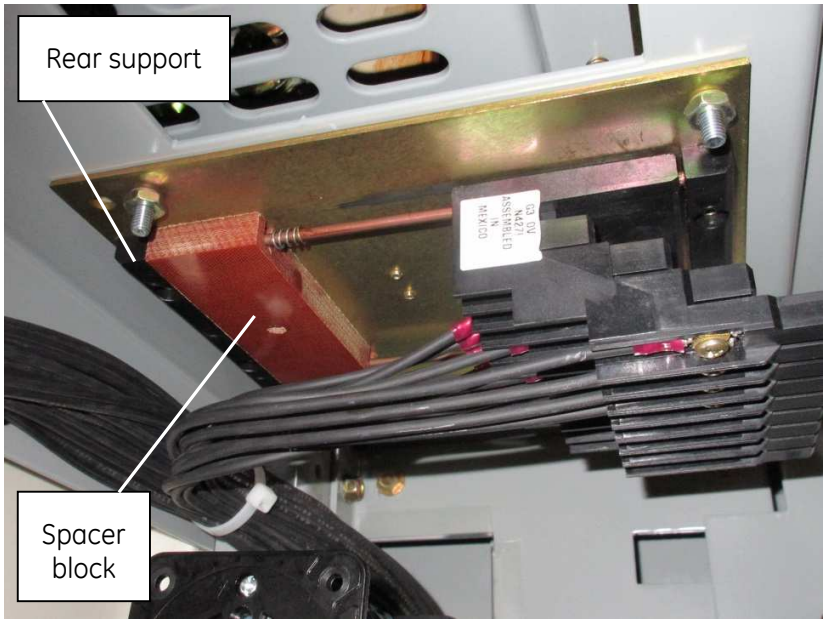
***Install Secondary Disconnect Spacer Block (800-2000A only)***

Install the spacer block Part No: 10113807P1 provided as shown in *Figure 31*, below. Remove the protective tape on the block and stick it on the secondary disconnect mounting plate as shown in *Figure 31*. Be sure the spring is moved to the front of the spacer block.

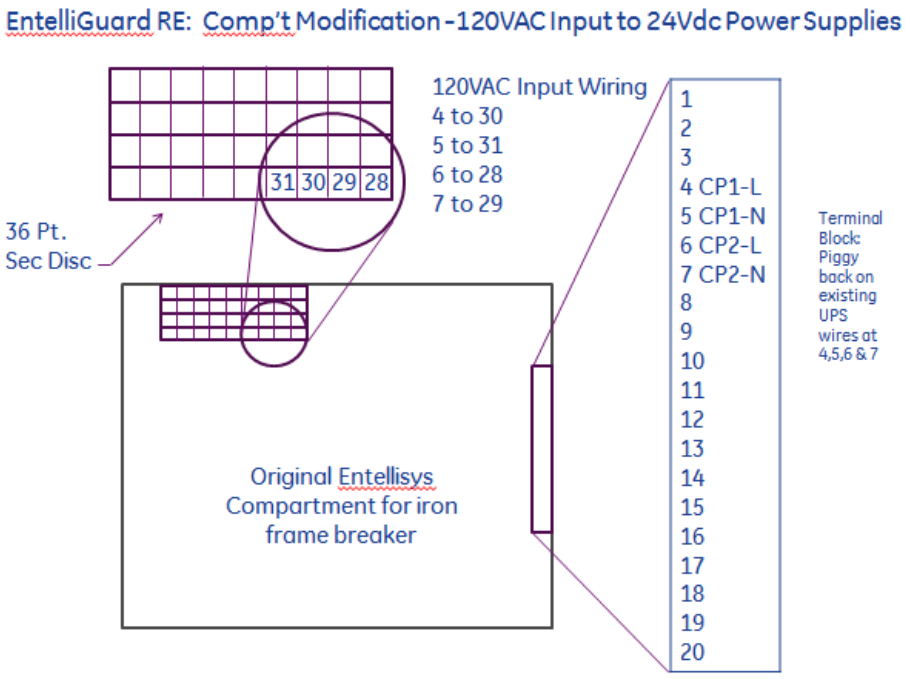
**Optional**: The hole in the spacer block can be used to add a 10-32 screw. Drill a 0.177"(4.5mm) hole in the steel plate above and install 10-32 taptite thread forming screw ( GE part: N722P16012B6)

**Note**: Use a #16 Std or 4.5mm metric drill bit Use 5/16" hex to install screw to 45-50 in-lbs Torque.

**Figure 31. AKD-10 Secondary Disconnect Spacer Block**



***Compartment modification – 120VAC input to 24Vdc Power Supplies***



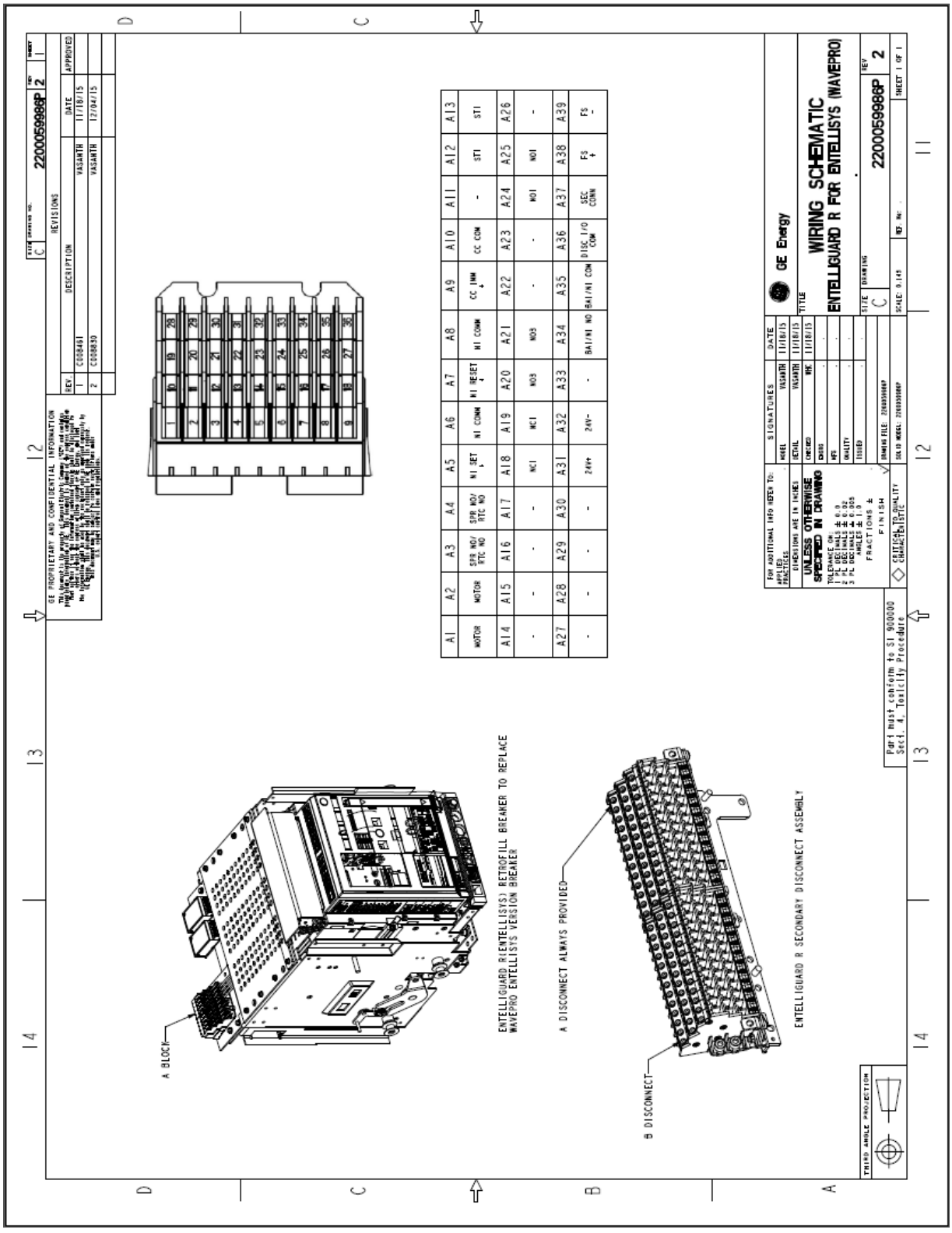

- Entellisys switchgear always consists of two UPS. They are named as UPS A and UPS B. Two leads with 120VAC are brought in from UPS A to CP1 –L and CP1 –N at terminal point 4 & 5 on a 20 point terminal block mounted on the right side of the compartment as shown, Similarly two leads with 120VAC are brought in from UPS B to CP2 –L and CP2 – N at terminal points 6 & 7.

- Wire Terminal 4 & 5 to Point 30 & 31 of 36 point secondary disconnect assembly in the compartment as shown with a 16AWG wire. Similarly wire Terminal 6 & 7 to Point 28 & 29 of 36 point secondary disconnect assembly in the compartment as shown. See wiring diagram shown. This will provide 120V AC supply to two 24Vdc Power supplies mounted on the breaker. After wiring, Rack the breaker in and check whether the trip unit display lights up. If not, recheck the wiring.

**Note:** When testing for voltage with a meter, probe the screw terminals. Never push probe into the female contacts inside the secondary disconnect or they will be permanently distorted and will not make proper contact with the male terminal on the breaker's 36 point secondary disconnect block.

***Install New Door***

1. To remove existing compartment door(s), refer to your manual on how to remove the legacy doors.
2. To install the new door, refer to the *Retrofill Doors Assemblies for AKD-5, AKD-6, AKD-8 & AKD-10, DEH-41563*. Use AKD-10 door. AKD-10 door is same as Entellisys door.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ENTELLIGUARD R FOR ENTELLISYS (WAVEPRO)
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A BLOCK
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A DISCONNECT ALWAYS PROVIDED
B DISCONNECT
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